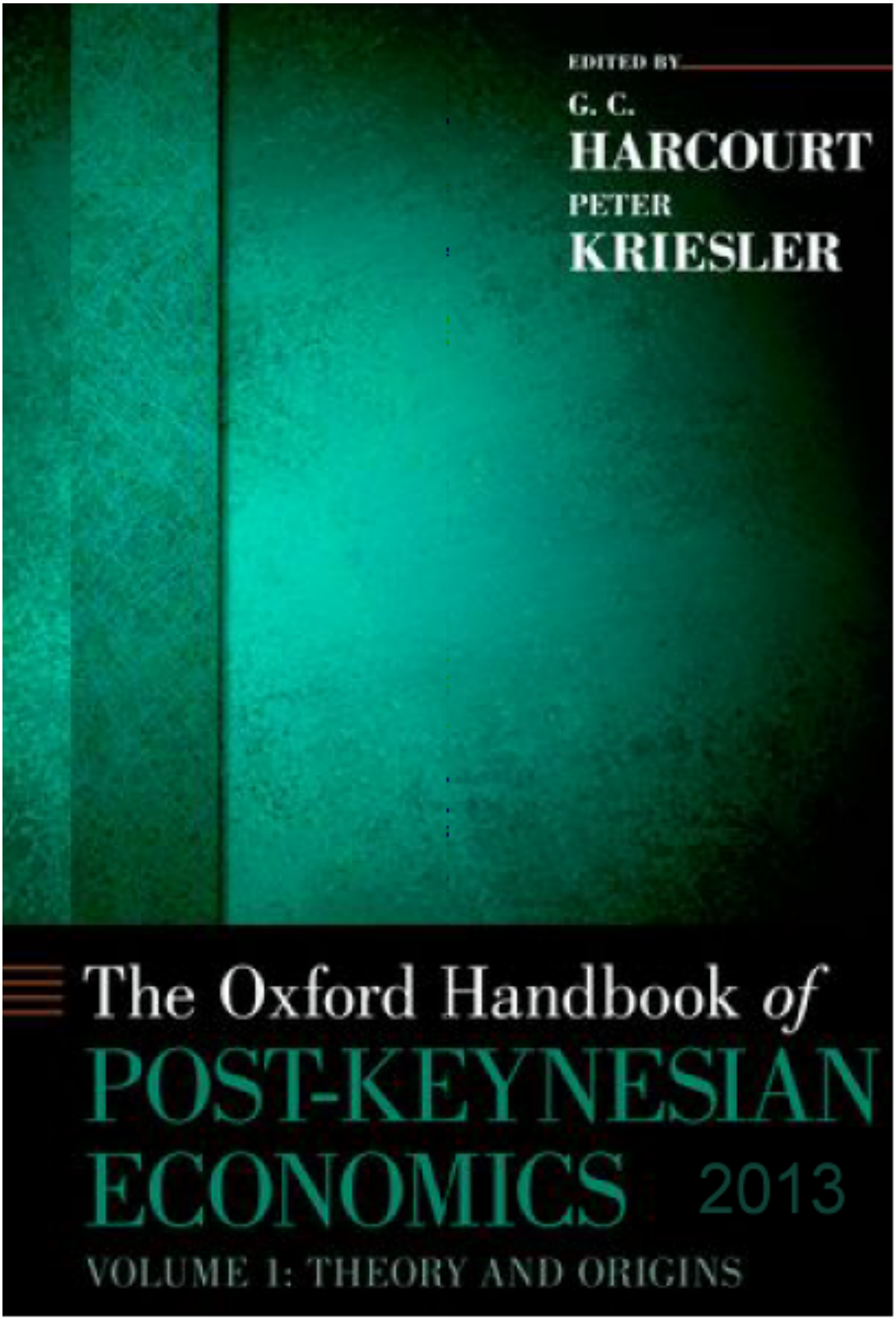
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G. C.
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PETER
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The Oxford Handbook of
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VOLUME 1: THEORY AND ORIGINS

THE OXFORD HANDBOOK OF

POST-KEYNESIAN ECONOMICS

VOLUME 1
THEORY AND ORIGINS

Edited by
G. C. HARCOURT
and
PETER KRIESLER

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Preface

The Oxford Handbook of Post-Keynesian Economics, Volume 1: Theory and Origins
Edited by G. C. Harcourt and Peter Kriesler

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Preface

THE gestation period of this two-volume *Handbook on Post-Keynesian Economics* is approaching five years. G. C. H. was asked by Michael Szenberg and Lall Ramrattan, the consulting editors of this series of handbooks with Oxford University Press, in the second half of 2007 to be a general editor of the volumes on post-Keynesian economics. He subsequently asked P. K., who was already commissioned to contribute chapters, to join him as joint editor in the first half of 2010. It was soon decided that two volumes would be needed as nominated contributors responded by saying yes. Inevitably, with such a wide-ranging project, some of those asked either declined immediately for good reasons or, also for good reasons, subsequently had to withdraw. Others gallantly came in, often well into the gestation period, to fill the gaps created. To all our contributors we offer a heartfelt thank-you.

The contributions themselves, though all are characteristic of their respective authors' distinctive styles, are ideal for a handbook: they are comprehensive and clearly, excitingly, and engagingly written, and they point the way forward to future developments. While there were times when the thought "herding cats" did cross our minds, overwhelmingly it has been a rewarding and pleasant task cooperating with our contributors, who are either old and trusted dear friends or welcome new ones.

We are much indebted for outstanding expert help with emails and typing (for the computer illiterate G. C. H.) to Janet Nurse, Jane Starnes, Grace Setiawan, and Viet Ha Ngyuen.

More than ever, G. C. H. is indebted to Joan Harcourt for her love, support, and understanding about what he has promised to be the last large project he will ever undertake.

P. K., while not prepared to make a similar promise, is, as ever, indebted to Teresa Kriesler for her love and support during this project, without which it would not have been much fun.

G. C. H. and P. K.

Preface

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April 2012

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Introduction

G. C. Harcourt and Peter Kriesler

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[–] Abstract and Keywords

This introduction discusses the main themes of post-Keynesian economics and the manner in which they are dealt with by the contributors to the *Handbook*. In particular, the important aspects of post-Keynesian analysis are identified, and their main critiques of mainstream theory are discussed. According to Joan Robinson, "*post-Keynesian* has a definite meaning; it applies to an economic theory or method of analysis which takes account of the difference between the future and the past" (1979b, 210). In other words, historical time forms the basis of post-Keynesian analysis, which also stresses the importance of history, uncertainty, society, and institutions in understanding economic phenomena.

Keywords: post-Keynesian economics, history of economic theory, economic methodology, heterodox approaches

1. Introduction

In this two-volume *Handbook* we, as joint editors, have tried to commission chapters that cover all the approaches and issues that come under the broad rubric of post-Keynesianism. As is inevitable with a project of this size, some of the potential authors we approached were unable to contribute. We hope that their absence is covered in this introduction and in the chapters of other authors.

When the term *post-Keynesianism* first emerged, perhaps the main guiding principle that gathered together a heterogeneous group of economists was dissatisfaction with the approach and content of mainstream economics, itself contained under the broad and still spreading rubric of neoclassical economics. Some economists who expressed dissatisfaction did so because they considered that they were continuing the mainstream itself, a mainstream derived from the classical political economists; Marx; Keynes and his "pupils"; Michał Kalecki, an increasingly important figure in post-Keynesian approaches and contributions; and the original institutionalists, especially Thorsten Veblen.[1] Marshall was also important historically, especially for his views on method and his attempts to deal with time, but, increasingly for some people, also as a whipping boy.

In its first heyday great hopes were held for post-Keynesianism as an—no, *the*—alternative to the mainstream. This was the underlying theme of the first major survey article on the topic, written by two second-generation pioneers, the late Al Eichner and Jan Kregel in the 1975 *Journal of Economic Literature*. It was subtitled "a new paradigm in economics" and was positively confident in tone.

By 1979, when the American Economic Association had its first (and only) session devoted to post-Keynesian themes, doubts in the profession at large had already begun to set in. For example, Lorie Tarshis's paper (1980) was subtitled "A Promise That Bounced?" When John King published his *History of Post Keynesian Economics* in 2002, pessimism rather than optimism had become more widespread, though King himself (p. 2) continued his own work undaunted and prolifically, to which his two fine chapters in the *Handbook*, one on wages policy, the

other on a major and increasingly influential pioneer, the late Hy Minsky, bear convincing witness. When one of the editors (G. C. H.) concluded his account of the structure of post-Keynesian economics and the core contributions of the mainly Cambridge pioneers (Harcourt 2006), he remained intellectually but not practically optimistic. He saw the contributions of Richard Goodwin and Kalecki to cyclical growth theory, and Nicholas Kaldor's later writings, in which, inspired by Adam Smith, Thorsten Veblen, and Allyn Young, he emphasized the relevance of cumulative causation processes (as characterizing the workings of major markets and indeed whole systems) as *the* way to go forward (Gunnar Myrdal independently had made the same emphasis).

Although these important pioneers of post-Keynesian economics are not with us to contribute to the *Handbook*, fortunately, we have a chapters by their followers, such as Mark Setterfield, who has followed in Kaldor's footsteps and who has also been inspired by the writings of the late John Cornwall (himself in turn much influenced by Kaldor).[2]

We would also have liked to have had a chapter by Luigi Pasinetti, the senior living heir in the Cambridge post-Keynesian tradition, but that was not possible. Happily, there are two comprehensive chapters, one by Prue Kerr and Roberto Scazzieri, the other by Mauro Baranzini and Amalia Mirante, which relate to his contributions and which serve to justify the claim that Pasinetti is probably the last of the great system builders in the profession.

We should also note that we have a long chapter by Heinrich Bortis, whose 1997 volume, *Institutions, Behaviour and Economic Theory*, is the most convincing case so far made for the coherence of a complete system of post-Keynesian principles. Yet we must own up immediately that, as with Joan Robinson, a founding mother of post-Keynesianism and one of our principal mentors, we are not yet convinced. We still prefer to adopt a "horses for courses" approach to issues as they come up and to agree with her that a "complete" theory to take the place of neoclassical theory "would be only just another box of tricks" (1979a, 119). Of course, we know that many of our contributors will not go along with this or even perhaps with a most succinct definition of post-Keynesian by Joan Robinson: "To me, the expression *post-Keynesian* has a definite meaning; it applies to an economic theory or method of analysis which takes account of the difference between the future and the past" (1979b, 210, emphasis in original).

But, as a broad church, we try to interact together like Malthus and Ricardo, who rarely agreed but always remained the best of friends.[3] We also wish to emphasize that Joan Robinson's influence and example permeate the themes that are discussed by the contributors to the *Handbook*.

The *Handbook* is in two volumes. The first contains essays that relate to the origins of post-Keynesian theory, the critique of mainstream theory, and the provision of alternatives. The second volume contains further critiques, discussions of methodology, the relationship of post-Keynesian economics to other heterodox approaches, and, most important, the implications of the post-Keynesian approaches for the provision of (p. 3) policies. All our contributors regard this last as the proper, central, and ultimate reason for their endeavors.

In the previous paragraphs we have tried to capture the atmosphere, opinions, and perspectives in the profession at large. These do not coincide with our views on the importance of post-Keynesianism and certainly not with many of the contributors to the volumes. A typical example is contained in the following comment by Mauro Baranzini, who believed that post-Keynesianism "was not just a reaction to mainstream economics, but the natural continuation of a grand research program started by Smith [and continuing] through Ricardo, Keynes and Sraffa. [He was] sure it would have taken place even if marginalism had not been devised or born" (email to editors, July 5, 2011).

2. Foundations

In chapter 1, volume 1, "A Personal View of the Origins of Post-Keynesian Ideas in the History of Economics," Jan Kregel has a masterly personal account of the origins of post-Keynesianism and the provision of the bases on which its later developments could be and were built.[4] Keynes is put at center stage with his complaint that those he called classical economists and those neoclassical economists whom he regarded as classicals, especially Marshall and Pigou, had neglected the role of aggregate demand and its corollary, effective demand, in their account of the workings of economies. In *The General Theory* itself aggregate and effective demand were crucial, central concepts, and Keynes integrated monetary and real elements from the start of his analysis of what he

perceptively named monetary production economies. The role of accumulation was also central insofar as it was employment-creating (its capacity-creating effects rarely figured).

Keynes also was old-fashionedly classical in insisting that labor was a crucial variable, and that key economic variables should be measured in units of labor. Though Keynes did not systematically develop the criticisms himself, he did make some astute observations on which others independently elaborated, resulting in fundamental criticisms of the use of supply and demand in the Marshallian/Pigouvian sense to explain relative prices and the distribution of income, especially in its marginal productivity form. Kregel singles out Piero Sraffa in his 1925 and 1926 articles, the introduction (1951) to the Sraffa with Dobb edition of Ricardo's works and correspondence, and *Production of Commodities by Means of Commodities* (1960) as the deepest exponent of these criticisms. He links Sraffa's writings to Ricardo's and Marx's theories of value and distribution.

While Keynes was mainly concerned with the application of Marshall's short-period framework to the economy as a whole, in order to tackle the problem of sustained unemployment, Kregel notes that the key role of accumulation in Keynes's analysis led back to the much longer period of the classicals' analysis of accumulation and distribution. Subsequent generations of post-Keynesians have built on these long-period theories of accumulation, distribution, and growth, usually in the context of golden age or, sometimes, relatively tranquil growth models; see, for example, Kahn (1959), Joan Robinson (1956, 1962), (p. 4) and Kaldor and Mirrlees (1962). As we have already noted Goodwin (1967) and Kalecki ([1968] 1971)[5] departed radically from this approach by developing theories of cyclical growth. These originated in the Kalecki-Keynes short period and are extended, short period by short period, to cover long stretches of historical time. Kaldor's later models embracing cumulative causation processes and Pasinetti's theories of structural dynamics are separate and promising developments starting from the same base.[6]

Having mentioned Sraffa's contributions, we need to point out that the inclusion of them as part of the core of post-Keynesian economics is not a universal view. Both some post-Keynesians and some outside critics, the most recent of whom is Christopher Bliss (2010), see no role for Sraffa or Sraffians (neo-Ricardians) in post-Keynesian developments. This is not the view of at least one of the joint editors (G. C. H.). Both of us agree that a distinction should be made between the views and approaches of Sraffa, on the one hand, and those of his closest followers, on the other.[7] Bliss believes that Sraffa was never interested in those aspects of monetary production economies as a whole that Keynes concentrated on, hence the case for his rejection. (Bliss has forgotten Sraffa's early 1920s papers in the *Economic Journal* and *Manchester Guardian*, on the banking crisis in Italy, and his undergraduate dissertation on the causes of inflation in Italy during World War I (see Sraffa [1920] 1993; 1922a; 1922b; and [Wendy] Harcourt and Sardoni 1993). Bliss's is a very special reading of the evidence, since we know Sraffa regarded Marx as the greatest of them all and saw his own work as fitting into aspects of Marx's "vision" and system, either to clarify or correct or tackle unfinished business in an overall scheme he admired and was happy to accept. We do not think Bliss could argue that Marx was uninterested in macroeconomic problems of either the short or the long period.

However, it is important to distinguish between Sraffa's positive and his negative contributions; his magnum opus was, after all, subtitled *Prelude to a Critique of Economic Theory*. This book was important both for the foundation it laid for a critique of neoclassical theory, and for its related rehabilitation of many important classical and Marxian concepts—such as those of the surplus, of the fundamental role of distribution, and of cost-determined prices. What is less clear is the operational (and perhaps theoretical) significance of the price equations and of the general method used (Halevi and Kriesler 1991 and the chapter by Halevi, Hart, and Kriesler on the traverse in this *Handbook*).

We have therefore three chapters discussing Sraffa's role and the relationship of his views and writings to those of Keynes, and the role of Sraffa's contributions in the development of post-Keynesian economics. Heinz Kurz, who is coediting several volumes of Sraffa's papers, brings his detailed knowledge derived from careful archival work together with his powerful analytical mind to bear on these issues. Richard Arena and Stephanie Blankenburg bring similar backgrounds to their incisive discussion of their revisit "to the debates on a difficult synthesis." Ajit Sinha, who recently published a critical, scholarly study of theories of value and distribution from Adam Smith to Piero Sraffa Sinha (2010), concentrates on the concept of the center of gravitation in classical thought, ancient and modern, in a critique of the role many interpreters of Sraffa's 1960 classic have argued it plays in his book.

(p. 5) In his chapter, "Sraffa, Keynes, and Post-Keynesianism," Kurz makes the point that Keynes was more concerned with activity and employment as a whole, while Sraffa was concerned with the distribution of the product in a classical context, linking the process to the formation of prices of production as well as to shares of income between the classes of capitalist society. Keynes too developed a theory of prices in the large to replace that associated with the quantity theory of money of Marshall, Pigou, and Irving Fisher; but he was not much interested in the distribution of income except when it bore on the determination of consumption expenditure and the provision of total voluntary saving.[8] There was as well an unbridgeable gulf between Sraffa and Keynes—Sraffa would have no truck at all with subjectivity in economic theory, especially as a determinant of economic behavior and activity. Keynes, though, always remained a Marshallian in this regard and put great stress on confidence, expectations, and choice at the margin in the liquidity preference theory of the determination of the rate of interest; he certainly thought of it as a, if not the, jewel in his crown.

All this was alien to Sraffa's mode of thought; see Kurz (2010) for his careful archival work to establish Sraffa's "secret scepticism" about those parts of *The General Theory* where the margin and utility are prominent. Sraffa also did not approve of the use Keynes made of the concept of own rates of interest, which Sraffa had developed in order to make an *internal* critique of the analysis of Hayek's *Prices and Production* (1931) in his review article in the *Economic Journal* (Sraffa 1932).[9] How we might bring together their insights and develop them in a number of ways, for example, institutional settings, price formation, income distribution, theories of accumulation, are themes of this chapter and the next. One of the most crucial issues Arena and Blankenburg consider in their chapter "Sraffa, Keynes and Post-Keynesians: Suggestions for a Synthesis in the Making" is the controversy about the short period and long period and the unexplored, perhaps impassable gulf between them, a feature of mainstream theory but also a problem to be tackled in post-Keynesian approaches. Altogether we have a comprehensive account of what has been happening and where it will be most fruitful to go in the future—exactly, we submit, what handbooks should provide.

Ever since the Physiocrats and Adam Smith, political economists have wrestled with the relationship between observable market prices, underlying natural prices (prices of production, and long-period normal prices) and the tendency to establish the equality of sectoral rates of profit with the overall macroeconomic economy-wide rate of profits in competitive conditions. Central to this analysis has been the concept of a center of gravitation, itself given different detailed characteristics at different points of time and in different contexts in the development of the idea (see Harcourt [1981] 1982). Common to them all is the concept of a central attractor. Many interpreters of Sraffa's 1960 classic argued that Sraffa's use of a uniform rate of profits was intimately related to these classical concepts and processes, together with equality of both classical effectual and neoclassical demands with supplies. Part of the problem with this approach is to provide an adjustment mechanism by which prices adjusted to their long-period values, in a way that did not influence those values (see, for example, Halevi and Kriesler 1991).

(p. 6) Ian Steedman published a most challenging and influential article in 1984. He asked a searching question. First, we have a preamble to it. The only prices decision makers can know or, at least, observe directly are immediate actual prices. Crucially, both profits and capital are calculated using these prices. So, Steedman asked, how do we know, in the light of Sraffa's detailed analysis of the complex and unpredictable beforehand differences in relative long-period prices when different values of a distributive variable are considered, whether the only observations possible will signal "correct" directions for production and accumulation to take in order to converge upon (or fluctuate around) the unseen but argued to be underlying natural prices et al.? (See also Dupertuis and Sinha 2009.) The thrust of Sinha's sophisticated and careful argument in "On the Notion of Equilibrium or the Center of Gravitation in Economic Theory" is that all these conjectures and perhaps unsolvable puzzles are beside the point, as far as the logic of Sraffa's system is concerned. He argues that Sraffa's system does not serve the function of providing long-period centers of gravitation; rather its function is to "account for a given distribution of income at any point of time." Sinha backs up his argument with archival evidence as well as a new look at what is already in the public domain in Sraffa's book.

Two of the most eminent first-generation post-Keynesians in the United States are the late Sidney Weintraub and Paul Davidson, who was Weintraub's pupil. Together they founded the *Journal of Post Keynesian Economics* in 1978. They were/are passionate defenders of all things Keynesian, or, we should say, Keynes. For them *A Treatise on Money* was the Old Testament and *The General Theory* was the New. Weintraub and Davidson starred together in a modern Acts of the Apostles, with Weintraub more akin to St. Peter and Davidson, appropriately, to St. Paul, even by having an "On the Road to Damascus" experience when he was taught by Weintraub. Davidson's

chapter, “Keynesian Foundations of Post-Keynesian Economics,” is an admirable complement to Kregel’s (who in turn was Davidson’s pupil).

Davidson sets out the essence of Keynes’s insights and system, why they contribute in the appropriate way to analyze the workings of a monetary production economy operating in a situation of fundamental and inescapable uncertainty. To this task he brings his well-known analysis of why a modern economy is an open or nonergodic system so that analysis built on the basis of closed and/or ergodic foundations are inapplicable to it. He complements this narrative with his encyclopedic knowledge of key passages in *The General Theory* and other writings of Keynes, and his pedagogically illuminating set of diagrams.

One of Weintraub’s many significant contributions was to bring up to date the analysis of product and factor market structures within the framework of *The General Theory*. These insights are reflected in Davidson’s narrative. A significant emphasis by Davidson is to show how Keynes was able profoundly to put money and finance with all their characteristics, especially a store of value and a provider of liquidity, into the analysis in an illuminating manner. Needless to say, Say’s Law, the quantity theory of money, and saving’s determination of investment are the major casualties of this analysis—just the very same propositions that have made a comeback in the anti-Keynes backlash of the past (p. 7) forty years and more, associated with Milton Friedman and the Lucasians. What strange times we have lived through, to be sure!

3. Money and Finance

Randall Wray’s chapter, which is succinctly titled “Money,” is on the essential properties of money as seen by different authors through the ages and now as he sees them himself. In doing so he draws on a profound statement by a great modern monetary theorist, the late Bob Clower: “Money buys goods and goods buy money, but goods do not buy goods” (Clower 1969, 207–8). Wray allies this with two other characteristics—money is essentially a debt, and default on debt is possible. These three propositions are the bases on which he builds his arguments, taking in the role of the state, the concept and role of liquidity, the essential characteristics of banks that serve to distinguish them from other players in finance capital, and the role played in modern economies by the interplay of their real and monetary aspects.

His is a closely argued narrative that represents the coming together of great monetary theorists of the past, Keynes, Schumpeter, Hicks, Minsky, and Clower, together with those of the present, for example, Augusto Graziani and the circuit school. Complementary with Wray’s chapter is Geoffrey Ingham’s remarkable book, *The Nature of Money* (2004), which brings up to date the treatment of money in the literature of sociology and constitutes a major leap forward in monetary analysis. He agrees with Wray’s emphasis on the essential role of the state in enabling money to be a unit of account, a medium of exchange, a store of value, and a source of liquidity, all within an environment of uncertainty. (It is the failure of mainstream general equilibrium theorists to introduce uncertainty properly, or at all, into their analysis that precludes them from introducing money in a meaningful way into macroeconomic analysis. For Clower as for Hahn this meant jettisoning the idea of general equilibrium à la Walras in macroeconomics.)[10]

Taking Keynes’s writings on money as their reference point, Victoria Chick and Sheila Dow in their chapter, “Post-Keynesian Theories of Money and Credit: Conflict and (Some) Resolutions,” examine four approaches to theories of money and finance in the post-Keynesian literature. They document conflicts but also point the way toward some reconciliation. They also argue strongly and persuasively that the return to the old-fashioned view that deposits are the source of bank loans, a feature of Monetarism and its offshoots that has become part and parcel of recent textbooks, should be overturned, with the view that money is endogenous taking its place. This old-fashioned view was associated with the ideological stances of Friedman, Hayek, and Lucas on the primacy of freedom in democratic societies, and so the need for simple rules rather than discretion in policy-making, especially monetary policy.

Chick and Dow show that when the banking system as a whole, as well as the behavior of individual banks, is analyzed, ceteris paribus, endogenous money is the only logical outcome. Moreover, they also show that liquidity preference theory does not have to be (p. 8) jettisoned in the process, but only modified, contrary to the view of the more extreme proponents of endogenous money, for example, Basil Moore and even Kaldor. Their chapter complements and adds dimensions to Wray’s chapter and to Rogers’s chapter that follows.

Rogers's principal purpose in his chapter, "The Scientific Illusion of New Keynesian Monetary Theory," is to show that New Keynesian monetary theory is a scientific illusion because it rests on moneyless Walrasian general equilibrium foundations (see Hahn 1965). Walrasian general equilibrium models require a Walrasian or Arrow-Debreu auction, but this auction is a substitute for money and empties the model of all the issue of interest to regulators and central bankers. The New Keynesian model perpetuates Patinkin's "invalid classical dichotomy" and is incapable of providing any guidance on the analysis of the impact of interest rates on inflation targeting. In its cashless world, inflation targeting, inflation, and nominal interest rate rules cannot be defined in the New Keynesian model.

Giuseppe Fontana has always been a peacemaker, an optimistic and cheery soul who sees the best in everyone, even economists. This makes him the ideal person to couple with Chick and Dow's chapter, with his contribution, "Single-Period Analysis and Continuation Analysis of Endogenous Money: A Revisitation of the Debate between Horizontalists and Structuralists." He provides a synthesis that allows him to show the analytical reasons for the differences he and others perceive between the horizontalists' and the structuralists' writings as proponents of endogenous money. Basically, the answer is to be found in different assumptions about the nature of expectations held and the period of "time" for which they are held. Thus, the horizontalists tend to be one–period-only persons with expectations formed at the beginning of the period and held for its length (following J. R. Hicks in *Value and Capital* [1939]); whereas the structuralists link periods together in discrete time, allowing events to feed back as they occur and so change expectations and actions in future periods.

Fontana develops an ingenious set of diagrams into which all these strands of analysis may be fitted and that spells out the essence of both approaches. As he writes, it provides an effective framework for tackling specific institutional setups and historical episodes.

Fontana's chapter is followed by chapters highlighting the contributions of two exceptional individuals to the post-Keynesian approach to monetary theory. In "Post-Keynesian Monetary Economics, Godley-Like," Marc Lavoie writes a masterly account of the late Wynne Godley's insights, intuitions, and contributions over the last fifty years and more. These were brought to a fitting culmination in the 2007 monograph that Godley authored with Lavoie. Entitled *Monetary Economics: An Integrated Approach to Credit, Money, Income, Production and Wealth*, it is a major contribution to our understanding of financial and real interactions in modern economies. It provides a relevant framework for economists to think about and develop their own analyses of these vital aspects of the processes dominating the behavior of modern economies.

Godley was a genuinely original thinker. His method has something in common with Marshall's—the idea of long-period rest points acting as attractors and overall constraints on short-period happenings. (Stephen Marglin used the same procedure in (p. 9) his original work on conflict inflation in the 1980s; see Marglin 1984. Rowthorn 1977 preceded Marglin's article on conflict inflation.) Godley, by constructing aggregate profit-and-loss accounts, balance sheets, and flow-of-funds statements, and looking at their compositions and interrelationships, imposed inescapable constraints on the environments in which the various decision-making groups in economies had to operate.

The other exceptional individual is, of course, the late Hy Minsky, who died too soon to witness recent episodes which many have dubbed "Minsky moments." John King, in "Hyman Minsky and the Financial Instability Hypothesis," gives an absorbing account of the origins and characteristics of Minsky's approach and the nature of his instability hypothesis. The latter arose from Minsky's readings of Marx, Keynes, and latterly Kalecki. Even in 1975 in his book on Keynes he was really developing, within Keynes's framework, his own original take on the inevitable stages of the endogenous cyclical evolution of capitalist economies over time. As with Marx's modes of production, so each stage carried within it the seeds of its own destruction and the embryos of the stages to follow.

4. Distribution and Growth

We mentioned above that the most promising ways forward will be cyclical growth theory, preferably allied with cumulative causation processes. In an introduction to one of the volumes of his *Collected Economic Papers* (Kaldor 1980), Kaldor laments that he had not been able to formalize his new views from the 1970s on, on the nature of the interrelated development in the world economy, in which cumulative causation played a central role, as did market structures, the setting of prices and the nature of products. He hoped, as did his great friend at Cambridge, Piero

Sraffa, that "someone younger and better equipped for the task" (Sraffa 1960, vi) might do so. As we also mentioned above, Mark Setterfield is one such younger and better-equipped person. His chapter is entitled "Endogenous Growth: A Kaldorian Approach."[11] In it Setterfield explores Kaldor's contributions, which were inspired by Allyn Young's lectures at the London School of Economics and his 1928 *Economic Journal* paper and developed by Kaldor's grappling with the problems that Harrod's seminal work on growth threw up—the nature of the relationships between the actual rate of growth (g_a), the warranted rate of growth (g_w), and the natural rate of growth (g_n).

Setterfield's mentor, the late John Cornwall, had from his earliest writings seen the unacceptability of the assumption that g_n could be regarded as determined by factors that were independent of those determining g_w and g_a (see Harcourt and Monadjemi 1999). These interrelationships are the core of Setterfield's chapter. He discusses demand-led growth in which international trade plays a dominant role, always an emphasis of Kaldor, and how the processes result in path dependence, sometimes but not always or inevitably with an ultimate reconciliation between g_w, g_a, and g_n. Setterfield analyses many different scenarios in illuminating diagrams and with some relevant simple algebra in (p. 10) order to bring out the richness of this realistic vision of the nature of modern capitalist economies. We conjecture that Kaldor would have approved; we know Cornwall did.

As we noted, Pasinetti is the senior living heir in the Cambridge tradition and probably also the last of the great system builders in economic theory. He is a central figure in both Prue Kerr and Roberto Scazzieri's chapter, "Structural Economic Dynamics and the Cambridge Tradition", and Mauro Baranzini and Amelia Mirante's chapter, "The Cambridge Post-Keynesian School of Income and Wealth Distribution." But as Pasinetti is the first to acknowledge, not only does he derive ideas from the great political economists and Marx but also from Sraffa and Keynes and his own immediate mentors, Richard Kahn, Kaldor, Goodwin, Joan Robinson, and Richard Stone. In the Kerr and Scazzieri chapter, the relevant contributions of Goodwin and Stone are also discussed, especially the Stone-Brown growth model, which was developed after Stone ended his term as the first director of the Department of Applied Economics at Cambridge in 1955.

Over the years Pasinetti has developed his unique distinction between propositions that are independent of institutional settings and so in a sense are timeless; and propositions in which specific institutional settings and historical situations and episodes condition the analysis. The first set of propositions lie more deeply behind the second in this analysis.[12] Pasinetti's approach is akin to Marx's schemes of reproduction as Pasinetti deduces the necessary conditions that have to hold in order that full employment of labor and capital are sustained over time in situations in which both methods of production and demands for different products are allowed to change, often due to endogenous processes. Hence the principles of structural economic dynamics are his central interests, as they are too of Goodwin and Stone.

Prefacing their account of these developments is a discussion of the nature of economic theorizing, drawing on Sraffa's deep views on the links between theory and reality, and how theory, application, and policy were developed historically in Cambridge economics. As has always been a feature of the Cambridge tradition, the bearing of theoretical findings on the formation of policies, not least for the medium to long term, and the need to be aware of the law of unintended consequences due to too great a concentration on the immediate present, are features of the conclusion to their chapter.

In one sense an integral part of Pasinetti's lifetime project and, in another sense, an offshoot of it, is his famous 1962 article in *R.E. Studs* of a theory of the determination of the long-period rate of profits (r) in capitalist society. This produced the "remarkable" results that r was determined by the marginal saving rate of pure capitalists and, in effect, g_n. The analysis has been extended to take in the government and overseas sectors and the implications for the distribution of wealth between different classes over "time." The result has proved to be remarkably robust, surviving attacks from the heavy artillery of neoclassical economists, especially from Frank Hahn, James Meade (1963, 1965, 1966), and Franco Modigliani and Paul Samuelson (1966).

No one has documented this literature or made more modifications and additions to it than Mauro Baranzini. In his chapter with Amalia Mirante he modestly excludes himself from the list of pioneers, naming in particular Kaldor, Kahn, Pasinetti, and G. (p. 11) C. H. (despite his protests!) (or perhaps Baranzini confined the list to Cambridge, as Baranzini was at Oxford?) He and his coauthor evaluate the huge literature associated with the ideas under eight heads. They point out that while the debates are still continuing, this post-Keynesian school of thought has made a

safe entry into the history of economic analysis. (It to be hoped that the rest is history rather than just history.)

Edward Nell's chapter, "Reinventing Macroeconomics: What Are the Questions?", is a tour de force, providing a schema for classifying approaches to macroeconomic questions in both the short period and the long period, ancient and modern, before reaching a justifiable climax with his own innovative approach, transformational growth. This last is Nell's vision of the nature of economic and social development in capitalist economies, an agenda he has been following since the late 1960s.[13] He is motivated by Joan Robinson's challenging (a challenge yet to be met) 1977 *Journal of Economic Literature* article, "What Are the Questions?" Nell is concerned with the links that various approaches—Keynesians of all descriptions, and also others of all descriptions—have made between short periods and long periods, to the great questions and problems of economic development originally posed by the classical economists who attempted to answer by what William Baumol (1951) memorably named their "magnificent dynamics."

Nell wishes to take in the interrelated causes of employment, output, income distribution, accumulation, growth, technical change, and institutional change, as seen by the various "schools" he identifies and defines. Naturally enough, he prefers his own contributions, mainly because he tries seriously to analyze endogenous technical progress in a monetary production economy that is recognizably capitalism as Marx and then Kalecki and Keynes saw it. He discusses the various ways economic decisions are said to be made in each approach, settling on being, as Marshall was said to have been (see Shove 1942, 323), "vaguely right rather than precisely wrong," as far as individual decision making is concerned. Of course, he will be accused of *ad hockery* by the mainstream and even some strands of Keynesianism, but he makes a good case for why this does not matter if the resulting theory is illuminating and, in the Marshallian/Pigovian sense, fruit-bearing as well as light-bringing.

As we noted, cumulative causation processes have become an increasingly prominent characteristic of post-Keynesian approaches. Robert Blecker takes up this theme in his chapter, "Long-Run Growth in Open Economies: Export-Led Cumulative Causation or a Balance-of-Payments Constraint?" He identifies two major strands in the approaches of post-Keynesian authors to the analysis of the long-run development of interrelated open economies. One is especially associated with Kaldor (and developed by John Cornwall and Mark Setterfield), who stressed the importance of export-led growth leading to virtuous cumulative causation expansion. The other is associated with Anthony Thirlwall (and also Robert Dixon and John McCombie, among many others), in which in the long term, export-led growth is constrained by the necessity of keeping the current account balanced (or, alternatively, keeping net capital inflows at a sustainable level), while more rapid growth of output tends to boost the demand for imports. The latter view puts special stress on the role of the income elasticities of export and import demand as constraining factors, while the former puts more emphasis on positive **(p. 12)** feedbacks from demand growth to productivity growth that help successful exporting countries to reinforce their international competitiveness.

It is interesting, perhaps even ironic, that Thirlwall is Kaldor's biographer and a great admirer of Kaldor's contributions, yet on this issue they seem to be at odds, as Blecker carefully explains.[14] Thankfully, he is able to provide at least some reconciliation between the two views so that the insights of both sides of the arguments may be retained. In doing so he has wise things to say about how equilibrium positions may have roles to play as medium-term attractors even when embedded in cumulative causation processes. He also brings out clearly the relevance of the fallacy of composition for a world in which all governments attempt to implement policies of export-led growth. As with most important propositions in economics, this seems obvious once someone else has pointed it out!

No one is more aware of the histories of the ways forward we have noted, or has made greater technical contributions to them, than Kumaraswamy (Vela) Velupillai. His chapter is appropriately entitled "Post-Keynesian Precepts for Nonlinear, Endogenous, Nonstochastic, Business Cycle Theories." In it is a comprehensive account of the writings of the pioneers including those he calls "second generation Wicksellians"—Lindahl, Myrdal, Hammarskjöld, and Lundberg—as well as Keynes and Kalecki. He pays a heartfelt tribute (which the editors warmly endorse) to the late Wynne Godley (who died in May 2010), "one of the most original and courageous post-Keynesian economists [he has ever] known, professionally and personally." He cites Godley's last book, coauthored with Lavoie (2007; see Lavoie's chapter in this *Handbook*) as "one of the best… books in the grand tradition of Wicksell, Lindahl, Keynes, and Myrdal." He expresses the hope that the precepts of his chapter reflect what he learned from Wynne Godley.

We feel his hope is more than fulfilled in his chapter and in his many other related papers. Velupillai brings out achievements and limitations; he identifies mistakes and signals unfinished business. Most important, he shows the way forward in an exciting and constructive manner. In the process he delivers a withering critique of mainstream real business cycle theory and of the method and approach of modern mainstream macroeconomists as they attempted to replace the more relevant applicable theory of Keynes, Kalecki, and those who followed their lead, not least Velupillai's own mentor, Goodwin. Velupillai also finds a proper niche for Minsky's insights in his proposals for future developments. And he most sensibly suggests the inclusion of Joseph Schumpeter's insights and approach, despite the horror that this no doubt would have caused Schumpeter himself.[15]

Velupillai is at the forefront of developments in formal analysis. This brings confidence to his suggestions for ways forward. Having argued that post-Keynesianism is by its very nature "endogenously dynamic and policy orientated," he adds that to be true to the formalization of the insights of the pioneers, we must embrace "analytical, epistemological, and methodological conventions and constraints that will entail less closed, less determined, mathematical models, encapsulating the richness of undecidable propositions in incomplete formal systems, facing uncomputable functions in the natural domain of economic data, institutions, and history." As editors we can only say amen.

(p. 13) **5. Pricing**

Economists have always minded their p's and q's, with emphasis first on one and then on the other, changing as historical situations change. Ken Coutts and Neville Norman in "Post-Keynesian Approaches to Industrial Pricing: A Survey and Critique" concern themselves with both in their judicious and detailed account of post-Keynesian approaches to the theory of price setting. They compare these approaches to those of standard mainstream theories. Their chapter provides a comprehensive history of the development and characteristics of the pioneers' contributions and their modern successors, sets out the inferences of each approach, and concludes with an account of the empirical evidence on price setting. They show that post-Keynesian theories, including those associated with their own work, are much more robust when tested against actual happenings than are any of the mainstream approaches.

Their chapter has a long section on the important contributions of P. W. S. Andrews, a famous "economic exile," as King (1988) called him. Andrews's book, *Manufacturing Business* (1949), is now recognized as a classic. While our authors are not uncritical of it and him, they do proper justice to his original insights. They also examine carefully the procedures and findings of the 1940s and 1950s Oxford economists' enquiries into manufacturing pricing, with which Andrews was associated, reaching a more favorable assessment than did contemporary commentators at Cambridge at the time, especially Kahn (1952) and Austin Robinson (1950).[16]

Coutts and Norman have been associated with important developments in Cambridge from the 1970s on, Coutts with Godley (who was a pupil of Andrews) and Nordhaus (1978), Norman through his most original PhD dissertation (1974), which was supervised by David Champernowne (see Harcourt 2001b), and then over the years in association with Coutts (see Coutts and Norman 2007). A feature of their work has been to bring in the role of international trade in the determination of prices. In the chapter they report on the full cost and normal cost hypotheses in the literature. They also refer to the post-Keynesian literature on pricing and the investment decision, which has its roots in Kalecki's pioneering contributions, ably assessed, as Coutts and Norman cite, in Kriesler's definitive account of Kalecki's microeconomics (Kriesler 1987).[17] They discuss the publications of the late Alfred Eichner (1973, 1976), Adrian Wood (1975), and Harcourt and Peter Kenyon ([1976] 1982) (but neglect, as did the others just named, the seminal contribution of James Ball [1964]). Except for Wood's analysis being explicitly golden age, all these authors complement each other's work on markup pricing (see Harcourt 2006, chap. 3).

A feature of the empirical findings reported here is how robust pricing behavior as analyzed by post-Keynesian authors in very different historical situations is. In their chapter are references to the encyclopedic work by Fred Lee in this area, especially in his very detailed history of the approaches (Lee 1998). We therefore follow their chapter with Lee's contribution to the *Handbook*, "Post-Keynesian Price Theory: From Pricing to Market Governance to the Economy as a Whole."

(p. 14) Lee draws on the themes in Coutts and Norman's chapter to move toward a comprehensive post-

Keynesian theory of prices within the processes at work within the economy as a whole. (Most of the previous writings relate to firms or industries.) In a sense this is an up-to-date version of the model of the economy that Kalecki presented in his remarkable review of Keynes's *General Theory* in 1936 (see Kalecki [1936] 1982 and Harcourt 2006, chap. 2). Lee's approach is also similar to Goodwin's later work, in which is combined aggregative models of the trade cycle with production interdependence models (see Goodwin and Ponzo 1987), in order to understand the dynamics of capitalist economies. Appropriately Lee's chapter is subtitled "From Pricing to Market Governance to the Economy as a Whole."

6. Kalecki

For many economists who are regarded as post-Keynesians, Kalecki is as important an influence as Keynes; for some Kalecki is the single most important modern pioneer of post-Keynesianism.[18] Certainly his influence has been growing fast in the relevant literature. Two economists who have important roles in this development are Robert Dixon and Jan Toporowski. They are the coauthors of the next chapter, "Kaleckian Economics." Dixon's work has always been characterized by a Kaleckian approach, and his style is akin to Kalecki's—sparse, clear, with arguments stripped to their essence; there is no fluff or unnecessary detours or digressions.[19] Toporowski is Kalecki's biographer. He was a friend of Kalecki's widow, Adela. His own work has the fearlessness and independence of mind that were characteristics of Kalecki's personality and writings.

In their chapter Dixon and Toporowski set out the essence of Kalecki's approach to both the short period and the trade cycle, which, along with theories of accumulation, were always Kalecki's major preoccupations in his analysis of how modern capitalism works. As with Keynes, he saw investment expenditure as the dominant cause of both activity levels and fluctuations in them. Their theories had different emphases. Keynes put more weight on the influence of long-term expectations and the rate of interest. Kalecki stressed the role of current profits and eventually came to argue that the rate of interest was beside the point as far as fluctuations were concerned because the long-term rate of interest, which Keynes believed was the key financial determinant of investment, did not vary that much. Kalecki also provided a macroeconomic theory of income distribution that was related to capitalist expenditures and the differing marginal propensities to save of profit-receivers and wage-earners. Keynes was content in *The General Theory* to go along with an adaptation of Marshall's theory of distribution, even though in *A Treatise on Money* he had provided the rudiments of a Keynesian theory of distribution, as Kaldor (1955–56) highlighted. Dixon and Toporowski link Minsky's instability hypothesis and his endogenous theory of the cycle resulting from the interplay of real and monetary forces, especially realized cash flows differing from expected ones, to Kalecki's account of the determination of employment and distribution, including (p. 15) his markup theory of pricing. They close with a discussion of Kalecki's remarkable 1943 paper, "Political Aspects of Full Employment," pointing out that it is still, indeed even more so, required reading today.

7. Wages and Labor

In *A Tract on Monetary Reform* ([1923] 1971), chapter 1, Keynes compared the social evils due to inflation, on the one hand, and deflation, on the other. He believed those of deflation were socially more damaging and therefore more to be avoided than those of inflation (not hyperinflation, though). He also argued that the role of policy was to secure a stable price level and to avoid the consequences of both these alternatives to it. (This may be one reason why Friedman was said to admire *A Tract* more than any other of Keynes's books. Of course, the fact that Keynes's analysis was an application of the quantity theory is also significant, for Keynes was then an avid supporter of it, regarding failure to accept it as evidence of stupidity, ignorance, or both; see Keynes ([1923] 1971, 61).

How times have changed! While mainstream macroeconomists still look to the quantity theory as the explanation of inflation, King in his chapter, "Wages Policy", argues that post-Keynesians look to the formation of money incomes, especially money wages but also the costs of raw materials, as the initiating cause of inflation and recently, King warns us, of deflation.

King takes the Kaleckian dilemma (Kalecki [1943] 1990) as the crucial background to his discussion: attempts to sustain full employment in capitalism will eventually come to grief unless permanent incomes policies can be established. These policies should follow the Kaldor-Russell-Salter rule of linking changes in money incomes to

changes in overall prices and overall productivity. He points out that incomes policies have no role in either Friedman's or Lucas's guides to policy but are essential in post-Keynesian thought. He takes us through the views of Keynes himself, then Joan Robinson and latter-day economists influenced by Keynes, including Kaldor in the UK, Eric Russell and Wilfred Salter in Australia, and, independently, Scandinavian economists.

There have been similar analyses but rather different policy suggestions designed to achieve the same ends in the United States. King discusses especially the analysis and suggestions of Weintraub, who also recognized the origins of inflation in cost-push phenomena associated with money wage bargains. Weintraub with Henry Wallich suggested carrot-and-stick measures, his tax-based incomes policy (TIP) scheme, to induce capitalists and wage-earners to bring about results that coincided with those produced by the more hands-on measures of the Australians and Europeans.

King takes us through the golden age of capitalism, stagflation, and the rise of neoliberalism, with its accompanying or preceding disappearance of unions and union power. He draws out the implications for tackling both inflation and deflation in these different historical settings, of combining acceptable wages policies with the maintenance of full employment, as all post-Keynesians argue for.

(p. 16) Another aspect of labor market operations to which post-Keynesians have made significant contributions relates to discrimination associated with race, sex, and age in these markets. The coauthors of the chapter, "Discrimination in the Labor Market," Peter Riach and Judy Rich, are pioneers in the use of field experiments, whereby employers are sent pairs of applications for jobs in which all the characteristics of the applicants are identical except for their race or sex or age. They compare their theoretical views on discrimination with orthodox views in which race, sex, and age are negative arguments in discriminating employers' utility functions. A consequence of this for orthodox theory is that, in competitive conditions, there will ultimately be the elimination of discriminating employers and the end of discrimination. As Riach and Rich note, we have been waiting a long time for this to happen, indeed, we are still waiting.

In the meantime these carefully controlled field experiments and those of sociologists and like-minded economists have given rise to a rich empirical literature that the authors succinctly but tellingly present. This field experimental approach is more adept at detecting discrimination than is the inferential method of the econometricians.

8. Less-Developed Economies

Next we have three chapters on post-Keynesian approaches and contributions to the economics of less-developed economies. The authors are Peter Kriesler, Anthony Thirlwall, and Amitava Dutt. Peter Kriesler's chapter, "Post-Keynesian Perspectives on Economic Development and Growth," is an example, par excellence, of the application of the post-Keynesian "horses for courses" strategy in analysis. He shows how theoretical understanding evolves and changes as the dynamics of different historical episodes in, principally, capitalism are examined. He stresses interrelationships between history, politics, and institutions. He starts with an appraisal of the classical political economists, highlighting the central organizing concept of the surplus—its creation, extraction, distribution, and use. He then examines the 1954 Lewis model of development with unutilized supplies of labor. Kriesler agrees with Lewis that, when the surplus labor has been absorbed, other principles and institutions come to the fore. Parallel to this are, first, the characteristics of competitive capitalism, especially as analyzed by Marx, then the Keynesian era, when the principal cause of unemployment changed from a scarcity of capital goods to a scarcity of aggregate effective demand. While these characteristics remain, capitalism itself has evolved into its monopoly era, as described by Baran, Sweezy, and Steindl, and finally the period of the dominance of large multinational oligopolies coupled with the dominance, in deregulated markets, of financial capital. A central implication of this evolution is that national governments are becoming less and less able to control powerful and destabilizing forces.[20]

Thirlwall, in "Keynes and Economic Development," rightly points out that while Keynes was not a development economist as we understand the description today, his theoretical apparatus about what drives capitalist economies as set out in *The General* (p. 17) *Theory* in particular, and his proposals at Bretton Woods for a new international monetary order, alas, never properly put into practice, bear fully on the current debates on development theory and policy. Thirlwall takes a more favorable view of Keynes's relevance than did A. K. Dasgupta when Dasgupta wrote a series of papers on the nature of development, growth, and effective demand

that contain many aspects of Lewis's model (see Harcourt 2012).

Thirlwall agrees with Lewis and Dasgupta that much of the unemployment in less-developed economies arises from a failure of the growth of the stock of capital goods to keep up with the growth of population and the potential workforce. He neatly analyses the consequences of this in terms of Harrod's g_w and g_n. He points out that Keynes was aware of the consequences of discrepancies between them (though he did not name the two rates of growth) before Harrod published his classic *Economic Journal* article in 1939. Thirlwall uses a neat diagram to analyze the implications of the differences between g_w and g_n in the context of less-developed economies and discusses how key parameter values may be changed in order to bring them closer together. One of these is the saving rate, and Thirlwall points out that Keynes could never have accepted the mainstream take on this, that it must be increased first in order to raise the rate of accumulation. He also thinks Keynes would have been scornful of the mainstream argument that a precondition for growth and development is price stability because inflation itself is largely a function of structural change.

He criticizes the undue emphasis on supply constraints in mainstream theory, old and new, and discusses the much more important role, in his view, of demand. In his discussion he also reminds us that Keynes was aware of the adverse implications of fluctuations in the prices of commodities and made relevant policy suggestions to counteract them. As with Keynes, so Thirlwall stresses the built-in contractionary biases in both the operation of economies and policies suggested and applied by the IMF and World Bank over past decades. He criticizes their view that inflation is demand-led rather than structural "because ultimately structural change is the only solution to poverty and underdevelopment."

Amitava Dutt's chapter, "Post-Keynesian Economics and the Role of Aggregate Demand in Less-Developed Economies," is a comprehensive discussion of the role of post-Keynesian economics in understanding the problems of less-developed economies of all varieties. It provides a framework in which a "horses for courses" approach is relevant for specific economies and issues. Dutt provides a historical view of the changing view on development under the post-Keynesian rubric.

To carry out this task formally, Dutt starts with a simple model that was initially developed by Rowthorn (1982) and Dutt (1984) himself. It explicitly has its origins more in Kalecki's independent discovery of the principal propositions of *The General Theory* than in Keynes's formulations. Dutt then enlarges the scope of the model, issue by issue, in order to take in the major problems and constraints facing less-developed economies. He allows a place for supply constraints but points out that these alone lead to limited explanations of problems and, more seriously, to misguided policy recommendations,[21] which is also the major thrust of Kriesler's and Thirwall's chapters.

(p. 18) Dutt's framework allows the impact of expected profitability, financial constraints, international trade and capital movements, dual sector developments, the choice of techniques, and fiscal constraints to be included and analyzed. One important emphasis, which comes from the work of Amit Bhaduri and Marglin (1990), is whether growth in particular instances is profit led or wage led. The strengths of these countervailing forces are a major issue and affect what will be regarded as suitable policies in particular cases.

He has an important section in which he contrasts post-Keynesian views on labor market flexibility with those of the mainstream. He shows that there is no clear-cut outcome but that the profit-led, wage-led distinction is an important factor. In his concluding section Dutt points out that though post-Keynesians have concentrated on macroeconomic linkages in this area, careful empirical research within the post-Keynesian agenda can be used "to analyze the pricing and financing of firms, as well as the decisions of individuals and groups such as peasant cultivators, informal sector proprietors, migrants, asset holders, and consumers."

9. Volume 2

Volume 2 is concerned with further post-Keynesian criticisms of mainstream economics; methodological issues (*not* the last resort of scoundrels but a necessary preliminary in order to provide coherent approaches to analyses of major issues in political economy); the relationship of post-Keynesianism to other heterodox approaches; and a necessary and appropriate finale, post-Keynesian policies. This last reflects the view that the ultimate raison d' être for being an economist (and even more so, a political economist) and doing economics and political economy is to arrive at sound, humane, and potentially realistic and realizable policies, especially overall package deals. These

should take into account the interrelated nature of modern economies, both internally and externally. It is not an accident that Kaldor's "last will and testament" to the profession (1996), which was based on his 1984 Mattioli Lectures, was entitled *Causes of Growth and Stagnation in the World Economy*. The last chapter contained comprehensive policy proposals, based on Kaldor's post-Keynesian vision, for the world economy as a whole (see Harcourt [1997] 2001a).

10. Methodological Issues

The volume starts with Abu Rizvi's definitive essay, "On the Microfoundations of Macroeconomics." Rizvi has contributed seminal critical articles to this large literature, which developed in the postwar period (see, for example, Rizvi 1994a), including a skeptical evaluation of the promise of game theory in both micro and macro areas (p. 19) (Rizvi (1994b). As with Marx so with Rizvi: he did not put critical pen to paper until he had thoroughly absorbed the approaches of those he ultimately criticized, for example, by teaching game theory for a number of years before reaching a view that doubted that it was the appropriate tool to come to our rescue. So, along with Alan Kirman (1989, 1992) and others, we are provided with a thoroughly researched evaluation of the microfoundations project.[22]

Rizvi follows Minsky's classification of macroeconomics after Keynes into three types—the neoclassical synthesis (both Keynesian and Monetarist), the new classical approach, and the fundamentalist Keynes scholars (Minsky 1981). Rizvi concentrates on the first two, though near the end of the chapter, he discusses why the last category has had difficulty in finding acceptance, suggesting that the explanation is to be found in the dogmatism of its critics. He concentrates on the first two strands because they explicitly concern themselves with microeconomic foundations. After the 1970s especially, they were goaded into doing so by the Lucasians and others who believed that to do otherwise was to commit the economist's sin against the Holy Ghost, by being ad hoc.

Rizvi discusses the limitations of representative agent models and then turns to where he has made a profound critical contribution, the general equilibrium theory of maximizing individual agents. In moving from these foundations to the behavior of the economy as a whole we have to deal with aggregation problems, the implications of the results of the Cambridge-Cambridge capital theory controversies, and Keynes's major insight, that the whole may be more than the sum of its parts (see Harcourt [1987] 1992), complemented by James Crotty's argument (1980) that the macroeconomic foundations of microeconomics, an approach that is derived from Marx, are of far greater moment (see Kriesler 1996).

Rizvi reviews the history of these developments, starting with Jevons and taking in *Value and Capital* (1939). But the central critique arises from spelling out the implications of the Sonenschein-Mantel-Debreu findings (see Rizvi 2006) about excess demand functions in general equilibrium theory, "a spectacular series of impossibility results," for the microfoundations of macroeconomics (see Rizvi 1994a).[23]

Rizvi's discussion leads him to ask what are the ways forward. Kriesler (1996) and King (2012) suggest, on the basis of Kalecki's work, among others, that micro analysis and macro analysis "lie side by side, existing interdependently, that is, on an equal footing. Some things are determined at the micro level… some things are determined at the macro level" (Kriesler 1996, 66), with both clearly influencing the other. Rizvi has some sympathy with this view. He looks at how other disciplines have analyzed similar problems. This leads to an eminently sensible conclusion: that since the microfoundations project in all its forms has been shown to be "'demonstrably' problematic," we need "a clear discussion of when economies can be studied as a whole, much as one would study institutions or ecology knowing that the macro level of analysis is irreducibly distinct from its parts."

The next chapter on methodological issues, "Post-Keynesian Economics, Rationality, and Conventions," is by Thomas Boylan and Paschal O'Gorman. It concerns a central (p. 20) theme of both Keynes's and post-Keynesian thought: rationality and conventions. It is also linked to the growing importance of the revolutionary impact of taking the existence of inescapable fundamental uncertainty explicitly into account in economic analysis. This is peculiarly a contribution of Keynes and post-Keynesians; the mainstream uses either an "as if" analysis that allows a direct application of theory built on an assumption of certainty to be applied to actual situations, or treats uncertainty as akin to an, albeit sophisticated, genus of the specie risk, so that the standard theories of probability may be applied. From *A Treatise on Probability* on (it was published in 1921 but originally written in the first decade

of the twentieth century as his fellowship dissertation for King's), Keynes had puzzled about probability, uncertainty, and the province of logic as applied to decision making. He was influenced by Marshall's innovative analysis of sensible (sometimes not) persons doing the best they could in situations of uncertainty, and he recognized that sometimes rational behavior was consistent with such an environment, and sometimes it was not.

In theorizing about the determination of the rate of interest and of investment expenditure, the role of conventions became increasingly important in Keynes's thought. This has continued on in post-Keynesian analysis built on this base, with vigorous debates about specific issues by leading post-Keynesian figures.

Boylan and O'Gorman provide a masterly overview of these developments and of preceding and parallel developments in philosophical views on conventions in the light of Hume's skepticism and later David Lewis's seminal work, first published in 1969. This leads them to bring to the fore the fundamental importance of Henri Poincaré's writings on conventions and conventionalism. They argue that his revolutionary reinterpretation provides the most sound justification for regarding conventional behavior by decision makers in economics as consistent with rational—and actual—behavior. They show that nonergodicity is not peculiar to the social sciences, as it also occurs within the domain of pure geometry. They conclude that "since geometry is a core paradigm of rationality, recourse to convention [such as Keynes and post-Keynesians have explored] is ipso facto rational." This finding has "major significance for post-Keynesian analysis."

Sheila Dow has made major contributions to our understanding of the role of methodology in the post-Keynesian project, as well as to our understanding of money and finance in post-Keynesian theory. Her chapter, "Methodology and Post-Keynesian Economics," provides an overview of the developments in post-Keynesian discussions on methodology in the past and suggests how these will be of major importance in ways forward, not least in post-Keynesians making themselves clear as they try to persuade others with different approaches and structures what they are about and how it is relevant to their concerns.

Dow starts with Keynes's views on method and points out how essential they are for an understanding of the links between Keynes's philosophical views and his economics. This enables her to evaluate the post-Keynesian contributions to this discussion, especially by Rod O'Donnell, Anna Carabelli, John Coates, Bradley Bateman, John Davis, and Jochen Runde. She emphasizes the open-system, closed-system distinction and the vital role for plurality in approaching economic issues. She worries that the (p. 21) renewed interest in Keynes and post-Keynesianism because of mainstream limitations in getting to grips with causes and cures of the current crisis may nevertheless allow post-Keynesian views to be misinterpreted, just as Keynes's views were in the rise of the neoclassical synthesis.[24] In order to avoid this, Dow argues that a clear understanding of the role of methodology is essential for *all* economists, even if only a subset work specifically on its development.

For many years Gay Meeks has offered a superb option on philosophical issues in economics in the M.Phil. degree in economics and development studies at Cambridge. Students who take the option almost always nominate it as the most rewarding, challenging, and interesting of the courses they have taken in the M.Phils. Not only were the discussions guided by Gay's wise and knowledgeable counsel, she also asked other outstanding economists, Robin Matthews and Frank Hahn, for example, to lead sessions. Simultaneously she was doing research on the link between Keynes's philosophy and his economics and discussing these issues with others at Cambridge who were doing research on the same issue: Rod O'Donnell, Anna Carabelli, John Coates, Jochen Runde, Tony Lawson, for example. Because of her selflessness in reading other peoples' drafts, her deep and painstaking scholarship, and her laudable devotion to teaching, her seminal and innovative writings took a long time to enter the public domain. So it is more than appropriate that the *Handbook* now includes her definitive account of these fundamental issues, in her chapter, "Post-Keynesian perspectives on Some Philosophical Dimensions of Keynes's Economic Thinking."

Her chapter, she says, is "a story of detection and… interpretation—of how philosophical elements in Keynes's economic thought came to be teased out, especially in the last thirty years of the twentieth century, and of reactions to them." She starts with a historical account of how Keynes came into contact with philosophical issues, initially through his father, John Neville Keynes, and his father's friends; then on his own account as an undergraduate and as a member of the Apostles just when G. E. Moore's *Principia Ethica* (1903) was published (Moore was an older Apostle); and also through Keynes's friendship with Frank Ramsey in King's (they were both Fellows) in the 1920s.

Meeks describes the emergence in the late 1970s, 1980s, and 1990s of interest in this, and in Keynes's early

philosophical papers and his dissertation for King's (which, as we saw, became Keynes [1921] 1973). Part of the impetus was the emergence of the editions of the *Collected Writings* of Keynes from 1971 on, which were intensively used by Meeks herself and O'Donnell, Carabelli, and Coates in particular in their research for their doctorates, together with the Keynes papers, mostly in the King's Archives but also in the Alfred Marshall Library of Economics, many of which had not been included in the *Collected Writings* volumes.

Meeks herself came to these debates through her research on chapter 12 of *The General Theory* and the interpretations that arose from the chapter in the writings of Joan Robinson and G. S. L. Shackle, and the illumination that Matthews provided in her seminar. Matthews's paper was published as his chapter in the important volume Meeks edited (Meeks 1991). The volume contains a much-shortened version of her own research work that had been discussed for several preceding years in her M.Phil. course.

(p. 22) In her *Handbook* chapter she discusses the major differences between Shackle's and Dow's interpretations, refers to Hume's views on induction and the meaning of reason in his day (principally deduction) and its influence on modern debates (on this see also Boylan and O'Gorman's chapter). She makes a subtle distinction between when economists' views on philosophy are directly relevant to their economics and when philosophical arguments are relevant even if the economists concerned are not aware of their origins in philosophy.

This discussion leads onto the contributions of Tony Lawson and his then pupil Jochen Runde, who emphasize weight of argument and confidence. She also refers to Coates's wider philosophical perspective (Coates was an outstanding philosopher before he became an outstanding and then practical economist who made a fortune on Wall Street, so that he is now a gentleman scholar in Cambridge, developing seminal ideas in neuroeconomics). After her thorough scholarly documentation of the controversies that arose and possible explanations of why, she reaches the sensible and essential conclusion: to obtain definitive answers, we cannot do better than to return to Keynes himself, a course of action she has consistently followed in her own work and in this chapter.

In the late 1970s and early 1980s, Rod O'Donnell wrote a scholarly and extremely clear PhD dissertation at Cambridge on the links between Keynes's philosophical views and his economics, which culminated in crucial aspects of Keynes's analysis in *The General Theory* and after. The dissertation was the basis for his well-received book, *Keynes: Philosophy, Economics and Politics: The Philosophical Foundations of Keynes's Thought and Their Influence on His Economics and Politics* (1989). He has since written many articles on these themes, and he draws on this large amount of careful analytical discussion for his chapter "Two Post-Keynesian Approaches to Uncertainty and Irreducible Uncertainty."

The two approaches are the Human Abilities/Characteristics (HAC) Approach and the Ergodic/Non-Ergodic (ENE). Each approach is set out in terms of its conceptual foundations, key components, and logical interconnections. The HAC approach draws primarily on Keynes's writings in both philosophy and economics, while the ENE approach, of which Paul Davidson is a prominent exponent, uses ideas drawn from Knight, Shackle, and stochastic process theory to understand Keynes's ideas. The chapter provides the basis for readers to make up their minds on the issues raised and how they may wish to proceed in their own work—exactly what a handbook should offer.

As with Keynes, so with some of the deepest and original post-Keynesian scholars, a training in philosophy has enriched their economics. This is certainly the case with Wylie Bradford. His chapter is "Interdisciplinary Applications of Post-Keynesian Economics." He documents the frequent claim that post-Keynesian economics is much more appropriate than other approaches to cooperate with other disciplines in explanations of economics and other issues. He points out that in fact the output of such exercises is disappointingly meager. Part of his chapter is meant to explain why. In doing so he points to the growing economic and/or social science imperialism of the mainstream, which earlier was documented by Lester Thurow (1977) and Harcourt ([1979] 1982).

(p. 23) He then illustrates the worthwhileness nevertheless of such an approach by examining the role of neoclassical economics as represented by Tjalling Koopmans in his *Three Essays* (1957) as the economic base of John Rawls's *Theory of Justice* (1971). Bradford argues convincingly that the economic base of Rawls's central arguments is rendered incoherent by the insertion of Koopmans's system into Rawls's system. Had Rawls, though, inserted the rival system of Pasinetti 1981, 1993, 2007, or indeed the system of Pasinetti 1962, incoherence would not have occurred. The nature of the economic society being assumed would have become relevant for working out the essential principles of justice.

This argument links back to Bradford's earlier comment that Lionel Robbins's influential definition of economics as a theory of choice in situations of scarcity (Robbins (1932) means that the principles of economics relate to an aspect of all life,[25] rather than a part of life such as is implied by Marshall's definition that "Political Economy or Economics is a study of mankind in the ordinary business of life" ([1890] 1961, 1). Bradford argues that Marshall's definition more fittingly underlies the post-Keynesian approach. So while the results so far advanced may be meager, Bradford's case study shows what substantial rewards lie in wait for post-Keynesians if they follow his lead.

One of the most important and influential recent developments in method and the theory of knowledge, especially for graduate students and others dissatisfied with the approaches and findings of mainstream economics, is the huge and growing literature on critical realism. At Cambridge this development has been led by Tony Lawson through his long-running and well-attended weekly seminar for critical realists (and others) and in more recent times, his discussion groups with those interested in ontology. Lawson has published two influential books (1997 and 2003) and many papers, some of which relate to the place of post-Keynesian economics in the critical realism project (e.g., Lawson 1994, 2009).

One of the most important people in these developments is Stephen Pratten, who thus is ideally placed to discuss the subject matter of his chapter, "Post-Keynesian Economics, Critical Realism, and Social Ontology." Pratten's doctoral dissertation (Pratten 1994) applied the principles of critical realism to an explanation of Marshall's dilemma —that his analysis was usually static, with supply and demand functions used to discuss the market, short and long periods, but his "vision" was dynamic, of economies as organic evolving systems, to the application of which his formal analysis was limited and unsatisfactory, as Marshall recognized.[26] Pratten, having adopted a critical realist approach, moved immediately to less abstract, more applied, and policy topics where he used the approach to advantage. Pratten has worked very closely over the years with Tony Lawson and others; he has long been a joint editor of the *Cambridge Journal of Economics* and in recent years, its highly effective managing chair.

In his chapter Pratten uses his understanding of critical realism to illuminate the weaknesses and limitations of the approach of mainstream economics—its overwhelming dependence on maximization under constraints—and to show why post-Keynesians and other heterodox developments are more promising ways to proceed.

Critical realists, he argues, are concerned with the nature of social reality, and this dictates their views on how to do theory and applied work. This in turn provides the (p. 24) background to the critique of how the mainstream approaches these pursuits. It also helps us to understand more specific issues, for example, the role of institutions, gender, technology, and social processes.

Joseph Halevi, Neil Hart, and Peter Kriesler have written an illuminating account of the origin and central importance of the concept of the traverse in economic theory. (The chapter's gestation period could almost persuade one joint editor [G. C. H.] that the Austrians were right to regard the input of time as productive.) The authors relate the concept, basically what happens to the economy either out of equilibrium or between two equilibria, to the traditional concept and role of equilibrium in economic analysis. They start with the concept of natural prices in classical political economy (prices of production in Marx) and how market prices determined by forces other than those responsible for natural prices lead to either fluctuations around or convergence on natural prices. These processes crucially do not affect the values of natural prices, which act, therefore, as centers of gravitation, as attractors.

The authors then trace through the literature the rise of criticisms of these constructions and the emergence of path-dependent processes whereby where systems end up is fundamentally influenced by the path they take to get there. Here the outstanding pioneers are John Hicks and Adolph Lowe. These considerations are associated with the emergence and analysis of cumulative causation processes, which were first to be found in Smith—what is not?—and then, in the modern era, in the writings of Veblen, Allyn Young, Kaldor, Myrdal, Lowe, Joan Robinson, (late) Kalecki, and Richard Goodwin. The contributions of these economists are compared, rightly, more than favorably with those of the mainstream and, especially, with those of its more extreme proponents, such as Robert Lucas and his surrogates. They are trapped within the confines of equilibrium and steady-state growth analysis masquerading as descriptive analysis of the actual world.

Complexity theory is one of the many exciting developments in recent years in both natural and social sciences. One of the pioneers of its application in economics is Barkley Rosser Jr. He was asked to contribute a chapter now

titled "A Personal View of Post-Keynesian Elements in the Development of Economic Complexity Theory and Its Application to Policy." Due to unavoidable circumstances, he was only able to let us have a summary of his proposed narrative. Though it is succinct, it is so chockablock full of insightful history, evaluations, and ways forward that we wish to publish it as a personal view of the elements of his proposed title.

In his outline he mentions the links to contributions and themes already discussed in previous chapters. In particular, Goodwin's, Kalecki's, and Velupillai's writings are especially relevant, as well as those of the original pioneers in Keynes, Joan Robinson and Piero Sraffa. In his opening paragraph, he explicitly concentrates on the three schools of post-Keynesian thought, dynamic/Kalecki, Sraffian neo-Ricardian, and uncertainty/Davidson, and two schools of economic complexity theory, dynamic and computational. He concludes that these links allow us to see "elements of unity among the often sharply contesting post-Keynesian perspectives."

(p. 25) 11. What's Wrong with the Aggregate Production Function?

Underlying the post-Keynesian critique of mainstream economics have been the issues associated with the Cambridge-Cambridge controversies in capital theory (see Cohen and Harcourt 2003; Harcourt 1969; 1972; [1976] 1982; 2006, appendix 2). The concept of the aggregate production function and its use, and of the form of the marginal productivity theory of distribution associated with it, have figured prominently in the literature. Though it is generally agreed that Cambridge, England, won the debates of the 1950s and 1960s (see Paul Samuelson's generous "summing up" in 1966), that has never stopped the use of the aggregate production function in both theoretical and empirical work, especially when endogenous growth theory emerged as all the rage in the 1980s. Nor did it lead leading mainstreamers such as Samuelson and Robert Solow ever to doubt the validity of their general approach, only that some details needed to be modified, extended, or cast aside.

Jesus Felipe and John McCombie's chapter, "How Sound Are the Foundations of the Aggregate Production Function?", addresses these issues. McCombie and Felipe (who also has collaborated with Franklin Fisher) have provided a long-running critique of the use of the aggregate production function in both theory and empirical work, especially in a critique of the approach in Solow's 1956 and 1957 articles and the surrogates that arose from them. A dispassionate reading of the exchanges (though Solow has never replied directly to McCombie, as Solow mounted his defense principally against Anwar Shaikh, one of the earliest critics; see Shaikh 1974, 1980, 1987, 2005) would show that McCombie's arguments (which incorporate the insights of Henry Phelps Brown, Herbert Simon, Franklin Fisher, and Shaikh in particular) have carried the day. Yet

> He who is convinced against his will,
>
> Is of the same opinion still.

This literature contains both an internal and external critique. The internal one, of which Fisher's writings are excellent and telling examples (Fisher 1971, 1978, 1972, 2006), are concerned with aggregation problems, not with the validity of the underlying concepts of the mainstream theory of value, production, and distribution. The external critique concerns the unacceptability of the conceptual basis of mainstream theory. The meaning as well as the measurement of capital and the robustness of simple relationships that reflect the neoclassical intuition that all prices are indexes of scarcity take center stage, as well as the essential "vision" of what makes capitalism run (see Harcourt 1995 for a succinct statement).

Running through the discussions is the finding that "goodness of fit" of production functions cannot bear on the robustness or otherwise of marginal productivity relationships as an explanation of the distribution of income between wages and profits because the specifications are akin to the national income *identity* that $Y \equiv W + \Pi$. Fitting (p. 26) production functions (of all forms) to data should always therefore result in very good fits (in the limit $R^2 = 100$ percent) because the specification is akin to the identity. No notice then should be taken of subsequent estimates of elasticities of substitution or factor shares as being consistent with empirical findings. The basic cause of the problem, as illustrated by Fisher's 1971 findings, is that causation runs from (say) constant shares to the putative Cobb-Douglas function, not vice versa.

So relying on aggregate production functions whether in theory or in empirical work is deeply problematic. What should be put in their place? The most promising developments are associated with the writings of Duncan Foley

and Tom Michl and their concept of the classical model of growth and distribution (see, for example, Foley and Michl 1999).

12. Marx and Post-Keynesian Economics

As has often been argued, post-Keynesians find their inspiration in the classical political economists including Marx, as well as in Keynes and Kalecki. In 1987 Claudio Sardoni published the definitive work on the relationship between the ideas of Marx and Keynes. (A second edition that now takes in Kalecki was published in 2011.) Sardoni elaborates on these connections and similarities in his chapter, "Marx and the Post-Keynesians." His perspective concerns the relationship of Marx's schemes of reproduction to post-Keynesian developments, an emphasis that he points out was highlighted by Joan Robinson (who also pointed out to Harrod that in his work on long-term rates of growth he had rediscovered Marx, volume 2).

Sardoni argues that this framework is an appropriate context in which to present in a simple and straightforward way some fundamental characteristics of market economies. He first sets out the schemes of reproduction and then introduces money, all the time looking for the conditions that are consistent with a balanced process of expanded reproduction. There is no suggestion that capitalist economies left to themselves would bring these conditions about. He compares his findings with a Kaleckian three-department model and poses a central (but often neglected) question: Where do the capitalists get the funds to finance their increased investment and/or consumption, a question posed by Marx and Kalecki with very similar answers. (Sardoni in his 1987 book had also shown that when Keynes and Marx asked the same questions, adjectives and mode of approach aside, they usually came up with the same answers.)

Sardoni then examines Harrod's and Domar's theories of growth and compares them with those of Marx. The key point is that $I \rightarrow S$, so that the larger is voluntary saving out of any given level of income, the higher must I be to create it. Finally, he examines the literature on Marx and post-Keynesians, showing that links between them have usually been neglected, that Marxians and post-Keynesians have gone their own way rather than collaborating. The most notable exception is Amit Bhaduri's remarkable macro text published in 1986, which follows the approach Sardoni has outlined. Had recent generations of economics students been brought up on Bhaduri's book, we may have avoided, or at least seen coming, the disasters of recent years. For these simple models **(p. 27)** bring to the fore not only the mainsprings of growth but also the susceptibility of market economies to instability and crisis.

13. Post-Keynesian Critique of Mainstream Macroeconomics

James Forder has a background in philosophy and politics as well as economics. As someone who understands and approves passionately of democratic values, he has written a number of important papers (see, for example, Forder 1996, 1998, 2004, 2005), criticizing the setting up of independent central banks in democratic societies. He brings this broad background to an incisive discussion of the foundations of macroeconomics in the 1950s and 1960s in his chapter, "Macroeconomics and the L-Shaped Aggregate Supply Curve." The chapter is an exemplary example of the value of a thorough knowledge of the preceding literature in a subject such as economics. Too much of the training of economists in recent decades proceeds as if only the literature of recent years is worth examining, so that accumulated economic knowledge consists of what has occurred in the past decade (with a moving peg). This often results in the discovery of inferior wheels, just because the important contributions of past greats are no longer known of or taught. (Some suggest this results from we economists suffering from physics envy.)

Forder's chapter avoids these pitfalls through his in-depth discussion of views about labor market behavior and the role of noneconomic factors in it. It may surprise many modern economists who use aggregate production functions and simplistic versions of marginal productivity theory to read Forder's survey of marginal productivity theory and the skepticism with which it was assessed by general and labor economists alike.[27] He reminds us of the views expressed on the notion of fairness in establishing relative wage structures and of the possibility of collusion between unions and management in the setting of wages and prices (those were the days!). He refers to the debates between Richard Lester (1946) and Fritz Machlup (1946) on the relevance of economic theory, especially as applied to labor markets. All this is the backdrop to the discussion of the L-shaped aggregate supply curve initially postulated by Keynes as a (very) special case in order to distinguish starkly between the impact of a

change in aggregate demand on output and employment up to full employment, on the one hand, and the change in prices at full employment and above when excess demand changes, on the other.

This leads Forder onto his discussion of the Phillips curve and Friedman's misleading description of it as the missing equation in Keynes's system, as though chapter 21 of *The General Theory*, "The Theory of Prices," had never been written and that Keynes had never responded to John Dunlop, Kalecki, and Lorie Tarshis in the late 1930s with a modified view (see Keynes [1936] 1973, appendix 3, 394–412). Forder discusses the various views on whether a sharp distinction between demand-pull and cost-push inflation can be made coherent, and on whether the Phillips curve can be regarded as a stable long-run (p. 28) relationship. He absolves Samuelson and Solow from any such claim in their much-quoted 1960 *American Economic Review* article, the misinterpretation of which was used to great effect to discredit Keynesianism and its policies in the stagflation episodes of the 1970s. He goes explicitly through the misinterpretations of the 1950s and 1960s, precipitating out a more coherent interpretation, which, he concludes, "would surely bring rewards."

Joerg Bibow is an outstanding scholar of Keynes. He has a detailed knowledge of Keynes's contributions and the huge literature, pro and con, that has been erected on them. He has a fine critical analytical mind and well-thought-out views on appropriate approaches to theory and policy, which, taken together, make him one of the most serious and important economists writing under the post-Keynesian umbrella today. His chapter, "A Post-Keynesian Perspective on the Rise of central Bank Independence: A Dubious Success Story in Monetary Economics," is concerned with the weighty issues surrounding the concept of an independent Central bank and the cases for and against its existence. In particular, as with Forder, he is much concerned to examine the legitimacy of such an institution in a democratic society, an important issue usually neglected by mainstream economists (who are often unstructured technocratic social engineers) and, with some exceptions, by post-Keynesians, too.

Bibow sets out the dimensions of the concept, of the various forms it may and has taken in practice, and of its relationship to the making and implementing of monetary policy and of economic policy in general. He is especially concerned to examine the relationship of the functions of a central bank to the operations of the state, the provision of a national currency, and fiscal policy.

Bibow provides stringent criticisms of the mainstream analysis of the need for and role of an independent central bank, arguing that these are placed within structures that make their conclusions virtually inapplicable and irrelevant. He discusses the worldwide rise of this convention and especially the influence of the pioneering institution in Germany on other, mostly European, economies. He also documents Keynes's views on the desirability or otherwise of an independent central bank and how it could effectively be fitted in with the provision of overall economic policy. As Bibow makes clear, Keynes was not completely averse to the establishment of this institution but did nominate constraints that would make it an effective institution. Bibow suggests that post-Keynesians should take Keynes's views into account within their own approach and make a commitment to establish whether or not it properly belongs in democratic societies.

The editors themselves believe that independent central banks are not consistent with either democratic societies or the effective implementation of package-deal post-Keynesian policies.

14. Economic Policy

A sharp dividing line exists between mainstream economists, on the one hand, and post-Keynesians, on the other, in regard to views on the role of the state. Ric Holt and (p. 29) Steve Pressman have written stimulating books and articles on this, and Holt provides a comprehensive survey of the issues at stake in his chapter, "The Post-Keynesian Critique of the Mainstream Theory of the State and the Post-Keynesian Approaches to Economic Policy."

He sets out starkly the main tenets of each group's approach and shows that they lead directly into vastly different views on the size and functions of the state and its policies. The most conservative noninterventionist views of mainstream economists derive their analysis from a wrong reading of Adam Smith—Holt implies but does not say that this group only knows of *The Wealth of Nations* ([1776] 1976), often may not have read it, and have never heard of its essential complement, *The Theory of Moral Sentiments* ([1759] 1976) (see Harcourt [1994] 1995). Basically, a strong belief in the efficacy of competitive forces leads to a call for minimum intervention especially in markets. It is common ground that institutions such as laws relating to enforceable contracts, the police and law

courts, and defense are the province of the state. But if in competitive conditions, there are always present strong equilibrating forces at both microeconomic and macroeconomic levels, the state must remain very much in the background.

Holt argues that Keynes and post-Keynesians were/are concerned to deny the powerful purchase of these forces at micro and macro levels, so that there was/is a major niche for the state to fill. (For each problem, it would still be necessary to establish that measures taken by the state are more effective in overcoming the problem than the workings of the market even *if* market failures had been shown to exist.) Holt stresses the much greater role for *social* intervention, that men and women are not islands in the post-Keynesian approach, and the implications of it for state actions.

He considers a wide range of problems—unemployment, inflation, the environment, for example—and compares and contrasts the great differences in proposed policies, each set following logically from underlying theoretical systems. He concludes by discussing serious differences in post-Keynesian views on theory and policy, especially with regard to policies concerning inflation. Holt suggests that future discussions and exchanges will be needed and be most useful in establishing a more realistic and enlightened view of the state's role and of the nature of economic theory itself.

Philip Arestis and Malcolm Sawyer are eminent post-Keynesian economists who, for many years now (both have recently had festschrift volumes in their honor), have made essential contributions to theory, applied work, and policies. Their chapter, "A Modern Kaleckian-Keynesian Framework for Economic Theory and Policy," complements Holt's. It shows the connection between a theoretical structure based on the contributions of Keynes and Kalecki and the policies that follow from them, in effect, a case study of the general arguments by Holt summarized above.

In their account deficient aggregate demand is a pervasive issue in the workings of modern economies if left to themselves (or if subjected to neoliberal policies). They also stress that the behavior of financial markets is a fundamental source of instability, not only within their own workings, but also through their feedbacks into the behavior of the real economy. They reject the Monetarist notion that inflation is overwhelmingly a monetary phenomenon, arguing that inflation is primarily a by-product of conflicts (p. 30) at work in modern economies associated with incompatible aspirations of broad social groupings (see also Rowthorn 1977; Marglin 1984; Harcourt 2006, chap. 6). They also emphasize a feature of the structuralists' approach, that often there may not be sufficient productive capacity to support full employment, so that the sharp distinction that used to be made between Keynes/Kaleckian unemployment due to too low effective demand, on the one hand, and Marxian unemployment due to insufficient capacity, on the other (analyzed in detail in Kriesler's chapter discussed above), is in fact blurred. This is due not least to inappropriate policies derived from a Monetarist views on how to control inflation (read, implicitly, revive or reinforce the reserve army of labor and, as an unintended consequence, blunt "animal spirits" and confidence in general and therefore adequate levels of accumulation and consumption in the process).

As with Holt, they link their "vision" to the policies they derive and advocate. They conclude by contrasting their suggested approach—"use fiscal policy in the short term and in the long term to address demand issues, use regional and industrial policies to create the required capacity and develop incomes policy to maintain low inflation"—with the prevailing orthodoxy—"use interest rates to address demand issues with fiscal policy left in neutral, to use the 'credibility' of the central bank to hold down inflationary expectations and to 'reform' labor markets to lower the nonaccelerating inflation rate of unemployment."

Also complementing the chapters of Holt, and Arestis and Sawyer is Heinrich Bortis's chapter, "Post-Keynesian Principles and Economic Policies." As we noted above, in 1997 Bortis published an outstanding manuscript in which he set out his comprehensive and, he argued, coherent system of post-Keynesian economics. In this he brought together ideas from Keynes and Sraffa, together with his thorough knowledge of the history of economic theory and political philosophy. As we also discussed above, if we were ever to be persuaded that a coherent post-Keynesian system existed, it would be by Bortis. He presents his ideas in three layers—a long-period set of growth relationships, drawing on Sraffa, Keynes, and Pasinetti (and before them, Smith and Ricardo), a Robinsonian theory of the cycle, and short-period problems allied with the impact of uncertainty—he therefore views his attempt at coherence as "a synthesis of Ricardo and Keynes" (Bortis (1986, 69). His present chapter is built on these foundations. He shows that there is a logical difference between an underlying timeless set of principles and

specific application of them. The latter are relevant as the rationale of a "horses for courses" approach emanating from Joan Robinson and those of many post-Keynesians, including the present editors.

The political philosophy of Keynes is also Bortis's foundation, for he regards Keynes as the foremost thinker who attempted to construct an alternative between socialism and capitalism, what Bortis calls Keynes's "Social Liberalism." (In his 1997 book Bortis named it "Comprehensive Humanism.")

The objective of Bortis's chapter is to set out his basic propositions and on them erect a systematic approach to the pressing problems facing modern economies, including providing a coherent underlying political philosophy. In particular, he takes in the problems of financial instability, the problems associated with the process of globalization, and the rise to dominance in decision making on both economic and political matters (p. 31) of large multinational oligopolistic firms and industries. Because of the broad range of important, indeed fundamental, issues that Bortis discusses, his chapter is considerably longer than the average length of the other chapters in the volumes, an indulgence that the editors (and the other contributors) graciously allowed!

15. Personal Distribution in Modern Capitalism

For many years now James Galbraith has been heading a large empirical project on income distribution in major economies in the world economy at the University of Texas, Austin. The project has brought together a huge body of data from disparate sources. This has been refined into detailed classifications using innovative statistical techniques in order to present the information in relevant detail.

In his chapter, "Post-Keynesian Distribution of Personal Income and Pay," he uses a broad post-Keynesian approach to analyze the links between macroeconomic behavior and changes in inequality over distinct historical episodes. He compares inequality over time and within regions, sectors, and countries. A major finding is that the movements in inequality within countries are dominated by a single global pattern, closely related to changes in the international financial regime. While we are not sure that Galbraith would agree with us, we think his finding is consistent with a major insight of Marx, that when finance capital is out of kilter with industrial and commercial capital, instability and often crises result. Accompanying such shocks are major changes in inequality, reflecting the impact of systemic behavior on the relative economic, social, and political power of the groups-classes that make up modern capitalist economies.

16. Post-Keynesian Environmental Economics

Neil Perry's chapter covers the emerging and important field of post-Keynesian environmental economics and complements Holt's in calling for the state to have a strong role in guiding the economy to an environmentally sustainable future. Perry surveys the field, provides extensions, and guides future research. Although he locates the history of post-Keynesian environmental economics as effectively beginning with Bird's 1982 *Journal of Post-Keynesian Economics* publication, "Neoclassical and Post-Keynesian Environmental Economics," and only recently accelerating, Perry questions whether some of the founding contributions to ecological economics, such as those by Boulding and Georgescu-Roegen, were also contributions to post-Keynesian environmental (p. 32) economics, and he discusses J. K. Galbraith's work on the quality of life and the power of corporations.

Perry discusses work on embedding the environment in post-Keynesian theory and proposes new directions, arguing that by using models developed by Sraffa and Kalecki, post-Keynesian economics is well situated to develop models that distinguish between growth and employment in different sectors of the economy and their resulting impact on the environment. This also requires embedding the entropy law within models of production, and this complements ecological economics. A post-Keynesian model of the macroeconomy with the entropy law included would be fertile ground for ecological economists, who have struggled to develop models and policy that simultaneously deal with the environment and social issues such as income distribution. Such a model would also be valuable for post-Keynesian economists analyzing endogenous business cycles, path dependence, and equitable distribution, where the latter includes a consideration for exposure to environmental contaminants.

The major component of Perry's contribution concerns a critique of orthodox environmental policy and a discussion of post-Keynesian alternatives. He provides a comprehensive critique of the foundations of orthodox

environmental economics and in particular the theoretical legitimacy of the marginal damage and marginal abatement cost functions that are widely used in the analysis of orthodox environmental policy.

Perry covers post-Keynesian alternatives to the "getting the prices right," one-policy-fits-all solution of orthodox environmental economics. With strong links to institutional economics, one of these alternatives is policy aimed at changing consumer preferences through changes in technical and social institutions that is guided by Lavoie's analysis of the post-Keynesian consumer. Another policy instrument may include environmental taxation, and based on the work of Kalecki, Steindl, and Salter, Perry outlines a post-Keynesian mechanism for environmental taxes that leads to changes in industry composition in the long term. A strong role for the state is envisioned to support the long-term change in industry composition.

In contrast to orthodox economics, there is a need for multiple policy instruments, and these include the much-maligned emission and technology standards (command and control approach) which have an important role to play in an economy characterized by fundamental uncertainty. Other important instruments include deficit spending and employment programs, which could simultaneously advance post-Keynesian concerns for equitable income distribution and full employment as well as promote environmental sustainability if directed carefully. Industry policy is also strongly recommended to promote particular qualities of growth.

In his final section, Perry considers the role of innovation for environmental sustainability and again highlights the role of the state. Post-Keynesian economists have followed the work of Salter (1960, 1965) in arguing that changes in technology and environmental productivity are generally resisted by industries. In a vintage capital model, changes in the emission profile of industries only occur when marginal firms that are also high-emitting firms become obsolete. Firms protect the return on their existing capital stock, and changes in technology are only incremental within incumbent plants (p. 33) and firms. Perry draws on Davidson's analysis of natural resources, which relies on Keynes's concept of user cost, to highlight the inherent problem of large multinationals being active in both renewable and nonrenewable, fossil-fuel-based energy industries. This creates an inertia that can only be broken when industry participants are independent—that is, when firms in fossil-fuel industries are excluded from the renewable energy industry. Again, this creates a need for strong government involvement because participants in the relatively tiny and new renewable energy industry require financing for their growth and policy to speed up the obsolescence of high-emitting firms while simultaneously protecting and retraining workers in outmoded industries.

17. Post-Keynesian Economics Down Under

Until the training of economists in the antipodes was restructured to make most of their economics departments clones of leading US departments, Australian and New Zealand economists had justly earned reputations for independent and creative thought and contributions, especially in understanding the operations of small, open economies. Two of the most original and productive contributors within this tradition are John Nevile in Australia and Paul Dalziel in New Zealand. John is now an elder statesperson; Paul started his professional life just when the implementation of extreme Monetarist and neoliberal views and policies came to dominate teaching and policymaking in New Zealand. Both have independent, critical minds, excellent technical ability, and keen economic intuition. Their chapter, "Theorizing about Post-Keynesian Economics in Australasia: Aggregate Demand, Economic Growth, and Income Distribution Policy," is concerned with the relationship between mainly Keynesian and post-Keynesian views and the development of theory and policy in Australia and New Zealand.

Nevile provides an historical narrative within which he discusses monetary policy, fiscal policy, incomes policy, and economic growth in Australia during several different historical episodes in the prewar and postwar periods. He documents the important influence in each of these eras of several well-known Australian economists—Douglas Copland, John Crawford, Peter Karmel, Eric Russell, Wilfred Salter, and Trevor Swan, for example. He also documents the development and application of Keynesian and then post-Keynesian ideas: in particular, Keynes in the two decades or so after the end of the World War II, more post-Keynesian after that. His own contributions and inputs rightly figure in the later period. He played a role in the report by the Vernon Committee report (Committee of Economic Enquiry 1966), a committee set up by Menzies in the early 1960s and then aborted by him soon after its publication as part of the fight between Treasury and the Department of Trade (read, the Treasury and Crawford). Nevile also developed the first econometric model of the Australia economy (Nevile 1962).[28] He has combined

theory, applied investigations, and policy recommendations on post-Keynesian lines ever since, latterly with Kriesler.

(p. 34) In Adelaide, Russell was the mentor of G. C. H. and others who were associated with the role of the Russell-Salter rule for incomes policy, first, within the Basic Wage submissions to the Commonwealth Arbitration Commission and, then, as part of the structure behind at least the first years of the Accord between employees, employers, and the Hawke-Keating Australian Labor Party government of the 1980s. Nevile makes an excellent case for the performance of the Australian economy being more impressive when Keynesian and post-Keynesian ideas ruled than what happened during the era of economic rationalism and neoliberalism, remnants of which still linger on even after the disastrous world financial and real upheavals of 2008 and 2009.

Dalziel documents New Zealand's experience, giving a proper place to the role of Conrad Blyth and, of course, to the most distinguished New Zealand economist of them all, Bill Phillips, even though he only spent his twilight years as an economist actually in New Zealand. Dalziel rightly points out that his own emphasis on asset inflation in the economic process is of profound importance in both understanding economic instability and what can be done about it—if only Dalziel surrogates were in charge in the universities and public services.

18. Perspectives on Recent Events

Gary Dymski's chapter, "The Neoclassical Sink and the Heterodox Spiral: Why the Twin Global Crisis Has Not Transformed Economics", is a brilliant critical essay on the deficiencies of the theories and policies built up from the general equilibrium model in the light of the neoliberal era of recent decades and the global financial crisis. Its purest and most stark manifestation is the efficient markets hypothesis, which its proponents still argue would continue to serve well if only government regulations could be removed. There is an explicit argument that aggregate demand will always be sufficient to absorb aggregate supply and that unequal diffusion of power on both sides of key markets plays no significant role in competitive environments. Orthodox proposals after the global financial crisis still continue to build on this underlying model, their faith unshaken by events.

Dymski argues that the approach is logically and practically bankrupt—a sink—and that new approaches to theory and policies must be built on bases created by Marx, Keynes, and Kalecki concerning how our economies really work.

As we noted, Lance Taylor has recently published the tome for our times. *Maynard's Revenge* (2010) is the history of macroeconomics told in the light of the recent and ongoing world financial and real crisis. The heroes of Taylor's narrative are Keynes and the post-Keynesians. He highlights the contributions of Minsky and Godley, also of Kalecki and Joseph Steindl. There are also star roles for Goodwin, Kaldor, and Charles Kindleberger.

Taylor combines comprehensive theoretical discussions of both Keynes and the post-Keynesians and of the mainstream alternatives that have dominated theory and policymaking in the last forty years. He allies these with an impressive account of the (p. 35) major historical episodes in the prewar and postwar United States, including its increasingly important relationship with the rest of the world. He sets out the policies that are needed in the wake of the financial crisis, policies based on his reconstruction of Keynes-type ideas as an integral part of Maynard's revenge.

It is fitting therefore that "Keynesianism and the Crisis," the closing chapter of the post-Keynesian *Handbook*, should be written by Taylor, while the penultimate chapter should be written by Dymski, another doughty warrior. In his chapter, Taylor presents the main findings of his book. He brings together a theoretical structure based on Keynes, Kalecki, the others named above, and also further references to the post-Keynesian literature. His account is political economy at its best, recognition of decision making under uncertainty, power struggles between competing groups and classes and their implications for economic activity and the distribution of incomes, and financial instability, its causes and consequences. As did Dalziel, Taylor stresses the causes and implications of financial and other asset inflation and deflation.

With this theoretical structure and the use of simple diagrams and tables, Taylor's narrative takes in major periods of the history of the United States. He concludes with pointers toward necessary policy reforms in the United States and internationally. Like Keynes, he recognizes major obstacles but remains clear-sighted and is a cheerful

optimist. One important point he stresses is how long in historical time community norms take to establish and change. An important example is how the huge blowouts in inequality of income and wealth of recent decades have progressively come to be accepted, though not, of course, by Taylor, nor by the contributors to these two volumes.

19. Last Words

It would be superfluous to go into more details. What we have tried to do in the introduction is to map out what is to be found in the two volumes, to indicate how the various topics interact, and to give a broad account of what may be found in each chapter. As joint editors, we feel extraordinarily fortunate to have had such outstanding contributors and contributions. We hope our introduction will stimulate readers to read, either comprehensively or selectively, the chapters that follow. We do not think they will be disappointed.

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Notes:

(1.) An outstanding example is the late Athanasios (Tom) Asimakopulos, who declined to be in the first edition of Philip Arestis and Malcolm Sawyer’s *Biographical Dictionary of Dissenting Economists* (1992) for this reason.

(2.) We would like to have had a chapter by Mark Roberts, who, like Setterfield, has carried on Kaldor’s work, but he was alas too committed elsewhere, not least to parenting.

(3.) In his last letter to Malthus (August 31, 1823) Ricardo wrote: “And now my dear Malthus I have done. Like other disputants after much discussion we each retain our own opinions. These discussions however never influence our friendship; I should not like you more than I do if you agreed in opinion with me.”

(4.) Kregel himself is a major pioneer of the development of post-Keynesianism. He has built on and considerably added to the fundamental contributions of the original pioneers.

(5.) In his earlier writings Kalecki had analyzed trendless cycles.

(6.) Cumulative causation processes are to be found in Adam Smith’s writings; see Kerr (1993).

(7.) In their 1988 survey of post-Keynesian economics, a considerable section was devoted by Omar Hamouda and Harcourt to Sraffa, and this emphasis was maintained in the latest survey by G. C. H; see Harcourt (2001, essay 19). See also Harcourt ([1981] 1982) for an earlier inclusion.

(8.) Keynes’s fundamental equations in *A Treatise on Money* ([1930] 1973) were thought by Keynes to be developed within the framework of the quantity theory, but Kahn argued that they could be discussed independently of this context and were then the better for it (see Harcourt 1994).

(9.) A similar point could be made about Joan Robinson’s “neoclassical” analysis in *The Accumulation of Capital* (1956) and her 1959 *Economic Journal* article on creeping down the production function.

(10.) This theme is further developed in Colin Rogers’s chapter in the *Handbook*. Clower and Axel Leijonhufvud also recognized that to really understand and develop Keynes’s insights it was necessary to return to Keynes’s Marshallian way of looking at things; see, for example, Clower and Leijonhufvud (1975), Clower (1997).

(11.) This is an appropriate title in more ways than one. The conceptual basis of modern mainstream endogenous growth theory is pure Kaldor, as Paul Romer but not Robert Lucas has acknowledged. However, its emasculated exposition in neoclassical terms would not have been at all to Kaldor’s liking. For an overview of growth theory from Adam Smith to endogenous growth, see Harcourt (2006, chap. 7).

(12.) Prue Kerr has pointed out that such a distinction could not be found in Marx’s analysis of organic interdependence.

(13.) G. C. H. read a draft of what eventually became Nell (1998) for Cambridge University Press well over thirty years ago. He wrote an enthusiastic reader’s report and so is delighted that the volume was at last published.

(14.) Thirlwall does not agree, commenting (June 17, 2011) that “Kaldor and I were at one on the concept of cumulative causation and balance of payments constrained growth.” He cites an article published in 1979 and coauthored with Robert Dixon, “A Model of Export-Led Growth with a Balance of Payments Constraint,” which marries both concepts together. Kaldor liked the article “very much.”

(15.) Schumpeter, along with Wassily Leontief, was one of Goodwin’s two principal mentors at Harvard (see Harcourt 1985; 1993).

(16.) Michael Farrell, who had worked with Andrews at Oxford and who was then at Cambridge, mounted a valiant counterattack; see Farrell (1951).

(17.) This sentence was drafted by G. C. H.

(18.) See Harcourt (2006, appendix 1), where it is argued that Kalecki was the most important all-round economist of the twentieth century.

(19.) No doubt Robert would tell us that Henry James could have written this last sentence.

(20.) Perhaps it should be pointed out that G. C. H. drafted these paragraphs and cleared them with his joint editor before they were included in this introduction.

(21.) Dutt points out an ironic finding that in his work on developing economies, Kalecki played down the role of aggregate demand and put stress on capacity constraints and inflationary pressures due to wage-good constraints.

(22.) Both editors have been much concerned with these issues, G. C. H. since his undergraduate dissertation (1953) and PhD dissertation (1960). In 1977 he edited a volume of a small International Economic Association conference held in 1975 and inspired by John Hicks, who sadly but with foresight ended the conference in despair (see Harcourt 1977, introduction). We have already referred to P. K.'s book on Kalecki's microanalysis, Kriesler (1987), while elsewhere he has written "Microfoundations: A Kaleckian Perspective", Kriesler 1996. Both editors think the role model for a constructive approach to the issues raised may be found in Kalecki's work, especially his review in 1936 of *The General Theory* (Kalecki [1936] 1982; Harcourt 2006, 21–25).

(23.) G. C. H. was overwhelmed with admiration when he read this paper, his introduction to Rizvi's work.

(24.) Lance Taylor's recent book (2010) and his chapter in these volumes show clearly and forcefully how such a misinterpretation could and should be avoided.

(25.) This is the course strongly advocated by Phillip Wicksteed in 1910, as Robbins acknowledged.

(26.) Neil Hart's superb PhD dissertation (2009), on Marshall and evolution, which will be published in two volumes by Palgrave Macmillan (Hart 2012 is the first volume), is the most profound explanation of these issues; but this should not detract from the importance of Pratten's much earlier contribution.

(27.) They also would profit from reading John Pullen's (2010) comprehensive critical history of the development of the theory.

(28.) In the 1940s Swan carried out an exercise based on the system of *The General Theory* and Australian statistics, but the empirical aspect of it was not technical econometrics (Swan 1989).

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A Personal View of the Origin of Post-Keynesian Ideas in the History of Economics

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The Oxford Handbook of Post-Keynesian Economics, Volume 1: Theory and Origins
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[–] Abstract and Keywords

In *The General Theory of Employment, Interest and Money* (1936), John Maynard Keynes takes pains to contrast his theory with what he termed "classical economists" such as David Ricardo, Alfred Marshall, and James Mill. This classification includes what today would be called neoclassical economists, to whom Keynes makes most frequent reference. The reason for this is that his classification is based on the absence of a theory of "effective demand." Keynes called his theory a general theory, which means that he was "chiefly concerned with the behavior of the economic system as a whole,—with aggregate incomes, aggregate profits, aggregate output, aggregate employment, aggregate investment, aggregate saving rather than with the incomes, profits, output, employment, investment and saving of particular industries, firms or individuals." Here Keynes appears to be primarily concerned to differentiate his approach from what is now called neoclassical microeconomics, and in particular to the use of Marshall's method of partial equilibrium or Léon Walras's general equilibrium based on individual supply and demand functions.

Keywords: The General Theory of Employment, Interest and Money, John Maynard Keynes, classical economists, David Ricardo, Alfred Marshall, profits, employment, Léon Walras, supply and demand

In his *General Theory* (1936) Keynes takes pains to contrast his theory with the "classical economists," "a name invented by Marx to cover Ricardo and James Mill and their predecessors.... I have become accustomed...to include in 'the classical school' the followers of Ricardo, those...who adopted and perfected the theory of the Ricardian economics, including (for example) J. S. Mill, Marshall, Edgeworth and Prof. Pigou" (Keynes [1936] 1973, 3 n. 1). Thus Keynes includes in his definition what today would be called neoclassical economists, to whom he makes most frequent reference. The reason for this is that he forms his definition on the basis of absence of a theory of "effective demand": "The idea that we can safely neglect the aggregate demand function is fundamental to the Ricardian economics,...effective demand...vanished from economic literature. You will not find it mentioned even once in the whole works of Marshall, Edgeworth and Professor Pigou, from whose hands the classical theory has received its most mature embodiment. It could only live on furtively, below the surface, in the underworlds of Karl Marx, Silvio Gesell or Major Douglas" (Keynes [1936] 1973, 32).

In his preface to the French edition, Keynes outlined another "main *differentiae* of my approach. I have called my theory a general theory. I mean by this that I am chiefly concerned with the behavior of the economic system as a whole,—with aggregate incomes, aggregate profits, aggregate output, aggregate employment, aggregate investment, aggregate saving rather than with the incomes, profits, output, employment, investment and saving of particular industries, firms or individuals. And I argue that important mistakes have been made through extending to the system as a whole conclusion which have been correctly arrived at in respect of a part of it taken in isolation" (Keynes [1936] 1973, xxxii). Here Keynes appears to be primarily concerned to differentiate his (p. 46) approach from what is now called neoclassical microeconomics, and in particular to the use of Marshall's method of partial

equilibrium or Walras's general equilibrium based on individual supply and demand functions.

Indeed, Keynes's only professed theoretical affinity is with "what now seems to me to be the element of scientific truth in mercantilist doctrine," and in particular what he called "the pre-classical doctrine" associated with Locke and Hume: "that everything is produced by labour, aided by what used to be called art and is now called technique, by natural resources which are free or cost a rent according to their scarcity or abundance, and by the results of past labour, embodied in assets, which also command a price according to their scarcity or abundance. It is preferable to regard labour, including, of course, the personal services of the entrepreneur and his assistants, as the sole factor of production, operating in a given environment of technique, natural resources, capital equipment and effective demand. This partly explains why we have been able to take the unit of labour as the sole physical unit which we require in our economic system, apart from units of money and of time" (Keynes [1936] 1973, 213–14).

The economists who developed Keynes's *General Theory* sought to extend his approach beyond the basically short-period confines of a given capital stock, as well as to extend his criticism of neoclassical economics' failure to deal with effective demand and provide a full-blown alternative to the "neo-classical synthesis," or to what Joan Robinson called "bastard Keynesianism"(Robinson 1962a), an approach which sought to combine equilibrium neoclassical microeconomics with hydraulic, fine-tuning Keynesian macroeconomics.

This effort involved distinguishing between other aspects of classical and neoclassical economics and despite Keynes's definition, a return to many of the main macroeconomic themes of the classical economists. This integration of Keynes's theory with the approach of the classical economists concerned four main areas. The first was the need to extend the theory to long-run capital accumulation, a theme that was central to classical economists from Smith to Ricardo to Marx. The second was an attempt to follow Keynes's proposals on a monetary production economy and shift the emphasis away from what Mill had called "catalactics" or the economics of exchange, and back to production as the source of wealth creation. The third was the attempt to provide an alternative approach to the neoclassical theory of distribution based on marginal productivity of individual factors of production. The starting point was found in the theories of income distribution across social classes associated with economists such as Ricardo (see, for example, Kalecki 1939 and Kaldor 1955–56). Finally, there was a need to incorporate, or at least come to terms with, Sraffa's devastating critique of Marshallian economics of supply and demand, and proposal that the alternative should be found in a reappraisal of classical economics (see Sraffa [1925] 1998; 1926, 1960).

Many economists interpreted Keynes's emphasis on the importance of investment in generating effective demand as implying that the current stock of capital was given. This was interpreted as being equivalent to Marshall's short-period analysis and suggested that the first extension of the theory should be to develop a long-period version of effective demand. This was the approach taken in Joan Robinson's "Generalisation of the (p. 47) General Theory" (Robinson 1956, 1962b). The analysis of capital accumulation also led back to the theories of Karl Marx and Rosa Luxemburg, as well as to Ricardo's analysis of the impact of the distribution of income on the rate of capital investment. In addition, contemporary theories such as the dynamic analysis of Roy Harrod (1939, 1948) and the analysis of long-run effective demand developed by Evsey Domar (1946) dealt with similar extensions of Keynes. One of the major difficulties in developing a theory of an economy developing over time was the treatment of expectations. In Keynes's theory these could be taken more or less as given at a point in time, while they clearly would be changing, influenced by the changes occurring in the economy, as it expanded. This conundrum was resolved by assuming that the economy evolved in tranquil conditions through time without major disruptions or disappointments. This approach built on Kalecki's idea of expectations being determined as an average of past experience and Harrod's idea of a warranted rate of growth as one in which entrepreneurs are broadly satisfied with the decisions that they have taken and thus do not revise their anticipations. The result was an analysis of comparative dynamics, or stable growth paths in which the impact of different constellations of investment decisions and technological conditions on the growth of employment could be compared (see, for example, Robinson 1956, 1962b).

In developing his theory Keynes had used Marx's idea of the creation of surplus value in the use of labor power in the production process: M-C-M′. Keynes adapted this approach to argue that the entrepreneur was only interested in converting money, M, invested into money profits, M′, irrespective of whether this involves a larger or smaller real output or employment of labor. He thus baptized money as the "real" factor in what he called a "monetary

production economy." In this way the production/investment decision replaced the emphasis on supply and demand in determining exchange values that had been the major concern of the neoclassical economists. The concern over production conditions led back to Adam Smith's concept of the division of labor and its extension to increasing returns in the work of Allyn Young, and of Marshall's attempt to incorporate falling supply prices into his explanation of short-period prices. Thus one of Joan Robinson's earliest attempts to provide a long-period version of *The General Theory* dealt not only with capital accumulation but of the labor intensity of the technique of production embodied in the new investment that was taking place (Robinson 1953–54, 1956).

In Ricardo's theory the expansion of the economy was linked to the amount of income that would accrue to capitalists who were presumed to use all of their profits to support new investment. This linkage between the distribution of income and the rate of capital accumulation was replicated in the extensions of Keynes's theory largely through the adoption of Kalecki's use of the Ricardian savings assumptions, that is, that workers received subsistence wages and thus could not save, while capitalists saved and invested all of their profits. This allowed an identity between profits and investment, and between consumption and labor incomes. Thus if value added in any period was comprised of profits and wages and output was comprised of investment and consumption goods the income and product accounts of the economy could be written $Y = P + W = C + I$ and (p. 48) produced Kalecki's famous aphorism, "Capitalists get what they spend and the workers spend what they get." The implication was that higher profits would produce higher investment and growth (Kalecki 1939; Kaldor 1955–56). In this simplified version there is a coincidence between workers' incomes, the wage bill, and consumption expenditures and between capitalist's incomes, their profits, and investment expenditures. Once wages exceed subsistence and capitalists become profligate and spend some of their profits on consumption goods, these simple equivalences break down, but as Pasinetti 1962 has shown, the introduction of these complications does not impinge on the distributive relation between capitalists' and workers' incomes and provides a powerful alternative to the neoclassical theory of distribution based on marginal productivity. Thus, distribution could be divorced from the strict dependence on the theory of value and exchange to be determined in the conditions of production and output.

Indeed, the attempt to make sense of the concept of the marginal productivity of capital and labor in an economy in which the level of output is variable and determined by the level of effective demand led to the discussion of exactly what was meant by a given quantity of capital that could be held constant while the quantity of labor varied to determine its contribution of output at the margin. Veblen had already identified the "classical failure to discriminate between capital as investment and capital as industrial appliances" in his "Preconceptions of Economic Science" (1899) and then more directly in his review of J. B. Clark's theory of value and distribution ([1908] 2002). This discussion turned on the mobility or malleability of capital but raised the additional question of the determination of prices outside a system of supply and demand determined equilibrium prices. Wicksell had already noted that the concept of the value of capital depended on the prices used to value it, and, since those prices incorporated profits for the producers/users of capital, that there could be circularity in determining its remuneration as a rate of profit when the value quantities already embodied the rate of profits on capital. Thus Wicksell noted the possibility that a given equipment of capital might have different valuations for a given rate of profit. In such cases there might be no unambiguous relation between the quantity of capital applied and its rate of return. If quantities could not be unambiguously specified, then the possibility of using quantities supplied and demanded to determine prices was also called into question.

This was the point of entry of Piero Sraffa's criticism of neoclassical economics, (Sraffa 1960) noting that while it might be possible to explain the demand curve on diminishing utility, this approach applied to production was based on a logical confusion incorporating two diverse explanations of the behavior of supply—increasing returns based on technical progress associated with the division of labor in an expanding economy and decreasing returns due to the law of variable proportions and relative scarcity of a factor based on Ricardo's theory of rent. If there was no coherent explanation of supply, then prices had to be determined by some other mechanism than the equilibration of supply and demand.

Sraffa himself indicated that an approach based on imperfect competition might provide a solution, and Joan Robinson's first major work (1933) dealt with this aspect, while (p. 49) Kalecki (1939), working from a Marxian perspective, proposed an alternative in the form of a markup of prices over costs that could be explained by the degree of monopoly, an approach also proposed by Abba Lerner. (See also Robinson 1977.)

Sraffa instead chose to follow a different route, seeking to refine the classical approach of prices determined by costs of production and the viability of the economic system in his *Production of Commodities by Means of Commodities*. Rather than a simple cost of production or adding up as found in Smith, Sraffa noted that whenever outputs were included as inputs in the production process of other outputs, prices had to be such that each process of production could use its outputs to acquire the appropriate inputs for continuous production and to provide a return on those inputs equal to that generated in every other process of production of output. These prices were called *prices of production* and would be directly influenced by the distribution between wages and profits, thus restoring the link between production, distribution, prices, and accumulation. A by-product of this linkage was the definitive demonstration that the prices of capital goods could not be independent of the rate of profits, and thus the quantity of capital in value terms could not serve as an independent variable to determine its marginal productivity.

Sraffa left the rate of profits in his system independent—he suggested that it might be set by the rate of interest on money (Sraffa 1960) but never drew further conclusions from his book, which was subtitled a "Prelude to a critique of economic theory". In particular he never provided an extension to the long period or to a theory of capital accumulation along the lines of Ricardo or Marx. His results did, however, highlight the importance in any such theory of the determination of the rate of profits, and an alternative determination of equilibrium prices to the supply-and-demand approach of the neoclassical economists. Post-Keynesian economists have concentrated on providing answers to these questions.

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Sraffa, Keynes, and Post-Keynesianism

Heinz Kurz

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[–] Abstract and Keywords

This article explores Piero Sraffa's role in the criticism of mainstream theory and the development of post-Keynesian economics. Despite claims to the contrary, there is a strong bond uniting post-Keynesians of various brands and Sraffa: it is their opposition to the marginalist or neoclassical theory. The latter revolves basically around two closely interrelated ideas, one regarding the determination of the volume of output as a whole and the other regarding the sharing out of that output among different claimants. This chapter first counterposes the classical and the marginalist approaches to the theory of value and distribution, as Sraffa saw them, and provides a summary account of his main criticisms of the latter. It then looks at Sraffa's view of the working of the economic system as regards the determination of output as whole and employment. According to Sraffa, the capitalist economy is not a crisis-free system possessed of an endogenous mechanism of self-regulation, as it is described by marginalist theory.

Keywords: Piero Sraffa, post-Keynesian economics, output, value, distribution, marginalist theory, employment, self-regulation, capitalist economy, mainstream theory

1. Introduction

Invited to contribute to this *Handbook* a chapter dealing with "Sraffa's role in the criticism of mainstream theory and the development of Post-Keynesian theory," I asked myself whether such a contribution was appropriate—quite independently of the spelling of the "Post-Keynesanism" under consideration (in one word, with or without a hyphen etc.).[1] It is far from self-evident that Sraffa's contribution ought to be reckoned as belonging broadly to post-Keynesianism, and there are voices maintaining that it should not. Interestingly, they come both from the camp of advocates of post-Keynesianisms of sorts and from the camp of its critics. Marc Lavoie (forthcoming) points out that among post-Keynesians there is a group that wishes to distance itself from Sraffa and those working in his tradition. And Christopher Bliss (2010, 636), a critic of post-Keynesianism, contends that Sraffa "had little continuing interest in macroeconomics"—"to call him a post-Keynesian is anomalous."

Upon some reflection I accepted the kind offer on the ground that there are sufficiently close links between Sraffa's viewpoint and the viewpoints of some post-Keynesians. In addition I found support in Ludwig Wittgenstein's saying that to try to define philosophical systems in travail is like trying to define clouds by their shape. Post-Keynesianism is an economic line of thinking or approach in travail, which at present is characterized by a set of convictions shared by its proponents, but which lacks overall coherence.[2] There is the famous joke that when ten economists are asked to come up with their views on a particular subject, eleven opinions will be presented, two coming from Mr. Keynes. I am inclined to think that with regard to post-Keynesians the situation is worse (or better, just as you like). There is, however, a strong bond uniting post-Keynesians of various brands and Sraffa: it is their opposition to the marginalist or neoclassical theory (see (p. 52) also Kurz and Salvadori 2010a). The latter revolves basically around two closely interrelated ideas, one regarding the determination of the volume of output as a whole and the

other regarding the sharing out of that output among different claimants: First, there is "Say's Law," conceived of as the tendency of the market economy, if left to itself, toward the full employment of labor and the full utilization of the capital stock. Second, there is the idea that the proprietors of the productive factors are remunerated according to the factors' marginal contributions to the product. While Keynes and his followers directed their attention and energy first and foremost at a criticism of the first idea, Sraffa and his followers did so with respect to the second one. This division of labor between the two groups of critics of marginalist theory may, but need not, involve a division of view, although attempts to integrate into a coherent whole what took off from different starting points turned out to be all but simple.

The composition of the chapter is the following. Section 2 counterposes the classical and the marginalist approach to the theory of value and distribution, as Sraffa saw them, and provides a summary account of his main criticisms of the latter. Section 3 deals briefly with the route by which Sraffa arrived at his results, which sheds additional light on his critical task. The section is based on Sraffa's unpublished work kept at Trinity College, Cambridge (U.K). (References to Sraffa´s papers follow the catalogue prepared by Jonathan Smith). Obviously, only a small part of his respective work can be surveyed. Section 4 draws the implications of these criticisms with regard to his view of the working of the economic system as regards the determination of output as whole and employment. According to Sraffa the capitalist economy is not the crisis-free system possessed of an endogenous mechanism of self-regulation that is described by marginalist theory. Section 5 contains some concluding observations.

2. Sraffa's Criticism of the Marginalist Theory of Value and Distribution

In the preface of his book (and even in the book's subtitle) Sraffa is very clear about its critical objective: the propositions in the book are explicitly designed "to serve as the basis for a critique of [the marginalist theory of value and distribution]" (1960, vi). He is also very clear about the origin of his propositions: they derive from "the standpoint…of the old classical economists from Adam Smith to Ricardo" (1960, v) and consist in a coherent reformulation of this standpoint, shedding its earlier weaknesses and developing its strengths. By reformulating the classical theory of value and distribution Sraffa at the same time sought to provide a foil against which the shortcomings of the marginalist theory can be put into sharp relief. We might qualify Sraffa's respective intellectual enterprise thus as reflecting Spinoza's *determinatio est negatio*.[3]

(p. 53) **Alternative Roles of Counterfactuals**

In the preface Sraffa also emphasizes the main substantive difference between the classical and the marginalist analytical approach, as he sees it. The former analyzes a *given* system of production actually in use, specified in terms of the actual gross outputs of the various commodities produced and the methods of production actually employed to do this plus the magnitude of one of the distributive variables, the real wage rate or, alternatively, the share of wages in the social product (or the general rate of profits). On the basis of these givens the classical authors determined the other distributive variable (and the rents of land) and relative prices. It is only after having established the mathematical properties of a given system of production with regard to the constraint binding changes of the distributive variables and the associated changes in relative prices that the classical authors turned to the problem of the choice of technique from a set of alternatives available to cost-minimizing producers. This choice is then shown to depend on income distribution.

The marginalist authors tried instead to understand a given system of production by analyzing *another*, an adjacent, system, taken to be only marginally different from it. This is reflected in their method of contemplating the presumable effects of hypothetical incremental changes "in the scale of an industry or in the 'proportions of the factors of production'" (1960, v). The marginalist approach thus involves as part and parcel of the method employed the invocation of a very particular counterfactual reasoning, reflected in such concepts as the marginal utility of a commodity and especially the marginal productivity of a factor.[4] Translated into the framework of a choice of technique and thus a choice among alternative systems of production, the marginalist approach focuses attention entirely on the hypothetical existence of a system adjacent to the actual one or, more precisely, on the existence of a switchpoint between the two systems (and actually a continuum of such switchpoints between systems). The characteristic feature of switchpoints is that both distributive variables, wages, w, and the rate of profits, r, are rigidly fixed and are the same in both systems. Sraffa found this marginalist presupposition unacceptable. In a note written on December 15, 1943, he stressed that

> the so-called determination is due to circumstances, which exist, not in the real world of actual production, but only in the world of imagination and possibilities: they are not intrinsic to the [actual] system and other levels [of *w* and *r*] cannot be "inconsistent" with it. As far as the real, existing, system described by the equations is concerned, any levels [of *w* and *r*] are consistent with it.
>
> (Sraffa Papers D3/12/35, 43(2))

The question is immediately close at hand, whether the choice of technique argument supports the marginalist intuition that the rate of profits (the real wage rate) can be conceived of as reflecting the marginal productivity of physical capital (labor) and whether the ratio of the two distributive variables moves inversely with the ratio of the quantities of the two factors of production. If the question were to be answered in the positive, then (p. 54) for any given endowment of the economy of capital and labor, given technical alternatives and given preferences of consumers, income distribution and relative prices (and the quantities produced) would be fully determined. In this case the particular counterfactuals invoked by the marginalist authors, especially the concept of the marginal productivity of capital, would be fully justified and the basic intuition guiding the approach confirmed.

The Revival of the Classical Approach

Sraffa's achievements now consist in the following. On the constructive side he showed that the classical approach was perfectly sound and allowed us to determine the general rate of profits and relative prices in terms of the system of production actually in use and the real wage rate or, alternatively, the share of wages in the social product. No other determinants were needed, and no other "forces" such as demand and supply functions had to be invoked. Scarce natural resources, such as land, fixed capital, and joint production did not constitute insurmountable obstacles to the approach, as some earlier critics had maintained.[5] The analysis also did not depend on any restrictive assumption regarding the employment of productive factors (especially labor). There is no presumption that the workforce of society is fully employed. (Both a casual observation of real economies and, as we will see below, theoretical considerations speak in favor of not prejudicing the analysis by focusing attention only on economic systems in which the services of all productive factors are permanently fully employed or close to full employment.) The classical approach draws attention to the main factors regulating income distribution and relative prices: technical knowledge embodied in the methods of production available to cost-minimizing producers at a given time, the amounts and qualities of natural resources at the disposal of society, and the real wage rate (or share of wages), seen as an outcome of the "scramble for the surplus" (Sraffa Papers D3/12/11, 83). Changes in these factors are identified as the main causes over time of changes in income distribution and relative prices. If we take Adam Smith's concept of an ever deeper division of labor seriously, as Sraffa apparently did, then actual changes in output levels are accompanied by learning effects and typically entail changes in the system of production in use, that is, changes in the methods of production actually employed. Concerned with reviving the standpoint of the old classical economists, Sraffa in his analysis therefore could not have recourse to constant returns to scale, thus his explicit warning that no such assumption is entertained (Sraffa 1960, vi).[6]

The Difficulty Besetting the Marginalist Notion of Capital

On the critical side, Sraffa stressed the implications and difficulties besetting the marginalist approach. First, by proceeding in terms of hypothetical marginal changes it entered unknown territory and had to come up with concepts the meaning of which was dubious (p. 55) or misleading. In consumer theory the concept of marginal utility introduced expectations into the analysis, because the benefits consumers derive from a marginal increase in the consumption of a particular good cannot be known a priori; it is an expected magnitude. Such expectations may, or may not, be met, and in case they are not met, they may change swiftly. The equilibrium contemplated by the marginalist theory therefore of necessity applies only to expected states and not to actual ones and may be fitful. More important, it is unclear what is meant by a marginal increase in the "quantity of capital" employed in the economy, given the employments of all other productive factors, labor and land. In order to be consistent with the rest of the analysis, the increase had to be in *physical* terms and had to leave untouched the size and composition of the capital stock in existence prior to the change. But what sense could be given to this thought experiment other than in exceptionally bold cases, such as the "corn model," where there is a single capital good, corn (used as seed), and where "more" or "less" of this capital good has an unambiguous meaning? But what is the meaning in the only interesting, because realistic, case in which there are heterogeneous capital goods? How could the

quantity of capital or its incremental increase be ascertained independently of relative prices and thus the rate of profits on whose magnitude the prices depend? This difficulty had not escaped the more attentive marginalist theorists, such as Knut Wicksell.[7] Confronted with the problem, they tried to cope with it as best as they could—eager to preserve, of course, the overall marginalist or demand-and-supply approach, which they considered to be the only one available.[8] This made them abandon the concept of a physical concept of capital and put in its place a *value* concept. That is, they contemplated a marginal increase in the *value of capital* (in terms of some numeraire) employed and allowed for an optimal adjustment of the *physical composition* of the capital endowment to the other data of the economic system—preferences of consumers, technical alternatives available to producers, and the endowments of the economy of original factors of production (labor and land).[9]

Alas, this was not really a way out of the difficulty, and it landed them right away in another difficulty. According to the received marginalist intuition (see above), which obtained its clue from the classical principle of intensive diminishing returns and thus the principle of intensive rent, the remuneration of a factor of production relative to the remunerations of other factors should be the smaller (larger), the smaller (larger) is its relative scarcity. In the case of an incremental increase of capital ceteris paribus, capital becomes relatively more abundant, that is, relatively less scarce, and therefore its rate of remuneration—the rate of interest (or profits)—can be expected to fall, following the usual marginalist reasoning. This however, implies that methods and entire techniques of production available at a given moment of time can be ordered monotonically in terms of the capital-labor ratio (or capital intensity) they represent with respect to the rate of interest. Sraffa's demonstration of the possibility of the reswitching of techniques and of reverse capital deepening showed that this view cannot be sustained: the marginalist theory of value and distribution was not the alleged *general* theory its advocates thought it was.[10] It applied only in special circumstances, on which more below.

(p. 56) We now turn to a brief discussion of the development of Sraffa's constructive, critical, and interpretative work. The reader interested in a fuller account is asked to consult Kurz (2003), Garegnani (2005), Kurz and Salvadori (2005), Kurz (2006a) and Gehrke and Kurz (2006).

3. The Route by Which Sraffa Reached His Conclusions

According to Sraffa, in economics the conclusions are sometimes less interesting than the route by which they are reached. In his case, it is interesting to have a look both at the route he took and the conclusions at which he arrived.

The Ceteris Paribus Assumption

In the mid-1920s Sraffa had criticized the Marshallian partial equilibrium analysis. He had shown that Marshall's theory was both logically inconsistent and could not explain the facts (Sraffa 1925, 1926). Much of Sraffa's criticism concerned the ceteris paribus assumption employed by Marshall. In his papers Sraffa variously called it "stupid" because it is generally not possible to hypothetically change just one variable and think of all others as "frozen in."[11] Marshall's approach in terms of simple demand and supply schedules designed to determine the price and quantity of a thing traded cannot be sustained. Since marginal analysis in general proceeds in terms of the ceteris paribus assumption (e.g., change the "quantity of capital," other things equal), it was clear that a central element of Sraffa's critical project had to consist in demonstrating the "stupidity" of this assumption by way of a general analysis. This he began to elaborate in the late 1920s in an attempt to lay bare, and then develop, the classical economists' approach to the theory of value and distribution.

Equations without and with a Surplus

From November 1927 up until the end of the decade, Sraffa had managed to establish in terms of what he called his "first" and "second equations" the mathematical properties of economic systems as regards income distribution and relative prices supporting any such distribution in the case of single-product industries and a given real (i.e., "inventory") wage rate without and with a social surplus. The attention focused on the case of free competition and thus a uniform rate of profits. Sraffa was clear that in systems with a surplus the "scramble for the surplus" necessitates taking into account social institutions in addition to "natural" conditions of production and abandoning the concept of (p. 57) cost and prices as determined exclusively by the latter. He understood, and illustrated in

terms of numerical examples, that relative prices generally depend on the sharing out of the surplus among workers and capitalists. He established an inverse relationship between the rate of profits and the share of wages, following Ricardo's concept of "proportional wages." It was thus not possible to assume an isolated change in the wage rate, for example, because such a change necessitated a change in the rate of profits and relative prices, given the system of production. By 1929 Sraffa had fully solved the problem of extensive diminishing returns and thus extensive rent and had established (1) that the choice of which qualities of land to cultivate depends on the level of the wage rate and (2) that the order of rentability and the order of fertility of different qualities of land need not coincide. He even came close to stating the possibility of a particular quality of land being cost-minimizing (and thus profitable) at two different levels of the wage rate, with another quality of land being cost-minimizing at levels of the wage rate in between, that is, the phenomenon of reswitching with regard to the use of lands. In the late 1920s he also began to study the problem of fixed capital.

Reasoning in a Circle

By the early 1930s Sraffa had established the fact that neither the quantity of capital employed with a particular method of production nor the quantity of capital employed in a particular industry nor the capital employed in the economy as a whole could be ascertained independently of relative prices and the distribution of income. For a given real wage rate the general rate of profits and the prices of commodities (expressed in terms of some standard of value), and thus the value of capital, were determined simultaneously. The marginalist postulate of a *given* quantity of capital (whether relating to a method of production, an industry, or the entire economy), whose marginal productivity would determine the profit rate, presupposes as already known what is yet to be ascertained: the rate of profits.

Observer versus Experimenter

In a document composed in the summer or autumn of 1929 Sraffa compared the sets of given quantities used in different theories in order to determine value (D3/12/13, 2–5). The quantities involved may be classed in three groups. The first group encompasses quantities

> which cannot possibly be measured, because they are not defined in terms of the method of measuring them, e.g. marg.[inal] utility and sacrifice. (No definition at all is given for measuring them in the case of several individuals: in the case of one individual, they are defined as being proportional to certain quantities, i.e. prices, but this is, as Cairnes says, "merely giving a name to the unknown causes of price.") (p. 58) Such quantities must be *excluded altogether*: at the worst, they may be used as a fictitious device for solving problems, but must not appear either in the premises nor in the conclusions.

About the second group Sraffa wrote:

> At the opposite extreme there are quantities which can be, and in fact are, statistically measured. These quantities have an objective, independent existence at every or some instants of the natural (i.e. not interfered with by the experimenter) process of production and distribution; they can therefore be measured physically, with the ordinary instruments for measuring number, weight, time, etc. Such are quantities of various materials used or produced, of lands, quantities of labour (?), lengths of periods (?), etc.[12] These are the *only* quantities which must enter as constants in economic theory, i.e. which can be assumed to be "known" or "given."

To this Sraffa added: "The 'extensive' theory of rent, and the labour theory of value only assume this kind of knowledge."[13] Notice also his reference to the "experimenter" who, differently from the detached "objective" observer, is said to interfere in the process, thereby changing its properties. This distinction plays a crucial role in his argument. Its meaning becomes clear when we turn to the third group:

> Finally, there is the class of quantities, which form the basis of Marshall's theory (or, rather, of Pareto's), such as demand and supply curves, marginal productivities (i.e. rate of growth of total), indifference curves, etc. Here the constant quantities have no names—they are the parameters of curves. The several quantities represented by these curves do not exist at any one moment, nor during any period of the recurrent steady process of production or consumption. They are alternatives, only *one* of which can exist

> in any one position of equilibrium, all the others being thereby excluded (even the one does not really exist if there is no change, since it is the rate of growth of a quantity, i.e. marginal product: it can be inferred from price, but so can marginal utility, which…we have agreed does not exist). Therefore, they cannot be found by merely observing the process or state of things, and measuring the quantities seen. They can only be found out by means of *experiments*—and these quantities in effect are always defined in terms of such experiments (successive doses applied to land; alternatives offered to the consumer; etc.)

He continued:

> These experiments cannot be carried out (and never have been, as a matter of fact) for various reasons: 1) the practical difficulties, 2) the lack of definition of the conditions to be required, which are always summed up in the absurd "other things being equal.["]
>
> But even apart from these difficulties, which might conceivably be overcome, there remains something about these experiment[s] which is very curious: they are generally regarded as acceptable, as if they were calculated to reproduce under controlled (p. 59) conditions, so as to be able to measure them, facts which actually happen "in nature" all the time but cannot directly be pinned down by observation. But the experiments have an entirely different significance: they actually *produce* facts which would otherwise not happen at all; if the experimenter did not step in first to produce them, and then to ascertain them, they would remain in the state of "unknown possibilities," which amounts to the deepest inexistence.
>
> (Sraffa Papers D3/12/13, 2–5; Sraffa's emphases)

Marginalist theory, Sraffa insists, does not simply analyze a given system as it is; it rather presupposes a somewhat different system. It does not accept the facts as they are, but first produces new "facts." Counterfactuals of a very particular kind are a sine qua non in marginalist theory right from the beginning: without them there would be no theory. Counterfactuals in classical theory play a very different role: they exemplify what the theory, which has been elaborated without any reference to counterfactuals, has to say in case some of the quantities of the second kind change.[14]

"Bortkiewicz's Dictum" and the "Monotonic Prejudice"

In 1931 Sraffa had to abandon the project of reconstructing the classical approach in favor of the "big Ricardo," the editorial project with which the Royal Economic Society had entrusted him in 1930. Soon after he was finally able to resume his work on the first project in 1942 (before he had to abandon it again because of the Ricardo edition in 1946) he in the following year by accident came across Ladislaus von Bortkiewicz's essay in three parts, "Wertrechnung und Preisrechnung im Marxschen System" (1906–7), and then studied other contributions by the same author. These served him as a welcome litmus paper test of his own earlier findings in the theory of value and distribution and the knowledge he in the meantime had accumulated on the classical authors and Marx. It can have only increased his interest in Bortkiewicz's papers when Sraffa discovered that the Berlin professor had enunciated essentially the same maxims the theory of value and distribution was supposed to meet as he, Sraffa, had done in the first period of his constructive work. Methodologically, Bortkiewicz was thus seen as a comrade in arms, although Sraffa was highly critical of some of the latter's views (see Gehrke and Kurz 2006). In particular, Bortkiewicz had put forward what Sraffa called "Bortkiewicz's dictum" or "dogma." Against Böhm-Bawerk's explanation of interest (profit) Bortkiewicz had insisted:

> I believe that this can be regarded as *the touchstone of such a theory*: whether it is able to show the *general cause of interest* also for the case in which not only *no technical progress*, of whichever type, takes place, but also the length of the periods of production appears to be technically predetermined, so that *no choice is possible between different methods*.
>
> (Bortkiewicz 1906, 970–71; emphasis added)[15]

In other words, interest had to be explained in conditions of a *given* system of production—setting aside a choice of technique and technical progress. In another paper Bortkiewicz had added the following specification of his maxim:

> (p. 60) Now my opinion is that in general the value of goods can only depend upon such technical knowledge as is applied in practice. But the value of goods remains unaffected by knowledge, which, on whatever grounds, is not utilized.
>
> The result thus obtained can be summed up in the following brief formula: *for [the determination of] the value of goods there come into consideration only actual methods of production [Verwendungsarten], and not merely potential ones*.
>
> (D1/91, 7; see Bortkiewicz 1907, 1296–97 and 1299 emphasis in original)

Sraffa marked these passages approvingly in the margin. In fact, without knowing Bortkiewicz's work, Sraffa in his systems of equations in the late 1920s had strictly adhered to the dictum, which flew in the face of the marginalist approach. However, he was critical of Bortkiewicz's opinion that techniques could generally be ordered monotonically in the usual marginalist way. As Sraffa noted, Bortkiewicz had correctly pointed out, against Böhm-Bawerk, that there is "no 'average period of production'" that could be defined independently of the rate of interest but then had nevertheless put forward the erroneous proposition that "in general" there is a lengthening of the period (i.e., an increase in capital intensity) with a fall in the rate of interest. This unwarranted belief reflected what Sraffa called a "monotonic prejudice" (Sraffa Papers D1/91, 14 and 27, verso). In fact, he had criticized this view as early as February 1931, and in his working notes he had in fact demonstrated the impossibility of a general monotonic ordering of the methods of production long before he came across Bortkiewicz's essay. In one of his notes, commenting on Kaldor (1939), another economist who had fallen victim to the prejudice, for example, he had pointed out:

> There is no assurance that, owing simply to a change in the rate of interest, the order is not reversed. Suppose two commodities produced by similar proportions of capital and labour (i.e. which are similarly divided between profits and wages): but one contains more capital in the "early" stages and less in the later ones—i.e. although the total quantity of interest is equal in the two commodities, in this one it is made up to a larger extent of compound interest: it is clear that if the rate of profits rises, the composition of this commodity will come to contain more profits (i.e. capital) than the other.
>
> (Sraffa Papers D3/12/15, 10)

Hence a main pillar upon which marginalist theory rested, the principle of substitution in production, could not be relied upon.[16] Alternative methods of production to produce a particular economy and even entire systems of production cannot generally be ordered monotonically in terms of the capital-output ratio (or the capital-labor ratio) with regard to the rate of interest (profits).

The "Surrogate Production Function" and Its Defects *Ante Litteram*

Sraffa also pointed out in which exceptional circumstances the marginalist theory applied. It turned out that these circumstances were those that guaranteed a strict (p. 61) proportionality between relative prices and the amounts of labor expended in the production of the various commodities, that is, a situation in which the simple (or rather debased) labor theory of value holds true.[17] Interestingly, in a note composed on January 16, 1946, Sraffa anticipated the flaw besetting Samuelson's attempted defense of the received long-period marginalist theory in terms of the concept of the "surrogate production function" (Samuelson 1962). As Sraffa's argument makes clear, Samuelson's reasoning sixteen years later had no claim to general validity. On the contrary, it presupposed the validity of the simple labor theory of value and thus held strictly true only in a one-good economy:

> The Irony of it is, that if the "*Labour Theory of Value*" applied exactly throughout, *then, and only then, would the "marginal product of capital"* theory work!
>
> It would require that all products had the same org.[anic] comp.[osition]; and that at each value of *r*, *each* comm.[odity] had an "alternative method," and that the relations within each pair should be the same (i.e. that marg.[inal] prod[uct]s. should be the same; …); so that, even when the System is switched, and another Org. Comp. came into being, it should be the same for all products.
>
> Obviously this would be equivalent to having only one means-product (wheat).

> Then, commodities would *always* be exchanged at their Values; and their relative Values would not change, even when productivity of labor [*sic*] increased.
>
> (Sraffa Papers D3/12/16, 34; Sraffa's emphases)

Sraffa's careful scrutiny of the marginalist theory of value and distribution thus led him essentially to the same conclusion he had reached with respect to Marshall's theory: "the theory cannot be interpreted in a way which makes it logically self-consistent and, at the same time, reconciles it with the facts it sets out to explain" (Sraffa 1930, 93).

This brief summary account of some of Sraffa's objections to the marginalist concept of capital does not, of course, exhaust his critique of marginalist theory, or rather of the various versions in which it existed. Sraffa perused carefully the contributions of, among others, Jevons, Walras, John Bates Clark, Böhm-Bawerk, Cassel, Wicksell, Pareto, Lindahl, and Hicks and jotted down his critical observations.[18] Due to space constraints it must suffice to draw the readers' attention to just a few of them.

"Men Kick"

Sraffa insisted that the demand and supply schedules have no objective contents: nothing corresponds to them in the real world. Especially in his earlier papers he repeatedly pointed out that the working horse of marginalist theory, the isolated utility maximizing agent—*homo oeconomicus*—is seriously misleading. In an undated passage (which, however, was in all probability written in 1942) he counterposed his own physical real cost approach (pertaining to systems with a given real wage rate) and the marginal utility approach and stressed that in his first and second equations the "food and sustenance of the workers [are] treated…on the same footing as that of horses." He added with **(p. 62)** characteristic irony: "Men however (and in this they are distinguished from horses) kick." This is, of course, an allusion to the "scramble for the surplus," which fixes the real wage rate and which is decided according to the particular circumstances ruling at a given place and time.[19] As to the special nature of horses, which is fundamentally different from the nature of men, Sraffa explained: "The horse (or his physiology) takes a strictly private view of his relation with his food…: he is a perfect utilitarian and thus forms the ideal object of study of the marg.[inal] utility economist" (Sraffa Papers D3/12/16, 18).

Supply and Demand Not Independent of One Another

Sraffa disputed the marginalist view that production and consumption, or "supply" and "demand," can be envisaged as entirely independent from one another. He quoted approvingly from a paper by Maurice Clark (1918, 8; emphasis added):

> Economic wants for particular objects are manufactured out of this simple and elemental raw material [primitive instincts] just as truly as rubber heels, tennis balls, fountain pens, and automobile tires are manufactured out of the same crude rubber. *The wheels of industry grind out both kinds of products. In a single business establishment one department furnishes the desires which the other departments are to satisfy*.[20]
>
> (Sraffa Papers D3/12/7, 4-8, Sraffa's emphasis)

Externalities

As regards the ubiquitous problem of externalities, Sraffa pointed out that "it is not sufficient to make utility of one commodity a function of all others consumed by the individual," as in Vilfredo Pareto's general equilibrium analysis, but it had also to be made dependent on the consumption of the "community" as a whole. Alas, "It would be as if in astronomy we said the movement of each star depends upon all the others, but we have not the faintest idea of the shape of the functions!" (Sraffa Papers D3/12/3, 70). Surely, *this* was the problem, and the received marginalist theory, rooted in methodological individualism, could not possibly deal with it. The classical approach right from the beginning focuses attention instead on certain properties of the economic system as a whole, that is, those relating to income distribution and relative prices in conditions of free competition. Its advocates identified the relationships of the conflicting interests and claims of different groups or classes of agents to the social product—workers,

capitalists, and landowners—that are compatible with the given system of production. Any theory starting from the volitions, decisions, and behavior of people would have to respect such properties and relationships and would have to come up with the same type of equations and solutions Sraffa had elaborated. Sraffa's argument was designed to show that the "forces" contemplated by marginalist theory, utility and disutility, reflected in (p. 63) demand and supply schedules, could not accomplish the task, be it for reasons of a lack of logical self-consistency of the argument or for an inability to reconcile the argument with the facts it sets out to explain.

4. Implications for a Theory of Employment, Output as a Whole, and Economic Growth

From what we have just learned follow certain implications for the main problem Keynes was concerned with, that is, the explanation of employment and output as a whole, and also for the relationship between Sraffa's work and post-Keynesianism. In order to get a clearer idea of this relationship we take into consideration other aspects of Sraffa's writings.

Say's Law Cannot Be Sustained

The most important conclusion that follows from Sraffa's investigation of the problem of the choice of technique is that Say's law of markets (as envisaged by the marginalist authors) cannot be sustained.[21] If we cannot rely upon the principle of substitution in production expressing the monotonic prejudice, then there is no reason to presume that the economy, if left to itself, will bring about a tendency toward the full employment of all productive factors. This result does not depend on the (downward) stickiness of prices, as it is assumed, for example, in neo-Keynesian models. Even if prices were flexible, a fall in the real wage rate need not bring about rising levels of employment, as conventional economic theory predicts. Prices in the classical economists and Sraffa play a different role from the one they play in the marginalist authors. According to Smith and Ricardo, normal or "natural" prices are not scarcity indexes and thus do not perform the task of guiding the economy toward full employment. Prices rather reflect the balance of power in the struggle over the distribution of income in given historical and institutional circumstances. Income distribution is not explained with reference to the demand for and the supply of productive factors. There is also no explanation of distribution in terms of marginal productivities of the respective factors. Profits (and rents) are a residual income that obtains within a given system of production and given real wages (or the share of wages).

Both Keynes and Sraffa rejected Say's Law, although for different reasons. With the analysis not constrained by the straightjacket of the full employment assumption, we do not encounter in classical economics such concepts as Pareto optimality: a system which, in normal conditions, exhibits smaller or larger margins of unused productive (p. 64) capacity and workforce is subject to different laws than a system characterized by full employment and full capacity utilization. In conditions with idle productive capacity the usual marginalist reasoning does not apply. In the marginalist world effective aggregate demand, by definition, has no impact on actual output and its growth over time, whereas in the world of the classical economists it has.

Effective Demand Matters Both in the Short and in the Long Run

A peculiarity of demand-constrained systems is that over longer periods of time excess capacity does not become fully visible and we might easily fall victim to the illusion that the capital stock is always more or less fully utilized. As regards labor, we are familiar with the phenomenon that the longer workers are without jobs the more difficult it is for them to get reintegrated into the employment system, because being on the dole is accompanied by a gradual loss of skills and the capability to work. As regards capital, any underutilization implies a smaller social product than possible, therefore a smaller rate of formation of fresh capital, therefore a smaller rate of growth of the social product, and so on (see Garegnani 1978, 1979). Hence, a level of effective demand that falls short of productive capacity for some time is reflected in the short run by an underutilization of given productive capacity and in the long run by a smaller pace at which productive capacity grows. While the labor force will be diminished as a consequence of unemployment caused by effective demand failures, the capital stock will expand less swiftly. In both cases the full effects of an insufficient effective demand are concealed. The inattentive observer might actually conclude that in the long run the system can be assumed to operate in conditions of close to full employment of labor and close to full capital utilization, whereas what actually happens is that effective demand slows down the development of the supply side of the economy. It would be an elementary mistake to think that the

supply side can be studied without taking into account the role of aggregate effective demand in shaping it.

In assuming full employment of labor and full capacity utilization, neoclassical models, old and new, follow Robert Solow and Trevor Swan's example, who in their 1956 contributions explicitly set aside problems of effective demand. However, we ought to add to their credit that Solow and Swan were not of the opinion that there are no such problems, both in the short and in the long run; see recently Solow's preface in Aghion and Durlauf (2005, 5). Despite Solow's warnings, modern neoclassical growth theorists, especially Robert Lucas, continued to be concerned almost exclusively with the evolution of potential output and ignore all effective demand failures. Interestingly, the subject index of the *Handbook of Economic Growth* has no entry on capacity or capital utilization. Ignoring the demand side is justified by Swan and his followers or surrogates in terms of the overwhelming importance of long-run growth compared with short-run fluctuations. These authors are not exempt from the illusion mentioned above. Assume two identical economies except for the fact that one, due to a better stabilization policy, manages to realize (p. 65) on average, over a succession of booms and slumps, a higher average rate of capacity utilization than the other economy. With Y as actual and Y^* as capacity (or potential) output, s as the savings rate, v as the actual and v^* as the optimal capital-to-output ratio, and $u = Y/Y^*$ as the average degree of utilization of productive capacity, we have

$$g_i = \frac{S}{Y}\frac{Y}{K} = \frac{s}{v} = \frac{S}{Y}\frac{Y^\star}{K}\frac{Y}{Y^\star} = \frac{s}{v^\star}u_i \quad (i = 1,2).$$

$g_i = \frac{S}{Y}\frac{Y}{K} = \frac{s}{v} = \frac{S}{Y}\frac{Y^*}{K}\frac{Y}{Y^*} = \frac{s}{v^*}u_i \quad (i=1,2).$

Assume now that $s = 0.2$ and $v^* = 2$, but $u_1 = 0.8$ and $u_2 = 0.7$. Then the first economy would grow at 8 percent per year, whereas the second would grow at only 7 percent. This may seem a trifling matter, and in the short run it surely is, but according to the compound interest formula after about seventy years the first economy would be larger than the second one by the amount of their (common) size at the beginning of our consideration.[22] Hence effective demand matters. Experience also suggests that there is no reason to presume that actual savings can be expected to move sufficiently close around full employment and full capacity savings. Persistently high rates of unemployment in many countries, both developed and less developed, strongly indicate that the problems of growth and development cannot adequately be dealt with in terms of the full employment assumption.

Criticism of Received Marginalist Views

For obvious reasons Sraffa also did not share the following marginalist doctrines, which are, of course, nothing but aspects or implications of the theory itself. He rejected in particular the following:

- The concept of an investment function according to which the volume of investment in the economy is elastic with respect to the level of the money rate of interest
- The view that an increase in saving spurs economic growth
- The idea that the supply of money can be regulated by the monetary authority with sufficient precision, that is, that the quantity of money in the system is exogenous
- The contention that economic policy is ineffective in the sense that fiscal and monetary policies can have no lasting impact on the performance of the economy

Investment Demand

The postulated inverse relationship between the volume of investment and the rate of interest is but another expression of the monotonic prejudice and cannot generally be sustained for the reasons given in the above. Alas, Keynes adopted a version of this concept in terms of his "marginal efficiency of capital" schedule.[23] He rests his argument on (p. 66) the dubious partial equilibrium method. Yet the schedule and the money rate of interest cannot be assumed to be independent of one another (see Kurz 2010, 192–94). Several commentators (e.g., Pasinetti 1974) have pointed out that Keynes's argument consists of an adaptation of the classical doctrine of extensive diminishing returns to the theory of capital and investment. Accordingly, different investment projects can be brought into an order of profitability much as different qualities of land can be brought into an order of fertility: the different investment projects will be realized according to the first order much as the different qualities

of land will be taken into cultivation according to the second one. Sraffa's demonstration in the late 1920s that the order of fertility generally depends on the rate of interest undermines both concepts. As regards the problem of the use of land, Sraffa, when resuming his work in 1942, asked: "Is it possible in our scheme to arrange a series of lands of different qualities in a descending order of 'fertility' that will be valid for all values of (independently of) *r* and *w*? No, it is not possible" (Sraffa Papers D3/12/25, 1).

Paradox of Thrift

The idea that any act of saving will entail an act of investment of the same magnitude is, of course, the core proposition of Say's Law. Both Keynes and Sraffa rejected Say's Law and thus also the view that an increase in saving necessarily leads to an increase in investment. The "paradox of thrift" implies on the contrary that because of its negative effect on aggregate effective demand and capital utilization, an increase in saving may in certain circumstances frustrate investors. The shrinking volume of investment will exacerbate the problem of effective demand and send the economy into a downward spiral, as analyzed by Roy Harrod with his "Instability Principle." Both Keynes and Sraffa were convinced that with respect to the performance of the economic system as a whole the attention should focus first and foremost on investment and not on saving (and consumption), because investment generates the amount of savings via changing levels of output and capital utilization (short run) or changing rates of expansion of productive capacity (long run).

Effective Demand and Obsolete Machines

Before we turn to the next issue, the reader's attention should be directed to an aspect of Sraffa's system of equations that has been overlooked by many commentators, and which indicates clearly that the equations can deal with different levels of effective demand. In the last section of the chapter devoted to land, Sraffa mentions "obsolete machines" and stresses:

> Machines of an obsolete type which are still in use are similar to land in so far as they are employed as means of production, although not currently produced. The (p. 67) quasi-rent (if we may apply Marshall's term in a more restricted sense than he gave it) which is received for those fixed capital items which, having been in active use in the past, have now been superseded but are worth employing for what they can get, is determined precisely in the same way as the rent of land.
>
> (Sraffa 1960, 78)

The larger is the effective demand for the various commodities, the greater is the number of these obsolete machines that will have to be used, and their use is possible provided the needed additional workforce is available, which Sraffa implicitly assumes to be the case.[24]

Endogenous Money

As regards the role of money and the control of its quantity, we should recall that Sraffa started as a monetary economist and throughout his life had a vivid interest in monetary issues, institutions, and so on. When at the beginning of the 1930s Friedrich August von Hayek launched an attack on Keynes's *Treatise on Money* (1930), Keynes found himself in an impasse because he was not familiar with the main building blocks of Hayek's criticism: Böhm-Bawerk's theory of capital, Pareto's theory of general equilibrium, and Ludwig von Mises's views on money. He wisely asked Sraffa, who was familiar with the works of the authors mentioned, to come to his defense. Sraffa did so in terms of a counterattack on Hayek's *Prices and Production* (Hayek 1931), to which Hayek replied and Sraffa responded.

Here is not the place to enter into a detailed discussion of this debate; see therefore the accounts provided in Kurz (2000a and 2010, 194–97). It suffices to point out two things. First, from Sraffa's argument it follows that while the banking system can fix the rate(s) of interest, the amount of money in the system is endogenous. To assume a ceteris paribus change in the rate of interest is once again not admissible. Second, in his debate with Hayek Sraffa introduced the concept of commodity rate of interest. This concept Keynes was eager to pick up in the *General Theory* (Keynes [1936] 1973, chap. 17, especially 223n), because he thought that it would provide him with the long-sought choice- and capital-theoretic foundation of his theory of investment behavior, both real and financial.

The lack of such a foundation was a major objection Hayek had put forward against the *Treatise*. The new concept allowed Keynes, or so he thought, to drive home the main message of the *General Theory*, that it is the downward rigidity of the money rate of interest that is the source of all the trouble. This downward rigidity is in turn explained in terms of the liquidity preference of wealth owners.

"Keynes's System": Liquidity Preference Theory

Sraffa was not at all happy with Keynes's use of the concept of commodity rates of interest, and he was critical of his explanation of why liquidity preference was to prevent the (p. 68) money rate of interest from falling sufficiently not only in the short run, but also in the long (see Kurz 2010). In Sraffa's view, as it is expressed both in his annotations of his personal copy of the *General Theory* and in two manuscript fragments, Keynes's argument was a mess, confused and confusing. He argued, among other things, that the concept of liquidity that Keynes uses is vague and ambiguous; that there is no reason to presume that liquidity is always a good thing for each and every type of agent—in fact, the downward-sloping liquidity preference curve is but a variant of the usual marginal utility curve; and that Keynes inconsistently admitted Fisher's effect for all commodities, except money. The last objection refers to a situation where because of the depressive tendencies in the economy money prices will tend to fall, that is, the value of money will rise. However, an expected rise in the value of money implies a lower "own rate of money interest," and not a higher one, as Keynes had assumed. In chapter 17, Sraffa concluded, Keynes did not reason correctly and got entangled in a maze of contradictions. Keynes's liquidity preference theory—which Sraffa called "Keynes's system"—could not bear the brunt of the explanation of a downward rigidity of the interest rate. Yet if the interest rate was flexible and if investment was sufficiently elastic with respect to the rate of interest, then there was no reason to presume that investment could not gravitate toward a level equal to full employment saving.

In short, the "revolutionary" message of Keynes's book was thwarted not so much by Keynes's occasional sloppiness, but by his retaining in new garb marginalist concepts that Sraffa considered to be untenable. Seen in this way, Keynes was not completely successful in what he had called a "struggle of escape from habitual modes of thought and expression" (Keynes [1936] 1973, xxiii). Sraffa approved of Keynes's critical intention but was disenchanted with its execution. In important respects he believed that Keynes had granted too much to received economic theory. Keynes's new theory exhibited several loose ends and contradictions and retained marginalist concepts.

It is ironic to see that the distinguishing feature of what today is known as "neo-Keynesian" and "New Keynesian theory" is the premise of sticky prices: Keynes is interpreted as an imperfectionist. While there are traces of imperfectionism to be found in his magnum opus, in the central part of it he assumes fully flexible prices. Keynes's analysis therefore cannot be accused of lacking generality because of an alleged assumption of price rigidities. The problem rather is whether his explanation of a lower boundary to the money rate of interest (in combination with an inverse investment-interest relation) vis-à-vis flexible prices stands up to close examination. According to Sraffa it does not. Keynes's argument suffers in particular from neglecting the implications of flexible prices via the value of money for the level of the "own rate of money interest." However, Keynes's failure must not be taken to be orthodox theory's triumph. In Sraffa's view, Keynes failed *because* in his analysis the orthodox elements overwhelm the truly novel ones.

Sraffa developed his criticism of Keynes from an approach that also considers (long-period) prices as fully flexible. This does not mean, however, that the conventionally invoked "forces of demand and supply" can be expected to generally bring about a full employment equilibrium. The irony is that Sraffa established these findings in terms (p. 69) of an elaboration of the classical approach to the theory of value and distribution. This approach, coherently developed, actually effectively undermines Say's Law—the law for which Keynes had thought he could put classical analysis on one side.

5. Concluding Remark

The *principle of effective demand* (Keynes) matters, in the long run no less than in the short run. Economics may be a dismal science or discipline, but its present dismal state applies not to the discipline as a whole or to all traditions of economic thought available. It applies to the neoclassical mainstream and especially to what is

misleadingly called New Classical Economics. It does not apply to some other lines of economic thought, which, to the detriment of the discipline and also to the detriment of society, have been marginalized in the recent past. Severe economic crises request the economics profession to reconsider its doctrines, abandon views that can no longer be sustained, return to views that can, or create new ones appropriate to the current situation. As Keynes put it succinctly in the *Tract on Monetary Reform*: "Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."

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Notes:

(1.) I should like to thank Christian Gehrke and Geoff Harcourt for valuable comments on an earlier version of this chapter.

In the following I don’t bother about the different fractions within the “ism,” whose relationship with one another

occasionally makes one forget that they think of themselves as brothers in arms.

(2.) See the early survey by Hamouda and Harcourt (1988).

(3.) Against this evidence one can only wonder what makes Bliss (2010, 636) contend that Sraffa "could not come up with a complete alternative to the classical theory that he disliked."

(4.) Bliss (2010, 636) misses Sraffa's point when he writes: "Sraffa's claim that because the [classical] model is unchanging marginal concepts are inapplicable looks like a simple mistake. Counterfactual changes can be imagined and their consequences worked out, as in standard linear programming." The point is that the classical approach does not need to invoke counterfactual changes in order to determine the general rate of profits and relative prices of a given system of production, whereas by construction the marginalist approach is bound to invoke a very particular kind of counterfactuals in order to accomplish the task. As will be seen in the following, it is the kind of counterfactuals under consideration that Sraffa found highly problematic. It goes without saying that the classical approach is not per se opposed to, or incompatible with, counterfactual reasoning, as Sraffa makes clear, for example, with regard to the implications of technical change in basic or nonbasic industries for income distribution and relative prices; see Sraffa (1960, 7–8). This is supported by Sraffa's unpublished work. In a note written in summer 1928 Sraffa emphasizes: "The question asked of the theory of value is the following: Given (from experience) the prices of all commodities …, find a set of conditions that will make these prices appear to be necessary. This means, given the unknowns, find the equations (i.e. the constants).… But this is the general question, the problem of finding the theory of value: when it is solved, once and for all, the particular questions asked are the reverse, i.e. given the constant equations, if the value of one of the constants is varied, how are the resultant prices determined?" (Sraffa Papers D3/12/9, 65)

(5.) For a discussion of some of the intricate problems involved, see Kurz and Salvadori (1995).

(6.) Sraffa at the same time made clear that it was of no harm employing such an assumption—a counterfactual—in playing with what he occasionally called a "toy," i.e. the system of equations, provided we did not mistake the results obtained for what was going to happen in reality.

(7.) For a discussion of Wicksell's attempts to come to grips with the problem of capital in a marginalist context, see Kurz (2000a).

(8.) Their inability to see that there existed an earlier approach, i.e., that of the classical economists, reflects well Sraffa's observation that since the "advent of the 'marginal' method" the former had been "submerged and forgotten" (1960, v).

(9.) For a detailed discussion of this move, see Garegnani (2010) and Kurz and Salvadori (1995, chap. 13).

(10.) The phenomena under consideration were discussed in great detail during the Cambridge controversies in the theory of capital. The classic source for a summary account of the controversies is Harcourt (1972); see also Garegnani (1970) and Kurz and Salvadori (1995, chap. 14).

(11.) For a consequent recognition of this fact in long-period theory, see Opocher and Steedman (2010). They show that many of the propositions of received demand-and-supply theory are untenable.

(12.) At the time Sraffa still vacillated as to whether the magnitudes with a question mark in brackets could in fact be treated as constants. See on this Kurz and Salvadori (2005, sec. 3).

(13.) This does not mean that Sraffa was uncritical of the labor theory of value; it only means that contrary to the marginalist theory it starts from the same set of data, or independent variables, or given quantities as Sraffa's own approach. For a discussion of Sraffa's (changing) views on the labor theory of value, see Kurz and Salvadori (2010b).

(14.) For a more detailed discussion of the role of counterfactuals in alternative theories, see Kurz (2006b).

(15.) To the above passage Bortkiewicz had appended a footnote in which he stressed that also J. B. Clark's theory of marginal productivity does not satisfy this requirement.

(16.) Bliss (2010, 636) writes that Sraffa "allows no substitution within a single process." Apparently Bliss defines processes as including entire substitutive production functions. In Sraffa's analysis there is of course "substitution" among factors via a change in the methods of production adopted at different levels of the wage rate (or the rate of interest). However, there is no presumption that this kind of substitution supports the monotonic prejudice: "ratio of interest rate-to-wage rate up, ratio of capital-to-labour down."

(17.) Neither Ricardo nor Marx had advocated such a theory. They understood perfectly well that in "time-phased" conditions (to use an expression Paul Samuelson coined) relative prices depend not only on the absolute amounts of labor quantities, but also on the time profiles of their expenditure and thus on the level of the wage rate (or the level of the rate of profits).

(18.) The reader must not think that Sraffa's critical attitude was limited to marginalist authors: he read each and every author with great attention and pointed out shortcomings of the argument, whenever he discerned them. Ricardo, Marx, and Keynes were no exception to the rule.

(19.) As the context in which Sraffa speaks of the "scramble for the surplus" (Sraffa Papers D3/12/11, 83) makes clear, the reference is to Adam Smith's discussion of the conflict over the distribution of income between "workmen" and "masters" in chapter viii of book I of *The Wealth of Nations* ([1776] 1976). Smith stressed: "What are the common wages of labour, depends every where upon the contract usually made between those two parties, whose interests are by no means the same. The workmen desire to get as much, the masters to give as little as possible. The former are disposed to combine in order to raise, the latter in order to lower the wages of labour" (WN, I.iii.11). However, due to differences in the size of each "party" (an argument that draws the attention to the problem of collective choice and action) and institutional factors he saw the masters to have commonly "the advantage in the dispute, and force the other into a compliance with their terms" (WN, I.viii.12).

(20.) In the margin of the last two sentences Sraffa put two straight lines, signaling agreement with the view stated in the text.

(21.) While in the marginalist conceptualization of the "law" the idea of a permanent tendency to market clearing concerns also the labor market, things are different in the classical authors. As no less an authority than David Ricardo put it in his *Principles* of 1817: "There is no amount of capital [!] which may not be employed in a country, because *demand is only limited by production*" (Ricardo 1951, 290, emphasis added; see also Gehrke and Kurz 2001). Notice that the reference is to the employment of *capital*, not labor, and to *production*, not employment. The classical authors envisaged Say's Law to apply only to commodities, whose production is motivated by expected profits. Since labor, although a particular kind of commodity, cannot be subsumed under this motive, Say's Law was not applicable. It was only with the wage fund doctrine and then in marginalist analysis that the "law of markets" was generalized to include a labor market: with flexible prices and wages and sufficient substitutability between goods in consumption and factors in production, all markets, including the market for labor, were taken to clear. Hence the "forces" of demand and supply were seen to establish a tendency toward the full employment of labor and the full utilization of plant and equipment.

(22.) This argument sets aside all effects that different activity levels of the economy might have on its overall propensity and capability to innovate and thus increase productivity.

(23.) As regards the long period, Keynes ([1936] 1973, 136) advocated the view that an increase in the capital-labor ratio is invariably accompanied by a decrease in the marginal efficiency of capital in general, which expresses, of course, the conventional marginalist viewpoint.

(24.) For a formalization of the case of obsolete machines in Sraffa, see Kurz and Salvadori (1995, 348–51).

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[–] Abstract and Keywords

Piero Sraffa's pivotal contribution to the critique of mainstream theory is well known. It had three principal targets: Marshallian partial equilibrium theory, the neoclassical macroeconomic theory of income distribution, and the neo-Walrasian microeconomic theory of general equilibrium from Pareto to Arrow and Debreu. This chapter examines well-known exponents of post-Keynesian economics who have made their position on the significance (or otherwise) of Sraffa's work for post-Keynesianism explicit. It first looks at Luigi Pasinetti's systematic attempt to integrate Sraffa's and John Maynard Keynes's core theoretical messages as elements of a more general theoretical framework. It then argues that historically specific institutional settings, conventions, and social practices play an important role in Sraffa's analysis. It also claims that his theory of production prices should be interpreted not in terms of a long-period analysis, but as a tool that allows us to explore complex and cumulative forms of economic dynamics not exclusively reliant on linear dynamical systems.

Keywords: Piero Sraffa, mainstream theory, partial equilibrium theory, macroeconomic theory, income distribution, microeconomic theory, general equilibrium, post-Keynesian economics, Luigi Pasinetti, John Maynard Keynes

Piero Sraffa's pivotal contribution to the critique of mainstream theory is well known. It had three principal targets: Marshallian partial equilibrium theory, the neoclassical macroeconomic theory of income distribution, and the Neo-Walrasian microeconomic theory of general equilibrium from Pareto to Arrow and Debreu. Sraffa's 1925 and 1926 articles on Marshallian partial equilibrium analysis, as well as his response to Dennis Robertson's attempt to defend Marshall in a symposium on the so-called cost controversies, organized by J. M. Keynes in the *Economic Journal* in 1930, were instrumental in its eventual decline (Sraffa [1925] 1998; 1926; 1930). *Production of Commodities by Means of Commodities* (*PCMC* for short, Sraffa 1960) addressed Austrian and Wicksellian versions of the theory of capital, as well as the "American" production function from John Bates Clark to Paul Samuelson and Robert Solow, in a similarly rigorous and devastating fashion. By contrast, the significance of Sraffa's theory of production for a critique of neo-Walrasian general equilibrium theory has been subject to some debate. For some, *PCMC* provides a useful foundation for a critique of temporary as well intertemporal general equilibrium analysis. Others regard as more decisive the inability of general equilibrium theory to provide satisfactory answers to the questions it raised in the first place, such as the lack of consistent and self-contained microeconomic foundations and its failure to prove the stability of equilibrium prices.[1]

Whatever the case, Sraffa's critical contributions certainly do not refer to, or make any substantial use, of J. M. Keynes's ideas. Sraffa's critique of Hayek's theory of capital, money, and interest could be considered a potential exception to this rule (Sraffa 1932), but even here the main sources of inspiration are his own theory of the determination of own rates of profit and his multisectoral conceptualization of the economic system. (p. 75) While this lack of reference to Keynes's work might be read to mean that Sraffa's contribution to economic theory as a whole is simply too far removed from the core concerns of post-Keynesian theory to be of substantial interest to

the latter, it is also the case that the vast majority of post-Keynesians decidedly welcomed Sraffa's critique of neoclassical theory. Should we then conclude that Sraffa's usefulness to post-Keynesian theory is limited to his critical contributions and does not extend to other aspects of his work, such as, in particular, *PCMC*?

To try to provide an answer to this question is the main purpose of this chapter. The task is not facilitated by the existence of numerous versions of post-Keynesian approaches and the ongoing debate about its internal coherence as a research program. To keep the discussion manageable, we focus on well-known exponents of post-Keynesian thought who have made their position on the significance (or otherwise) of Sraffa's work for post-Keynesianism explicit. Section 2 provides a brief discussion of Luigi Pasinetti's systematic attempt to integrate Sraffa's and Keynes's core theoretical messages as elements of a more general theoretical framework. As is well known, Pasinetti's theory of structural change and economic growth accommodates and redefines central Keynesian concepts such as, in particular, the notions of effective demand and full employment, from the vantage point of his multisectoral "natural system." This, in turn, is considered entirely compatible with the Sraffian system. While Pasinetti develops interesting and challenging avenues along which to explore the compatibility of Keynes's and Sraffa's contributions to economic theory, we argue that some features of his natural system require further clarification. Section 3 of the chapter suggests a slightly different route toward an eventual integration of core aspects of (post-)Keynesian and Sraffian analyses. This concentrates on three main aspects of Sraffa's positive contribution to economic analysis: First, we argue that historically specific institutional settings, conventions, and social practices play an important role in Sraffa's analysis. Second, we suggest that Sraffa's theory of production prices should be interpreted not in terms of a long-period analysis, but as a tool that allows us to explore complex and cumulative forms of economic dynamics not exclusively reliant on linear dynamical systems. Finally, we draw on this discussion to highlight similarities as well as remaining differences between (post-)Keynesian and Sraffian theory, placing particular emphasis on those approaches in the latter "camp" that have explored nonstandard variants of the Sraffa system such as differential sectoral rates of profit.

1. Post-Keynesians on Sraffa: From Keynes to Sraffa

The term "Keynesian fundamentalism" has sometimes been employed to characterize Paul Davidson's interpretation of Keynes's theory (e.g., Coddington 1976). This should not be taken to imply any negative connotations, and Davidson's own very useful (p. 76) account of the genesis of his approach in *Money and the Real World* provides a succinct summary of the core motivation underlying this interpretation of Keynes:

> Accordingly, I felt that it was necessary to go back to Keynes's own writings, especially his *Treatise of Money* and his *General Theory*, and to extract, integrate and update the original conceptual framework. Starting from Keynes's fundamental axioms that in the real world (1) the future is uncertain (in the sense that Knight and Keynes used the term), (2) production takes time and hence if production is to occur in a specialization, monetary economy, someone must undertake contractual commitments involving performance and payment in the future, and (3) economic decisions are made in the light of an unalterable past while moving towards a perfidious future, Keynes's theoretical model is developed in this book in order to provide a rich harvest of insights into such current economic problems as accumulation, inflation, income distribution, and the growth of the stock of money.
>
> (Davidson 1978, xii)

For Davidson, the analytical core of this research program consists of four main features designed to facilitate our understanding of the real world:

> (1) Money matters in the long and short run, i.e., money is not neutral—it affects real decision making. (2) The economic system is moving through calendar time from an irrevocable past to an uncertain future. Important monetary time series realizations will be generated by nonergodic circumstances; hence decision-making agents know that the future need not be predictable in any probability sense…. (3) Forward contracts in money terms are a human institution developed to efficiently organize time consuming production and exchange processes….The money-wage contract is the most ubiquitous of these efficiency-oriented contracts. Modern production economies are therefore a money-wage contract based system. (4) Unemployment, rather than full employment, is a common *laissez-faire* situation in a market oriented, monetary production economy.

> (Davidson 1984, 562–63)

Given the importance Davidson's Keynesian fundamentalism accords to monetary phenomena, the concept of the short period and the role played by nonergodicity and radical uncertainty, there seems to be little if any ground for a rapprochement with Sraffa's theory of production (e.g., Harcourt and Kerr 2003). At first sight at least, the latter gives pride of place to real phenomena and appears to be playing down the relevance of economic behaviors and expectations for economic analysis. This is all the more the case if we follow the so-called surplus approach[2] in interpreting Sraffa's theory as an analysis of long-period positions. It thus comes as little surprise that Davidson (2003–4, 247, 252, 259 n. 12) severely admonishes King (2002) for welcoming Sraffa and the Sraffians into the post-Keynesian fold, if only to an extent (see also King 2005, 379).

Hyman Minsky initially was less averse than Davidson to the inclusion of elements of Sraffian analysis in the construction of an alternative, nonmainstream approach to economic theory. After all, he considered himself neither a fundamentalist Keynesian nor even a post-Keynesian and kept an open mind toward Keynesian analyses that had remained, or were considered to be, outside the post-Keynesian camp. Some argue that (p. 77) it was his participation in the Trieste Summer School that, to borrow John King's term, gradually turned Minsky "Anti-Sraffa" (King 2002, 209), in the sense that he became convinced that little or nothing could be wrung from Sraffa's positive contribution to economic theory that would be useful for contemporary Keynesianism. Thus, at a conference held in Florence in 1985 on the occasion of twenty-five years of the publication of *PCMC*, he left little doubt as to where he stood with regard to a possible rapprochement between Sraffians and Keynesians:

> Given my interpretation of Keynes (Minsky 1975, 1986) and my views of the problems that economists need to address as the twentieth century draws to a close, the substance of the papers in Eatwell and Milgate (1983) and the neoclassical synthesis are (1) equally irrelevant to the understanding of modern capitalist economies and (2) equally foreign to essential facets of Keynes's thought.…
>
> Sraffa says little or nothing about effective demand and Keynes's *General Theory* can be viewed as holding that the long run is not a fit subject for study. At the arid level of Sraffa, the Keynesian view that effective demand reflects financial and monetary variables has no meaning, for there is no monetary and financial system in Sraffa. At the concrete level of Keynes, the technical conditions of production, which are the essential constructs of Sraffa, are dominated by profit expectations and financial conditions.
>
> (Minsky 1990, 362–63)

By contrast, Jan Kregel took a more positive view of such a rapprochement, and he pursued this project for some time, not least through the Trieste Summer School in whose organization he played a pivotal role. Kregel took as his starting point Sraffa's view on the relationship between the monetary rate of interest and the rate of profits, and analyzed Keynes's and Sraffa's respective notions of the own and the monetary rates of interest (e.g., Kregel 1976, 1982, 1983). Sraffa discusses both concepts in his critique of Hayek (Sraffa 1932), and, as is well known, this discussion reverberates in *PCMC* when he introduces the rate of profits as an independent variable determined by the monetary rate of interest. With regard to Keynes, Kregel highlights the interest rate parity theorem (e.g., Keynes 1922) and chapter 17 of *The General Theory*, in which Keynes makes use of Sraffa's own rates of interest. Kregel's analysis suggests that Sraffa's rate of profits as an independent variable is determined by Keynes's monetary rate of interest. Although this is an interesting suggestion, so far as we are aware it has not been developed further into a more general political economy framework within which Keynes's short-period theory of effective demand in a monetary production economy could be more systematically linked to Sraffa's theory of production that is mainly concerned with income distribution and—according to Kregel—with capital accumulation in the long period.

Kregel's contribution has been interpreted as an attempt to include Sraffa's system in an "integrated real-monetary system" (Kregel 1983) that, in turn, could serve as a basis on which to build a unified approach to the Keynesian long period. Asimakopulos (1982), Bhaduri and Robinson (1980), Bhaduri (1986), and Harcourt (1981) all share the spirit of this position, albeit with some differences. Asimakopulos interprets Sraffa's system of production prices as a long-period position defined as a quasi-stationary "state of rest." (p. 78) This rather limits its usefulness for Keynesian long-period analysis, and Asimakopulos consequently regards Sraffa's system primarily as a critical tool in the analysis of conventional economic theory. Bhaduri and Robinson's view is similar but takes a more constructive turn in that Sraffa's system is perceived as an abstract framework that can gradually be filled out with

"real world" components and analyses, situated in "historical time." Harcourt (1981) accords similar importance to historical time and takes the Robinson-Garegnani controversy (Garegnani 1978, 1979; Robinson 1979) forward by suggesting a number of different interpretations of the gravitation concept (Harcourt 1981, 41). Harcourt emphasizes the methodological limitations of static comparisons of long-period positions and is critical of interpretations of Sraffa's system (whether by neoclassical or post-Keynesian authors) as "balanced or appropriate states" with reproduction (Harcourt 1981, 46–47). He explains his own preferred interpretation of the gravitation center concept by means of a meteorological analogy: "The average temperature thus is a centre of gravity in the sense of a central tendency to which actual temperatures will tend, the outcome of sustained and fundamental forces, that is to say, the average serves to explain most of the order of magnitude of the values actually observed from day to day" (Harcourt 1981, 41). In the context of economic theory, such "averages" are best understood as "macroeconomic concepts associated with the working of the system as a whole, which impose themselves *as norms* on group behavior within the system" (42, emphasis added), such as distributive norms or the expected trend values of normal cost pricing hypotheses. This normative interpretation of Sraffa's system not only opens the door to a Sraffa-Keynesian synthesis in the sense that many post-Keynesian contributions to the theory of price formation and income distribution in contemporary capitalism may be considered as compatible explanations of historically specific macroeconomic norms. It also suggests that, rather than as a "balanced state," Sraffa's system is better understood as a "snapshot" of an annual production cycle (a term Harcourt does not employ but essentially describes (1981, 47) and on which more in section 3). Harcourt does not take definite sides in this debate, leaving the question of whether or not a long-period interpretation of Sraffa's production prices should positively be rejected (see also Sinha 2010).

Marc Lavoie not only welcomes the idea that the post-Keynesian short period can be integrated with an interpretation of Sraffa in terms of long-period analysis, citing Kregel and Joan Robinson as supporters in the post-Keynesian camp (Lavoie 1992, 3), but takes the discussion a step further by including both Sraffa's positive contribution to economic theory and post-Keynesianism in a single economic paradigm that he labels "post-classical." This compares to the neoclassical equivalent as follows:

> As in the neoclassical case, the post-classical paradigm contains a vast array of schools of thought and theories which are stretched over several fields. In my view, the post-classical programme groups together a vast number of non-orthodox economic theories. Marxists, Radicals, Institutionalists, Structuralists, Evolutionarists, Socioeconomists, the French circuit and regulation schools, neo-Ricardians and post-Keynesians (with or without the hyphen) all belong to the post-classical research programme. Although they may have substantially different options on various topics, such as the theory of value or the relevance of the long-period analysis, I (p. 79) believe they hold the same metaphysical beliefs prior to the elements constituting the hard core of their respective theories. These post-classical economists are thus linked by something more than their dislike for neoclassical economics.
>
> (Lavoie 1992, 5–6)

This paradigm—within which post-Keynesian as well as Sraffian approaches can be accommodated—is based on four core presuppositions: "Realism, organicism, procedural rationality and production" (Lavoie 1992, 7). Lavoie suggests that, from the vantage point of post-classical analysis, "the uniformity of the rate of profit is only a convenient hypothesis to make" and that "differentiated rates of profit due to oligopolistic conditions and barriers to entry are perfectly compatible with the Sraffian model" (1992, 147). In this perspective, the construction of a unified postclassical theory of prices essentially amounts to an attempt to merge post-Keynesian markup (and cost-plus) theories with neo-Ricardian approaches assumed to be "based on a theory of full-cost pricing" (1992, 349). Following Dutt and Amadeo (1990, 80), Lavoie also supports the view that neo-Ricardian approaches do, in fact, have space for the inclusion of monetary and financial theory (1992, 371).

Lavoie's (as well as Dutt and Amadeo's) position also takes on board what Pasinetti called a sharp distinction between productive capacity and actual production:

> Among the peculiarities which an industrial society has acquired, with respect to more primitive (agricultural) societies, there is one that requires us to make a sharp distinction between productive capacity and actual production. In primitive (agricultural) societies, each farmer tries to produce as much as he can. He will then take whatever amount of his product is in excess of his needs to the market. And

> there this produce will fetch the price the market makes. In an industrial society it is not so. At any given point of time, productive capacity is indeed what it is—it cannot be changed. But productive capacity does not mean production—it only means *potential* production.
>
> (Pasinetti 1974, 31–32, emphasis in original)

The main question then is obviously whether Sraffa's prices of production are those of actual magnitudes or full capacity prices. Dutt, Amadeo, and Lavoie effectively sidestep the problem by assuming that Sraffa's quantities are long-period quantities at underutilized capacity levels of the system. Prices are thus not determined at any one point in historical or actual time, that is, by means of a "snapshot," but neither are they full capacity prices. Some Sraffian authors such as Ciccone (1983) and Kurz (1991) agree that actual rates of capacity utilization can diverge from their "normal" levels or values for extended periods of time when actual prices have converged or nearly converged on production prices, while others such as Eatwell and Milgate (1983, see also Eatwell 1998) have maintained that productive capacities will fully adjust to the demand structure.

Lavoie's position thus constitutes a sort of compromise between the surplus approach advocated by Garegnani and that of post-Keynesian authors such as Vicarelli (1974), Earl (1983), or Eichner (1985). As seen, Lavoie accepts Garegnani's view of Sraffa's production prices as long-period prices but rejects the idea that they are the outcome of a gravitation process and does not regard the uniformity of profit rates as indispensable. As Dutt and Amadeo do, he introduces the notion of underutilized production (p. 80) capacities to the system of production prices and interprets these (with, e.g., Vicarelli, Eichner, and Harcourt) as normative prices and (with, e.g., Earl) as supply prices. Differently from Lavoie, however, these last-mentioned authors do not equate Sraffa's prices with long-period prices (see also Hamouda and Harcourt 1988).

Many of Lavoie's suggestions are stimulating and undoubtedly merit further attention. That the post-classical paradigm, as it currently stands, is more a research program than a fully developed theory should not count against it, all the more so given that alternative views on a synthesis are at least equally tentative at present. From our point of view, more problematic is Lavoie's apparent acceptance of the dichotomy between short- and long-period analyses or, more precisely, the differing role he attributes to (post-)Keynesian and neo-Ricardian elements of an eventual synthesis as, respectively, short- and long-period analyses. As we argue in section 3, this interpretation of Sraffa's theory of production as a purely long-period theory seems to us neither convincing (even for the case of differentiated sectoral profit rates) nor helpful to a successful integration of Sraffian with Keynesian thought.

2. Pasinetti's Theory of Structural Dynamics: Bringing in Sraffa and Keynes

The influence of classical economic thought (from William Petty to Simonde de Simondi) on Pasinetti's work has clearly been more pronounced and direct than is the case for much of post-Keynesian analysis. Pasinetti's interest in similarities and overlaps between Ricardian and Keynesian notions of economic causality, for example, goes back at least as far as his *Growth and Income Distribution* (Pasinetti 1974). His theory of structural change, more specifically, retains and builds on three core concepts of classical thought in particular: natural magnitudes, the classical notion of the core driver of economic growth, and a conceptualization of structural dynamics that cannot be adequately captured by a homothetic growth path.

First, Pasinetti attaches major importance to so-called natural magnitudes, thus following in Ricardo's footsteps, albeit with some qualifications. For Ricardo, natural magnitudes are those that cannot be disturbed by a transitory or accidental cause. Pasinetti takes this definition on board when maintaining that the focus of his analysis of structural change is "on those objective elements of reality that have a high degree of persistence through time" (1993, 20), but also introduces the more demanding criterion that natural magnitudes refer to "those objective forces that are so basic as to be given prior to, and independently of, any institutional set-up" (1981, 149). The latter encompasses a wide range of possible rules and institutions that govern economic behavior, such as, for example, free competition or, alternatively, the existence of barriers to entry. Natural magnitudes are therefore determined "at a level which is so fundamental as to allow us to investigate them independently of the rules of individual and social behavior to be (p. 81) chosen in order to achieve them" (Pasinetti 2007, 275). This distinction between the natural system and its institutional setting is, of course, the essence of Pasinetti's well-known "separation theorem" (2007, 274), according to which "we must make it possible to disengage those

investigations that concern the foundational basis of economic relations—to be detected at a strictly essential level of basic economic analysis—from those investigations that must be carried out at the level of the actual economic institutions" (275). The obvious importance of this difference between Ricardo's and Pasinetti's respective definitions of natural magnitudes should not, however, distract from core similarities in their explanations of economic growth and structural change: In both cases, structural factors, such as the state of technological knowledge and skills and the sectoral composition of effective demand, are at the heart of the analysis, and these depend on macroeconomic laws, such as Engel's Law, and on the rules that govern industrial technical progress. There is no space, in either approach, for the marginalist resort to individual means-end maximizing rationality, or to the explanation of economic dynamics in terms of subjective magnitudes operating in the sphere of exchange.[3]

Second, Pasinetti shares the classical view that the core driver of economic growth is neither capital nor labor, but technological and scientific knowledge that evolves through manifold and overlapping organizational, technical, and social learning processes in the sphere of production. Finally, as with classical theory, Pasinetti describes a nonhomothetic process of structural change. At every point in time, sectoral rates of technical progress differ, implying a different evolution of the technical coefficients of each sector. In addition, the growth rates of demand also vary by sector so that, in accordance with Engel's Law, the sectoral composition of aggregate demand changes. This conceptualization of economic dynamics closely resembles its classical counterpart, for example, in regard to the emphasis various classical theories of capital accumulation place on the role of different sectoral returns to scale.

An important implication of this affinity of Pasinetti's theory of structural change with core classical concepts of economic dynamics is that the natural prices of Pasinetti's system can be interpreted as a generalization of Sraffa's production prices. At the same time, Pasinetti's natural system is essentially of a normative nature: Pasinetti determines the system's equilibrium conditions, but does not provide a systematic analysis of the probability of an equilibrium position being reached or of its stability once reached. The equilibrium conditions of Pasinetti's natural system relate to the compatibility of capital accumulation and of the level of effective demand with the full employment of resources. Interpreting the system as a positive equilibrium system would be misleading in that none of the determinants of effective demand or of technical progress ensure convergence to equilibrium. In Pasinetti's system, no force is at work that could be seen to engender convergence to a stable state of rest. Quite the contrary, where Pasinetti tentatively explores the system's trajectories of effective demand and technical progress his remarks suggest instability and the presence of disequilibrium dynamics (Pasinetti 1981, 235, 243, Pasinetti 2007, 229, 286). In short, Harrod looms large in that the existence and stability conditions of Pasinetti's natural system are normative in a sense reminiscent of the role played by Harrod's equilibrium conditions for the knife-edge problem (on this point see Harcourt 2006, 102–8). **(p. 82)** It follows that whether or not the normative benchmarks of the natural system's equilibrium conditions are met is entirely a matter of the institutional setup that governs the macroeconomic system. In reverse logic, economic policy interventions are required if these conditions are to be met since, contrary to mainstream economic analysis, there is no presumption of exchange or market forces being at work to make sure that the necessary equilibrium conditions are in place. This relationship between the natural system and its institutional setting is where Keynesian concepts and ideas come into play: The equilibrium conditions, that is, the compatibility of capital accumulation and of levels of effective demand with full employment, extend core Keynesian concepts to the theory of structural change. Pasinetti's insistence on the inherent instability of the system, if left to its own devices, further reinforces the Keynesian emphasis on the need for appropriate policy intervention. Last but not least,

> the *very nature* of the process of long-run growth requires a structural dynamics which leads to difficulties in the short run. The one implies the other; therefore the whole process has to be accepted and tackled in its entirety. It is no use complaining about short-run difficulties, since they are the inevitable effect of long-run technical and social evolution. Nor is it useful to rely on long-run full employment growth-paths, for they will never be achieved, unless an appropriate process of structural change is continually carried out in the short run.
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> (Pasinetti 1981, 243–44, emphasis in original)

Thus, from a point of view favorably inclined toward the integration of (post)Keynesian analysis with Sraffa's theory of production, Pasinetti's work undoubtedly represents a very major contribution. Not only does his theory of structural change and economic growth develop a coherent framework to extend the theory of effective demand

and underemployment to long-run dynamics, but Pasinetti also provides a similarly coherent theory of prices that can be interpreted as an extension of Sraffa's prices of production to the problem of structural change. Moreover, Pasinetti is one of very few economists who have tackled the challenge of providing a general theory of structural change. His attempt is all the more valuable and pertinent in that it takes on board a world that no longer resembles any notion of a "golden age" but in which unequal sectoral growth patterns and structural heterogeneity, within and between countries as well as in terms of the dynamics of technological progress, have become a defining characteristic of economic dynamics.

This said, some of the basic features of Pasinetti's approach certainly require further clarification: The "separation theorem" raises the question to what extent the concept of a natural system without any institutional or behavioral rules can be conceived of in any meaningful way. For instance, if technological and scientific knowledge is to be the core driver of economic growth, as in classical economic theory, then how can we meaningfully abstract from the social organization of technical progress? Similarly, it is difficult to see how Pasinetti's natural prices can be understood without the concept of division of labor. Yet this is inherently socially determined. How can we refer to "industries" without some resort to the social and institutional factors that define them as such? There is, of course, a standard (structuralist) response to these and similar questions, namely (p. 83) that objects (structures) and the relationships between these can be studied without this analysis requiring an understanding of the (individual or collective) behaviors that underlie them. This certainly is a response of a kind, well known to philosophers, but not one that is therefore altogether satisfactory: It begs the question of what, precisely, constitutes the rationale of the "separation theorem": What, ultimately, makes some features of an economy "natural" as opposed to institutionally determined?

Next, while the equilibrium conditions of Pasinetti's system, understood as a normative benchmark, facilitate an understanding of why this benchmark may be out of reach in the real world, Pasinetti does not provide any proof of the system's inherent or endogenous stability and, therefore, also not of its *in*stability, either. Even if we took it for granted that stability cannot be proven and that instability therefore rules the roost, it would still be both necessary and interesting to define and explore different types of instability: Which are the variables that are foremost in creating instability? Complicated as such an exercise is bound to be, it also seems indispensible to the design of constructive economic policy intervention. Pasinetti essentially provides a description of the "equilibrium" conditions required to analyze structural economic dynamics and of the ways in which different variables might interact over time to maintain these conditions, but there is no analysis of how to reach this "equilibrium" or of what might happen to local stability in the event of a shock to the system.

A corollary of the above is that we do not get an analysis of how cumulative short-period disequilibria may affect the long period. Even though Pasinetti (1981, 243–44, quoted above) is well aware that short-run "difficulties" are the inevitable result of the long-run evolution of the system and cannot be analyzed independently of the institutional and natural features of this evolution, there is no systematic analysis of the impact of cumulative short-period disequilibria on the features and dynamics of the long period. Put differently, the relationship between economic cycles and economic growth is not systematically explored. Finally, there is of course only a very limited analysis of what different institutional setups might look like.

3. An Alternative Route to a Synthesis: From Sraffa to Keynes and Post-Keynesians

Most of the authors discussed in section 1 have approached the question of a Keynes-Sraffa synthesis starting from Keynes's ideas and exploring the potential compatibility of Sraffa's system with these ideas. By contrast, Pasinetti builds a new theory into which he incorporates both Keynesian and Sraffian elements. A third possible route to a synthesis between the two approaches inverts the perspective adopted by the majority of post-Keynesian authors and thus sets out from Sraffa's production system (p. 84) to develop an interpretation of this system that allows us to take on board elements of (post-)Keynesian analysis.

So far, we have mentioned the so-called surplus approach only in passing. This is, of course, the predominant interpretation of Sraffa's system and one that has, by and large, also been adopted by "pro-Sraffa" post-Keynesians, such as Kregel, Dutt, and Lavoie. Notwithstanding important and well-known differences between the positions of Garegnani, on the one hand, and "pro-Sraffa" post-Keynesians, on the other, the latter have tended to accept the idea that Sraffa's production prices are long-period prices. The core assumption required to ensure the

internal logical consistency of this position has been succinctly summarized by Carvalho:

> The long run is *defined* as a period in which the ultimate determinants predominate over supposedly *accidental* short-run circumstances. Is it necessary to suppose the existence of a long-run position that is *independent* of short-run results and behaviours? After all, with investment decisions, inevitable "errors" are committed; are these errors neutral in relation to the given long-run position? If they are not neutral, the commitment of resources to a certain use would impose a whole new configuration of income distribution, capital and technology on the system and create the necessity of looking for another set of "long-run" prices. The dilemma is, therefore, that a gravitation theory is meaningless in the short run but that, in order to be significant in the long run, it demands that the gravity center remain fixed over time no matter what actions are taken by the agents.
>
> (Carvalho 1983–84, 276–77, emphasis in original)

This highlights the basic problem arising from a long-period interpretation of Sraffa's production prices: The logically necessary assumption of independence of the long-period position from short-period outcomes and behaviors—or of the dichotomy of short- and long-period analyses—sharply reduces the explanatory power of gravitation theory. In fact, it is difficult to see why gravitation theory would be fundamentally different from the theory of *tâtonnement* in general equilibrium theory: Even if the final prices of production are not Walrasian equilibrium prices, they still are the *unique* outcome of a convergence process that operates through the adjustment of demand and supply where this adjustment may or may not result in full or normal capacity utilization. The implication is that changes of the system's main variables—prices, quantities, distributive variables—are purely virtual since otherwise the long-period position would be affected by agent errors. In addition, the only changes that can be accommodated within this framework are of a linear type, further limiting the scope of the analysis by excluding all other changes, that is, those that can only be captured by means of nonlinear dynamics. Finally, even for this severely limited scope of analysis technical difficulties aplenty arise for the case of models with more than two sectors (Steedman 1984). If, given these limitations, the independence assumption is dropped, gravitation theory sensu stricto has to be abandoned to pave the way for an exploration of more complex dynamics in which short-period prices follow long-run trajectories that are cyclical or chaotic or imply the existence of multiple equilibria.[4] As Steedman (2001, 423–24) argues, "the realities of modern economic growth (p. 85) cannot be adequately captured by linear models allowing only for capital accumulation, labour force growth and technical progress…. [E]ven with simplifying assumptions, resort has to be taken to simulations and to complicated case-by-case statements on outcomes."

The Analogy of the "Snapshot" and the Question of Causality in Economics

An alternative approach to a possible Keynes-Sraffa synthesis thus departs from the predominant current in "pro-Sraffa" post-Keynesianism in that it explicitly rejects an interpretation of Sraffa's production prices as long-period prices. Instead, its point of departure is the well-known metaphor of the "snapshot" that depicts the economic system as frozen at one point in time with no information provided as to what happens either before or after the snapshot is taken (e.g., Harcourt and Massaro 1964a, 716; Roncaglia 1978, 119). Sraffa's production prices are those of an "annual production cycle with an annual market" (Sraffa 1960, 10). The main question to clarify then becomes what exactly the concept of the "snapshot" implies for the analysis of economic dynamics and for a potential Sraffa-Keynes synthesis.

In an unpublished note, dated October 1929 and held in the Sraffa Archive,[5] Sraffa explicitly refers to the metaphor of an "instantaneous photograph" in the following terms:

> This notion of time is important: it really substitutes "instantaneous photographs" as opposed to ordinary time. It is only a part of ordinary time, it has only some of its connotations: it includes event, also different events, but no change of events. It enables us to compare two simultaneous, but not instantaneous, events—just as if they were "things."
>
> (Sraffa Papers D3/12/13 (1))

Applied to Sraffa's theory of production prices, this notion of an "instantaneous photograph" could simply be taken to mean that relationships between "snapshots" of "events," that is, of the production "moment" of an annual

cycle or of an entire annual production cycle, cannot be traced. In this case, Sraffa's contribution would be limited to a kind of conceptual benchmark that describes the structural essence of a capitalist market economy, but an extension of his approach to the analysis of economic dynamics beyond static comparisons between different "snapshots" would definitely have to be excluded. As Roncaglia correctly points out, even in this case, Sraffa's concept of the "instantaneous photograph" is not static in the sense of being atemporal since "time is taken into account by the fact that any particular moment of time is determined by its past history, and serves as the determining factor of the next moment in time" (Roncaglia 1978, 119). But even so, there clearly would be little to be gained from a Sraffa-Keynes synthesis.

A somewhat different and more constructive interpretation of the "snapshot" analogy, certainly from the point of view of an eventual Sraffa-Keynes synthesis, emerges from a number of Sraffa's unpublished notes on the problem of causality in economics. These would suggest that Sraffa's reference to the "snapshot" analogy was, in fact, developed **(p. 86)** in the particular context of reflections on the concept of causality and its role for our understanding of time, and thus of (economic) dynamics (Blankenburg 2006). This is not the place to embark on a comprehensive exploration of Sraffa's thoughts on causal explanations in economics, but it seems to us to be useful to outline at least a few core considerations that led him to adopt the analogy of the "instantaneous photograph." Put briefly, this appears to constitute a response to two specific problems he identified.

First, Sraffa notes that

> the "so-called problem of causality" in physics comes to this: given any physical system, is it possible, at any rate in theory, to make an exact prediction of its future behaviour, provided that its nature and condition at *one* given point of time are *exactly known*?
>
> (Sraffa Papers D 1/91(66), emphasis added)

He realizes that this concept of causality imposes extremely challenging requirements on social theorizing that it may well be impossible to meet, namely "that there is no room either for dispersion of or entering of foreign influences" (Sraffa Papers D3/12/13 (1)) in the analysis of a particular causal relation. Thus,

> The test of any theory of causality is that it should be independent of the *distinction between space and time*.
>
> (Sraffa Papers D1/3 (25), emphasis added)

Second, Sraffa is, however, also concerned about the implications of *not* taking this test of causality seriously:

> Economists who do not take this objective test as the standard of what is the cause of an event, are always driven back to trace the "ultimate causes, causae causantes, etc." to the wants, desires, aversions, decisions, volitions and intentions (or inducements and rewards) of individuals. In fact, if we do not use an objective standard and rely simply upon an unconscious "feeling that this must be the real cause"…, we are bound to base the conclusions on our own individual experience, from which it appears that we do what we want, or what we like, etc., and this seems the only convincing final conclusion.
>
> (Sraffa Papers D1/9 (6))

What concerns Sraffa here is not primarily the subjectivist nature of some *causae causantes* in economics. He is unconvinced by *all* reasoning in terms of such ultimate causes, be this the marginal theory of demand, labor,[6] or the "marginal product of capital" derived from "the quantity of capital" measured in value terms that, while involving a tautology, is not subjectivist in the same introspective sense as "marginal utilities." Rather, Sraffa's more general concern is the confusion of such *inexistent* "ultimate causes," which he also says are "best called an illusion" (Sraffa Papers D3/12/10 (61)), with *real* causal claims *presumably* based on adherence to the more demanding concept of causality adopted in physics (or more precisely, mechanics). In this sense, Sraffa's primary target is, of course marginalist theory (or "marginism," e.g., Marcuzzo and Rosselli 2011; see also Kurz in this volume for a wider discussion of Sraffa's critique of marginalist theory): This relies **(p. 87)** on ultimate causes but pretends to provide an account of real causal mechanisms that determine the future trajectories of the units or entities under consideration, essentially by resorting to the mathematical approach to the limit, or the "physicist's δt," that is, by including time but "making it so short as actually to leave no room for change in circumstances: the

cause + effect are perfectly contiguous—nothing is in between them" (Sraffa Papers D3/12/13 (1)). The result is a misleading depiction of change in terms of imaginary forces, such as the symmetric forces of demand and supply.

In our view, Sraffa's reference to the analogy of the "instantaneous photograph" has to be understood in the context of his own solution to this twofold problem of causality in economics: While the "time- and space-less" notion of causality in physics is too restrictive for the purpose of economic theorizing, the marginalist response is seriously flawed. Sraffa's alternative consists in resorting not to the technique of differentiation, but the concept of "identity" as a limiting case of real causal relations:

> the causal relation between A and B includes, as a limiting case, identity. If they are different in time, it says nothing as to one being the cause of the other, or vice versa, in any particular case to which it is applicable. And, of course, between concepts, or abstract categories these are logical, but not causal, relations.
>
> (Sraffa Papers D1/9 10)

The analogy of the "snapshot" can be understood, not as simply replicating this notion of "identity," but perhaps more broadly as informed by this gradual clarification of problems arising from different concepts of causality in economics: In this sense, the "snapshot" of an "event" is of a logical nature in that it does exclude all change. This is clear also from Sraffa's introductory remarks to *PCMC* in which he warns of "mistaking spurious 'margins' for the genuine article. Instances will be met in these pages which at first sight may seem indistinguishable from examples of marginal production; but the sure sign of their spuriousness is the absence of the requisite kind of change" (Sraffa 1960, v). However, it is *not* therefore also logical in the more narrow sense of simultaneous interdependence, as in general equilibrium theory. Quite the contrary, the exclusion of "spurious" change from the "snapshot" analogy does not deprive it of a real causal nature, and therefore also of the possibility of an exploration of its implications for economic dynamics. As Roncaglia (1978, 119) has pointed out, and as is evident from Sraffa's note quoted above, the "instantaneous photograph" is "part of ordinary time," and causal reasoning remains present in a specific technical sense, explained by Pasinetti (1974, 44 n. 27) as "an asymmetrical relation among certain variables, namely as indicating a one-way direction, in which, in a formal sense, the variables of the system are determined."

This second interpretation of the "snapshot" analogy, if applied to Sraffa's theory of production prices, opens the way to an extension of what might best be described as an "ontological event"—that is, an event with a real existence in historical time—to a dynamic "ontological" framework, precisely because the "snapshot," thus understood, retains a causal (sequential) concept of time. To what extent this possibility, based on our (second) interpretation of Sraffa's concept of the "snapshot," of opening *PCMC* to an enquiry into the kinds of dynamics that may, more specifically, be compatible not only (p. 88) with the "snapshot" itself, but also with a Sraffa-Keynes synthesis, is a different matter to which we now turn.

Intraperiod Dynamics

Our starting point is Sraffa's concept of the annual production cycle and a more general consideration of similarities between the classical notion of reproduction and the Keynesian notion of circulation (e.g., chapter 15 of *A Treatise on Money*, vol. 1). Both notions share the same causal-sequential concept of time and of economic change elucidated in the context of Sraffa's notion of the "snapshot": Time is irreversible, and economic operations are assumed to succeed one another throughout a given period. Relationships between economic variables are given within each period and can change only in the transition from one period to another. There are, thus, two different types of dynamics, one that refers to a simple succession of phases within each period—what we refer to as intraperiod dynamics—and another that concerns the transition from one period to another and changes between two successive periods, that is, interperiod dynamics. Further below, we briefly discuss a third type of dynamics that operates across several periods and is akin to structural or long-run dynamics, but that, in this specific context, we refer to as transperiod dynamics to avoid confusion with these widely used concepts (see also Arena 1987 and 1992).

The notion of recursive or successive periodical dynamics can be traced back to the classical division of time into "revolving circles of production and consumption" (Mill 1823, 227), an expression Sraffa (1951, xlii) takes up in the

introduction to his edition of Ricardo's works and correspondence. "Periods" are generally assumed to be "years" and facilitate a clear definition of the production process that can only be understood in dynamic terms:

> The whole of what the productive powers of the country have brought into existence, in the course of a year, is called the gross annual produce. Of this the greater part is required to replace the capital which has been consumed; to restore to the capitalist what he has laid out in the wages of his labourers and the purchase of his material, and to remunerate him for the wear and tear of his machinery. What remain of the gross produce, after replacing the capital which has been consumed, is called the net produce; and is always distributed, either as profits of stock, or as rent.
>
> This net produce is the fund, from which all addition to the national capital is commonly made. If the net produce is all consumed unproductively, the national capital remains unaltered. It is neither diminished nor increased. If more than the net produce is consumed unproductively, it is taken from the capital; and so far the capital of the nation is reduced. If less than the net produce is unproductively consumed, the surplus is devoted to productive consumption; and the national capital is increased.
>
> (Mill 1823, 223–24)

The close affinity between Sraffa's "annual production cycle with an annual market" and the classical notion of a circular production process is particularly evident in this (p. 89) passage from James Mill, even though the concept itself is, of course, not classical in origin but goes back to the Physiocrats, its core characteristic being a sequential notion of time, in contrast to the notion of simultaneous logical time of the Walrasian general equilibrium theory of production and its modern interpretations.

Reviving this "original picture of the system of production and consumption as a circular process" (1960, 93) that corresponds to the "standpoint, which is that of the old classical economists from Adam Smith to Ricardo" (1960, v) and to "Quesnay's *Tableau Economique*" (1960, 93), Sraffa depicts a sequence of economic activities from advances through actual production to returns. In Ricardo's version of classical theory, the analytical framework—that is, the validity of Say's Law and the role accorded to a theory of the gravitation of market prices toward natural prices—is closed in the sense that there is no space for uncertainty in the succession of intraperiod phases. But as Garegnani (1978, 1979) has shown, Say's Law is not indispensable to Ricardian theory, a point that is also evident in Sismondi's approach, since it derives different hypothesis from the same analytical tools employed by Ricardo.

In our view, a similar causal-sequential notion of time is also characteristic of Keynesian analysis. The role played in *The General Theory* by the principle of effective demand and by short-period investment expectations in the determination of levels of output and employment is an example of the systematic separation of the determination of output levels through investment behavior from the analysis of exchange behavior in the markets. Admittedly, *The General Theory* with its adherence to the notion of equilibrium is not the best place to start. Keynes's (and also Kalecki's) work on the "finance motive" is more to the point in that it places the distinction between (initial) finance and (final) funding of investment and production at the heart of the analysis to show why saving need not precede investment (e.g., Davidson 1965 and 1986; Graziani 1984; Asimakopulos 1983 and 1985; Terzi 1986). By a long way the clearest example of a circular or recursive conceptualization of economic activities is, of course, to be found in *A Treatise on Money*. Keynes here explicitly refers to the "normal circle of exchange between earnings and consumption" ([1930] 1971, 30). In our view, this plays the same role in Keynes's analysis as does the annual cycle of production in Sraffa's, namely that of a framework based on sequential intraperiod dynamics.

Moreover, in *A Treatise on Money* economic activity is depicted as a succession of contracts between agents. The initial contract takes place between banks and firms and highlights the importance Keynes accords to bank money. This first contract is necessary because production takes time and entrepreneurs need to finance production, salaries, and current investment in advance. The second contract is the wage contract. This is an illustration of the workings of the monetary production economy, in this case through the "struggle over money wages between individuals and groups" (Keynes [1936] 1973, 13), a reference to distributional conflict that Sraffa will later include in his analysis through the inverse relationship between wage and profit rates. The third contract between producers and consumers is possible only because bank money forwarded to entrepreneurs for production (including money wages) creates at least part of the purchasing power required for sales to go through. The final contract between firms (p. 90) and financial investors (including speculators) facilitates the consolidation, a posteriori, of investment expenditures through external finance.

This similarity between the classical-inspired Sraffian notion of the annual production cycle and the Keynesian notion of the industrial circulation period—that is, their shared adherence to the conceptualization of core economic activities in terms of unidirectional sequential intraperiod dynamics, as opposed to the simultaneous interdependency of marginalist economic theory—also means that economic change, in *PCMC* as well as in *A Treatise on Money*, is conceived of as resulting from the succession of several production cycles or circulation periods. This is, of course, also reminiscent of Kalecki's view that the long run is determined by the succession of short-run cycles and has no independent existence (Kalecki 1968).

Interperiod and Transperiod Dynamics

Second, while the concepts of reproduction and circulation, respectively, impose macroeconomic constraints on the transition from one period to another, these capture interperiod dynamics only insufficiently. A fuller understanding of transitional dynamics between periods requires, in particular, a more detailed analysis of the role played by expectations and, more specifically, of the way in which those in control of firms' decision-making form and periodically revise their investment plans at the end of each period. Differently from what is often assumed, neither classical nor Keynesian economic theory has much to offer us in this regard.

Those adherents of classical economic thought that subscribe to Say's Law obviously are not concerned with this question in the first place. Those who reject Say's Law have tended to focus on the analytical implications of this rejection for interperiod rather than intraperiod dynamics (e.g., Arena and Torre 1985 for the case of Sismondi). Keynes was very much interested in the nature and meaning of uncertainty and its implications for the formation of different types of expectations. Yet his analysis and observations also remain largely confined to intraperiod dynamics and are very little concerned with the transition between periods. This is not surprising, since Keynes was of the view that the formation of short-period expectations did not exert any major influence on the stability, that is, the path of the economy over time (Keynes 1973, 602–3, see also Amadeo 1989, 107–13).

This lack of analysis beyond intraperiod dynamics also extends to the third form of economic dynamics that interacts with both intra- and interperiod dynamics but persists across several periods, that is, transperiod dynamics. This concerns variables such as the state of technological knowledge and skills, population growth, the evolution of consumption patterns and of existing production capacities, as well as historical determinants of income distribution. The "classical school" treated these variables not as parameters, but as endogenous factors at least partially explained by economic theory. The best-known examples include Adam Smith's theory of the division of labor, Babbage's principles of "scientific management," Ricardo's theory of machinery and of the fall of the rate of profits, as well as Malthus's theory of population growth. With the (p. 91) advent of marginalism, these variables were turned into parameters responsive only to exogenous shocks. For entirely different methodological as well as substantial reasons, Sraffa (1960) also treats these variables as parameters, as does Keynes in *The General Theory*. Keynes, more specifically, differentiates between "independent variables" and "givens." The former include the propensity to consume, the marginal efficiency of capital, and liquidity preference, whereas the latter refer to existing productive capacities, the state of technology, consumption patterns, and different forms of competition. Keynes does not assume "these factors to be constant; but merely that, in this place and context, we are not considering or taking into account the effects and consequences of changes in them" (Keynes [1936] 1973, 245). He thus explicitly excludes an explanation of the third type of (transperiod) dynamics from his analysis.

The main implication is that a Keynes-Sraffa synthesis that simply "adds" (aspects of) Sraffa to Keynes, or vice versa, is bound to end up with a very limited analysis of economic dynamics, namely one that would reduce the analysis of economic dynamics to the analysis of convergence processes of intra- and, to some extent, interperiod dynamics toward a long-period position determined by exogenous parameters.

In our view, a more promising, albeit also a more challenging, route toward a Sraffa-Keynes synthesis, rather than combining elements of Sraffian and Keynesian analysis within a framework that takes the long-period position as a "given," would have to take on board Steedman's observation, quoted earlier, that "the realities of modern economic growth cannot be adequately captured by linear models," requiring instead resort "to simulations and to complicated case-by-case statements of outcomes" (Steedman 2001, 424).[7] What we have referred to as transperiod dynamics in the context of our comparison of Sraffian and Keynesian positions could, in this sense, also be described as complex cumulative dynamics: cumulative because the interactive effects of all three types of dynamics along trajectories governed by path dependence would have to be considered, rather than virtual

adjustments around a long-period position (as, for example, in Nicholas Kaldor's well-known concept of cumulative causation); complex because, in formal terms, path dependence generally implies nonlinearity (as, for example, in Goodwinian and Kaleckian approaches to cyclical growth). That is, the dynamics under consideration cannot be limited to a convergence process toward a unique position.[8]

Agent Heterogeneity

Third, Sraffa's notion of an annual production cycle and the Keynesian notion of the circulation period both imply agent heterogeneity. Agents are not simply (free and equal) individuals whose sole economic activity consists of exchanging goods among themselves ("pure exchange") or against factors ("production") in a sphere governed by the laws of demand and supply, but they are defined by their position in the economic cycle or circulation period. In other words, agents belong to distinct social groups occupying different roles in the organization of the three principal activities of the annual cycle or period of circulation: the planning of advances (or the formation of investor expectations (p. 92) in Keynesian terms), production and consumption. The only actors involved in the first phase of the production cycle are entrepreneurs who control decision making on production, recruitment, and investment plans. The level of employment is therefore not a matter of demand and supply in labor markets, but exclusively a matter of entrepreneurial expectations. Neither are there factor markets during the second phase of production, since the employment of labor does not involve an exchange between labor services and consumption goods. Finally, commodities are produced "by separate industries and are exchanged for one another at a market held after the harvest" (Sraffa 1960, 3), while in *A Treatise on Money* wage-earners use their money wages to buy products.

This definition of agents, not as interchangeable individuals with objective functions and initial endowments, but as heterogeneous individuals belonging to social groups whose roles in the economy are governed by institutional rules and social convention, is not limited to intraperiod dynamics, but necessarily carries over to interperiod and transperiod dynamics, since entrepreneurial expectations and decision making affect future investment and the technological trajectory of the economy. These, in turn, are influenced by the evolution of income distribution and social conflict, described in their different ways by Sraffa and Keynes.

These are only some of many more possible points of convergence between classical-inspired Sraffian and Keynesian approaches, albeit, in our view, the most important from a point of view favorable to an eventual synthesis. As mentioned in section 1, there are of course also important differences that include, in particular, the role accorded to monetary analysis and the determination of prices. We focus on these two points of divergence between Sraffian and Keynesian analyses since they have, for obvious reasons, received a lot of attention (see, for instance, Harcourt 1965), but above all because neither of these differences seems to us to pose entirely insurmountable obstacles for a Sraffa-Keynes synthesis.

The Role of Money

The primacy of the concept of commodities—understood as something that is difficult to produce and reproduce and that is destined for sale in the markets—over money in classical economic theory is well known and is reflected in the fundamental role accorded to real phenomena, such as relative prices, distributive variables, and the determinants of capital accumulation. In Sraffa's system, too, the place given to money remains very limited.

Keynes's *A Treatise on Money* clearly embraces an entirely different perspective: "Money of account" is the "primary concept" in this approach (Keynes [1930] 1971, 3), and this primacy of money over commodities is most apparent in its abandonment of the theory of value and in the specific treatment reserved for the notion of "commodity money": If commodity money is money, this is not, as in the Ricardian tradition, because it is principally a commodity with a specific exchange value that is difficult to produce. Rather, commodity money is money due to the societal convention according (p. 93) to which money is "the *thing* which answers to the description [i.e., money of account]" (Keynes [1930] 1971, 3). Money of account is not, however, the only concept considered in *A Treatise on Money*. "Money itself" is "that by delivery of which debt contracts and price contracts are *discharged*, and in the shape of which a store of general purchasing power is *held*" ([1930] 1971, 3, emphasis in original). Money proper can take the form of state or bank money, where the latter renders possible the circulation of income. Bank money is periodically created and destroyed by the banking system, and its life span is the same as that of the circulation of commodities. Here again the life span of bank money is determined by the

duration of the circulation period and is governed by intraperiod dynamics.

At first sight, this difference appears fundamental in nature. However, for classical economic theory more generally, it has to be kept in mind that resort to the quantity theory of money (in addition to Say's Law) is typical only of its Ricardian strand. As with Say's Law, mentioned earlier, this reliance on the quantity theory of money is by no means a logically indispensable element of classical theory (see, for instance, the Banking School). As concerns Sraffa's writings on money, the only publication that refers to "the quantity of money in the form dominant at the time" (Panico 2001, 286) is his Italian thesis on inflation in Italy (Sraffa [1920] 1993). In fact, this, as well as later publications (Sraffa 1921a, 1921b, 1922a, 1922b), primarily adopts an institutional perspective on the role of money in the economy. Both Keynes and Sraffa suggest that monetary phenomena, such as inflation or deflation, can have an impact on social conflicts about income distribution even if their respective views on the strength and persistence of these effects differ. Panico argues that, in Sraffa, this "testifies to the adoption of a standpoint, which will be here called 'conventionalist,' according to which the *level* of the economic variables under examination is not determined by natural or material forces, such as the availability of the factors of production in the neoclassical theory of distribution, but can establish itself at any level considered *normal* by the common opinion and can be affected by the decisions taken by the monetary and other authorities" (Panico 2001, 287, emphases in the original). This "conventionalist" label could equally well be applied to Keynesian analysis and therefore to a synthesis between Sraffian and Keynesian approaches, if we remember that in *A Treatise on Money* as well as in *The General Theory* the functioning of the monetary rate of interest strongly depends on the role played by conventions in the formation of short- as well as long-run agent expectations. The main difference between Keynesian and Sraffian approaches to monetary theory is not one that would seem to pose an insurmountable problem for a synthesis. This arises from Sraffa's insistence on *social power relations*, for example, in his 1921 and 1922 contributions, in which he tries to shed light on the relationships between industry, finance, and the political world and thus on "the existence of conflicts within the capitalist class" (Panico 2001, 288), the impact this has on economic policymaking as well as its indirect effects on income distribution. As regards the money supply, following his thesis, Sraffa gradually abandoned the quantity theory of money. In addition, his active interest and role in debates leading up to the publication of *A Treatise on Money* together with his well-known skepticism of *The General Theory* suggest that Sraffa (p. 94) endorsed the assumption of endogenous money supply, although, as far as we are aware, his published work does not contain any explicit endorsement of this position. These ideas also appear to be confirmed by Sraffa's suggestion in *PCMC* that the monetary rate of interest determines the independent variable of Sraffa's price system, namely the rate of profits. As Panico (2001) suggests, this monetary rate of interest should be regarded as in part "conventional" and in part "controlled." It would seem quite feasible to integrate this view on the role played by social convention as well as sociopolitical "control" factors in the determination of the monetary rate of interest with the assumption of endogenous money supply to build a Sraffian-post-Keynesian consensus in this regard (see, e.g, Arena 1982 and 1984; Pivetti 2001; Aspromourgos 2004; Lavoie 2010; and Kurz in this volume).

The Determination of Prices

The second point of divergence we would like to take up in this contribution concerns the determination of prices. On the classical side of the argument, Ricardo emphasizes the concept of natural or production prices, based on the hypothesis of a uniform rate of profits and the gravitation of market prices around natural prices. The surplus approach retains this hypothesis as well as the gravitation center concept. In both cases the idea of natural or production prices also presupposes an intersectoral analysis of the economic system. On the Keynesian side of the argument, things are rather simple: As we know, Keynes himself did not provide a fully developed theory of price determination, even if chapter 21 of *The General Theory* could be considered as an adaptation of Marshallian short-period competitive pricing to the economy as a whole.

Full-cost and cost-plus price theories, whether in their various post-Keynesian versions or in the original variants developed by R. L. Hall and C. J. Hitch as well as P. W. S. Andrews and E. Brunner, respectively (e.g., Wilson and Andrews 1951), seem to be the obvious route to take out of this potential impasse. We have already mentioned post-Keynesian authors, such as Dutt, Harcourt, and Lavoie, who have emphasized the compatibility of their own price theories and those of other post-Keynesian authors with Sraffa's theory of production. While this compatibility has not as yet been formally established within a general framework, there is a clear analytical and conceptual overlap of these approaches with Sraffian authors who have replaced Sraffa's original assumption of a uniform rate

of profits with differential intra- and intersectoral rates of profit (e.g., Boggio 1980 and 1990, who provides the most detailed model with differential rates of profit; see also Arena and Froeschle 1986; Arena et al. 1990).

We have also already pointed to the most important revision that a synthesis, broadly based on these premises for the development of a hybrid theory of price determination, requires from the (dominant) Sraffian perspective. As well as abandoning the hypothesis of a uniform rate of profits and with it the Smithian concept of free competition, this includes most fundamentally an interpretation of Sraffa's theory of production prices in terms of the "snapshot" analogy rather than as long-period prices, that is, as a theory of the (p. 95) existence of relative prices at a specific moment or phase of the annual production cycle. Since we have already dealt at length with this latter aspect, we will here focus briefly on the uniform rate of profits. The obvious question that arises in this context is of course why Sraffa introduced this hypothesis in the first place. In our view, Hicks provides a succinct and apt response to this question when he argues that the uniformity of the rate of profits should be understood as a "conventional uniformity" (Hicks 1985, 306). The role of this "convention" in Sraffa's theory of production derives directly from the explicit assumption on which *PCMC* is based, namely Sraffa's view that the core distributive conflict in capitalist economies is that "between capitalists and workers" (1960, 9). This does not exclude a consideration of other types of social conflict, either between other social groups or in the context of other economic systems. But as Steedman (1986) has pointed out, this explicit starting point of *PCMC* means that differential sectoral rates of profit must be excluded from the basic analysis since otherwise "branch interests" could outweigh "class interests." In addition, the uniformity postulate plays the role of a minimal social norm that imposes itself on all producers and is, in this sense, a condition of the reproduction of a capitalist economy: Not obtaining this rate of profits would prevent all or some producers from repeating their production process and would, consequently, prevent the reproduction of the economic system as a whole. The Ricardian interpretation of the natural rate of profits clearly comes to mind: Ricardo ([1952] 1973, 235, 256–57, 272) argues that obtaining this rate of profits constitutes producers' main motivation, since otherwise their production cannot be repeated and the economic system as a whole would go into decline.

Within an analytical framework based on these cornerstones, there is nothing to prevent production prices from being defined in monetary terms, all the more so if the chosen numeraire is Keynes's "money of account" in *A Treatise on Money*. Similarly, there is nothing to stop such prices from being understood as supply prices (e.g., Earl 1983), that is, as prices that will not automatically adjust and that will therefore not be market-clearing in the short period.

4. Concluding Remarks

One of the similarities between Keynesian and Sraffian analysis we highlighted was in fact a shared criticism, namely, their limited contribution to our understanding of what we have called transperiod dynamics. There is thus little choice but to look to new terrains for the development of our understanding of such dynamics. Within a post-Keynesian "broad church" we can see two possible routes for such an enquiry: First, Pasinetti's theory of structural change and economic growth could be developed further in the direction of detailed case-by-case analyses of the relationship between the natural system and its institutional setups. In this case, different scenarios would have to be explored in the form of models that analyze core path dependency effects between what Pasinetti refers to as the short and long periods, and what we have referred to as the relationship between our three types of dynamics. The complexity of Pasinetti's system (p. 96) makes this a formidable task. At the same time, however, it remains the case that the equilibrium conditions of local as well as global stability in Pasinetti's approach have as yet to be explored. An alternative route would take its main inspiration from a large number of contributions to post-Keynesian macroeconomic theory in the tradition of Kaldor and Kalecki. These approaches to the analysis of economic dynamics promise to be easily reconcilable with much of what constitute post-Keynesian "microeconomic foundations," such as pricing and investment theories, as well as contributions to the theory of banking and finance. Obviously, these approaches remain at a considerable remove from Sraffa's theory of production. This would thus likely be a more complicated enterprise, and it is perhaps not surprising that this route is the least advanced so far, from the point of view of a potential Sraffa-Keynes synthesis.

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Notes:

(1.) The authors would like to thank G. C. Harcourt very warmly for his invaluable advice and suggestions. The usual disclaimer, of course, applies.

See Kurz in this volume for an extensive discussion of Sraffa's role in the critique of mainstream economic theory. In this contribution we focus primarily on the compatibility between Sraffian and (post–)Keynesian approaches.

(2.) The term "surplus approach" here refers to theories of prices and income distribution in the tradition of Adam Smith, David Ricardo, Karl Marx, and Piero Sraffa that define profits and rents as residual magnitudes (after wages have been paid) and in which a uniform rate of profits results from a process of gravitation toward long-period production prices.

(3.) In his interpretation of John Maynard Keynes's theory of liquidity preference Pasinetti only assumes that entrepreneurs proceed by ranking "all possible investment projects in order of decreasing profitability and then carrying out investments up to the point at which the expected rate of profit from the last project (called the 'marginal efficiency of capital') is just higher than, or equal to, the rate of interest as expressing the cost of borrowing" (Pasinetti 1974, 37). Moreover, Pasinetti observes that in *The General Theory*, the rate of interest is determined by the demand for money and the quantity of money issued by the "central authority" (37). He therefore characterizes the rate of interest as a "purely monetary phenomenon" (37).

(4.) On this point we disagree with Lavoie (2010, 21–22), who argues that Sraffians have unfairly been criticized for rejecting the possibility of path dependence. He quotes a footnote in Garegnani (1983) and Mongiovi and Rühl (1993) as examples of Sraffian contributions that have recognized the possibility of the trend being determined by short-period or cyclical fluctuations. While this is correct, to our knowledge neither of these authors has gone beyond the mere recognition of this possibility, i.e., has developed an analytical argument of how path dependence could be made compatible with an interpretation of Sraffa's prices of production as long-period prices.

(5.) The Sraffa Papers are kept in the Wren Library at Trinity College, Cambridge. References to Sraffa's unpublished notes follow the catalogue prepared by members of staff at the Wren Library, and all emphases are in the original unless otherwise stated.

(6.) This is well documented in the Sraffa Papers; see e.g. Kurz and Salvadori (2005, 417–20).

(7.) Although far from perfect, this would suggest that another analogy provided by Harcourt (1981, 47) to illustrate differing interpretations of the gravitation center concept is closer to the mark than the meteorological analogy he eventually adopts. This depicts gravitation dynamics in terms "of a dog always running towards its master who is riding a bike. The bike is the centre of gravity which itself is moving but the dog's direction of movement at any point in time can be predicted by knowledge of where the bike (and its master) is, at that moment in time." The main point, however, is that "knowledge of where the bike (and its master) is" may be a more complex matter than suggested even by this analogy.

(8.) See for instance Arena, Froeschle, and Torre (1990).

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On the Notion of Equilibrium or the Center of Gravitation in Economic Theory

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[–] Abstract and Keywords

The notion of equilibrium has played a critical role in economic theory since Adam Smith. It is in the theories of value that the notion of equilibrium has played a crucial role, and to the extent that a theory of value is fundamental to any economic theory of the capitalist market economy, it has remained critical to economic theorizing in general. In the classical tradition, the theory of value is concerned only with the commodities that are produced and the supplies of which can be increased or decreased by changing the labor and materials allocated to their production. In the neoclassical tradition, however, the theory of prices is built on the paradigm of pure exchange, and, therefore, it can determine prices without invoking the condition of the uniformity of the rate of profits. This chapter examines the notion of a "center of gravitation" in the classical tradition, which includes Piero Sraffa.

Keywords: Piero Sraffa, equilibrium, center of gravitation, theory of value, economic theory, classical tradition, neoclassical tradition, prices, profits

Introduction

The notion of equilibrium has played a critical role in economic theory since Adam Smith, and it is almost invariably invoked as an ideological support for the efficiency of the market in dealing with economic crisis. It is in the theories of value that the notion of equilibrium has played a crucial role, and to the extent that a theory of value is fundamental to any economic theory of the capitalist market economy, it has remained critical to economic theorizing in general.

In the classical tradition, the theory of value is concerned only with the commodities that are produced and the supplies of which can be increased or decreased by changing the labor and materials allocated to their production. In this context, the classicists maintain that the long-term values of commodities are determined by their "cost of production," where "cost of production" not only includes the material costs but also the uniform wages paid to the laborers and the uniform rate of profits received by the capitalists on their invested capitals (and in the case of Adam Smith, uniform rents received by the landlords on land as well). It is the condition of *uniformity* or *equality* of returns to factors in all the sectors and industries of the economy that enables the classicists to derive or determine the long-term prices of the commodities. However, this necessary condition for the determination of the long-term prices or what classicists call "natural" prices is supposed to hold when the supplies of all the commodities are equal to their effectual demands. In other words, the condition of the uniformity of wages and the rate of profits is linked to the condition of equilibrium of effectual demands and supplies, (p. 102) and, therefore, the determination of the natural prices is based on the condition that equilibrium of demand and supply holds. In the neoclassical tradition, however, the theory of prices is built on the paradigm of pure exchange, and, therefore, it can determine prices without invoking the condition of the uniformity of the rate of profits. It, nevertheless, maintains the condition of equilibrium of demand and supply but drops the condition of uniformity of

the rate of profits as a necessary condition for it. Though the Sraffians have remained strongly wedded to the notion of equilibrium, it is my contention that Sraffa (1960) breaks from both the traditions in this regard. On the one hand Sraffa maintains the classical condition of uniformity of wages and the rate of profits, but on the other hand he delinks this condition from the condition of equilibrium of effectual demands and supplies, thereby liberating the theory of prices from the shackles of equilibrium.

In this chapter we are mainly concerned with the notion of "center of gravitation" in the classical tradition, which includes Sraffa. However, a brief discussion of the orthodox general equilibrium theories is also introduced for the sake of continuity and completeness of the story. Though Keynes's *General Theory* has been interpreted in a Walrasian framework by many (see, for example, Hicks 1937; Patinkin 1956), I have decided to leave it out on the ground that it is not a theory of prices. Marshall's price theory has also been left out for being a partial equilibrium theory.[1]

The Classical Tradition

Even though Adam Smith never uses the word "equilibrium" in a mechanical sense, he argues that empirical prices or the "market prices" at any given time are always gravitating toward a set of prices that in some sense is "natural" and more stable. Adam Smith's reasoning begins with the basic accounting principle that the value of the total net output produced in a production or a harvest cycle must be equal to the total net income generated in the economy. On the assumption that there are only three classes of recipients of income (landlords, capitalists, and workers), he hypothesizes that at any given time the "natural" wage rate and the "natural" rate of profits are conventionally given data (actually they are supposed to depend on the historical rate of growth of the economy and certain social norms). Rent of land, in contrast, is determined in the food-producing agricultural sector, where both input and output can be taken to be the same good, and hence the conventional "natural" wages and profits can also be reckoned in the same good. It is Adam Smith's contention (which is in agreement with the Physiocrats) that there is always a physical residual of food left after deducting the "seed" and the "natural" wages and the "natural" profits, which turns into an income category for the landlords as rent. From here on Adam Smith argues that the "natural prices" of all the commodities must *ultimately* resolve into "natural" wages, "natural" profits, and "natural" rents. In other words, given the "natural" rates of wages, profits, (p. 103) and rents plus the techniques of production in use, one can determine the set of "natural prices" as shown below:(Ap + H)(1 + r) + tL = p,

$$(\mathrm{Ap}+\mathrm{H})(1+\mathrm{r})+\mathrm{tL}=\mathrm{p},$$

$(\mathrm{Ap}+\mathrm{H})(1+\mathrm{r})+\mathrm{tL}=\mathrm{p},$

where A is an n × n matrix of commodity inputs a_{ij}, which represents the quantity of good j required to produce, on average, 1 unit of good i. We take good 1 as "corn" with a_{11} positive and all other a_{ij} elements as zero in the first row of matrix A. H, L, and p represent vectors of labor time, land units, and the "real price" or the labor time commanded respectively (thus the wage rate by definition is equal to 1). And r and t represent the rate of profits and rent per unit of land respectively. On the assumption that the Hawkins-Simon condition holds, we can represent our production system in terms of Adam Smith's price equations as

$$(\mathrm{H}+\mathrm{rH}+\mathrm{tL})=\mathrm{p}-\mathrm{Ap}(1+\mathrm{r})=[\mathrm{I}-\mathrm{A}(1+\mathrm{r})]\mathrm{p}$$
$$\mathrm{p}=[\mathrm{I}-\mathrm{A}(1+\mathrm{r})]^{-1}(\mathrm{H}+\mathrm{rH}+\mathrm{tL}),$$

$(\mathrm{H}+\mathrm{rH}+\mathrm{tL})=\mathrm{p}-\mathrm{Ap}(1+\mathrm{r})=[\mathrm{I}-\mathrm{A}(1+\mathrm{r})]\mathrm{p}$
$\mathrm{p}=[\mathrm{I}-\mathrm{A}(1+\mathrm{r})]^{-1}(\mathrm{H}+\mathrm{rH}+\mathrm{tL}),$

given that the equations are independent. This can be expanded as

$$\mathrm{p}=[\mathrm{I}+\mathrm{A}(1+\mathrm{r})+\mathrm{A}^2(1+\mathrm{r})^2+\mathrm{A}^3(1+\mathrm{r})^3+\ldots](\mathrm{H}+\mathrm{rH}+\mathrm{tL})$$

$\mathrm{p}=[\mathrm{I}+\mathrm{A}(1+\mathrm{r})+\mathrm{A}^2(1+\mathrm{r})^2+\mathrm{A}^3(1+\mathrm{r})^3+\ldots](\mathrm{H}+\mathrm{rH}+\mathrm{tL})$

This resolves all prices into wages, profits, and rent. Of course, Adam Smith did not argue his case in such a mathematical manner, but his theoretical argument can be fairly represented by these mathematical equations (for details on Smith's theory of value, see Sinha 2010a, 2010b).

These natural prices are determined on the condition that the uniform rates of wages, profits, and rents prevail. It is Adam Smith's contention that if the quantities demanded and the quantities supplied of various commodities are not equal, then the market prices of commodities with excess demand will rise above their natural prices, and the converse will occur for the commodities with excess supply. He further argues that if the market price of a commodity is higher than its natural price, then one or more factors associated with its production must receive higher income than their "natural" rates and the converse for the commodity with a lower market price than its natural price. According to Adam Smith, this will, under the condition of free competition, trigger a movement of factors from the sectors where their incomes are lower than their "natural" rates to the sectors where those factors are receiving higher than their "natural" rates, bringing in its wake an increase in the supply of the commodities that were in excess demand and conversely for the commodities that were in excess supply. And as supplies adjust to demands, the market prices move toward their natural prices.

But what ensures that quantities supplied are equal to quantities demanded when all the market prices are equal to their respective natural prices? Adam Smith's answer to this problem is that demand must be "effectual," that is, it must be backed by real ability to buy. But the real ability to buy comes from real income, which is generated **(p. 104)** in production. How much income is generated can only be determined if not only the techniques in use but also the size of the economy or the total employment of labor is known. In other words, Adam Smith begins with a given empirical economy with its inputs and outputs as known data (similar to Sraffa). The argument runs as follows: the given empirical set of outputs generates a set of incomes that generate a set of quantities demanded. This set of quantities demanded may not match one to one with the outputs produced. The idea of "effectual demand" refers to the fact that the economy should be able to produce the set of "effectual demands" by *reallocating its given employment of labor*. In other words, on an implicit assumption of constant returns or linear techniques, any given economy can produce many sets of output combinations by reallocating its given total labor employment. Any such sets of outputs could represent the set of effectual demands. The gravitation mechanism is designed to argue that market price signals direct reallocation of labor such that the economy eventually produces exactly what is demanded. Thus supplies will match the quantities demanded one to one and market prices will coincide with natural prices, as the only cause of divergence of market prices from natural prices is the incongruence between supplies and effectual demands:

> The natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating. Different accidents may sometimes keep them suspended a good deal above it, and sometimes force them down even somewhat below it. But whatever may be the obstacles which hinder them from settling in this centre of repose and continuance, they are constantly tending towards it.
>
> (Smith [1776], 1981, 75)

So what role does the notion of gravitation play in Smith's theory of prices? It is clear that Smith's natural prices are determined by the *objective* input-output data of any given economy and the distribution of income given by the history of economic growth and social norms and the productivity of the food-producing land. This allows no role for human psychology or motives. But Smith also believes that the economic actors are individual human beings who act on certain motives, particularly to improve their conditions whenever there is an opportunity to do so. The notion of gravitation allows him to put all these psychological aspects in one box and show that their influence is to generate a sort of gravitational force on both supplies and market prices toward effectual demands and natural prices respectively. Clearly the notion of equilibrium is critical to Smith's theory of value, as the conceptual legitimacy of the notion of natural price rests on it being the equilibrium market price, even though the forces of demand and supplies themselves are not supposed to be the determinants of the natural price.

The neoclassical reading of classical economics, led by Samuel Hollander (1973, 1979, 1992), argues that it is incorrect to suggest that the natural prices of classical economics are independent of demand factors. Hollander argues that Adam Smith and other classicists assume *constant costs* in the context of the gravitation mechanism only for illustrative simplicity. His contention is that classical economists begin their analysis with given endowments; thus a change in demand patterns, say a shift in consumption demand from a "capital intensive" to "labor intensive" good, would increase the **(p. 105)** total demand for labor and therefore wages, causing techniques of production to shift in favor of relatively "capital intensive" techniques, which in turn must cause changes in the natural prices of goods. The weakness of this interpretation lies in the fact that it is unable to account for Adam Smith's notion of "effectual demands" as demand points backed by real income. In our

interpretation presented above, the "effectual demands" are well-defined points, and given that the gravitation mechanism is concerned with reallocation of the total employed labor of the empirical economy, the question of a rise or fall in the demand for labor in the context of the gravitation mechanism does not arise. Therefore, in this context an implicit assumption of constant returns implies constant costs as well.

Ricardo ([1821] 1951) accepts Adam Smith's description of the notion of the center of gravitation: "In the 7th chap. of the Wealth of Nations, all that concerns this question is most ably treated." He, however, develops his theory of value in opposition to Adam Smith's. According to Ricardo, Adam Smith first takes the natural rates of all the three income categories as independently determined or given from outside, and then he simply adds up the three income categories to determine the natural prices. Since then this has been the dominant interpretation of Smith's theory of value (for a critique of this interpretation, see Sinha 2010a, 2010b). On the basis of such an interpretation, it has been alleged that Smith maintained that a rise in wages would lead to rise in the prices of all the commodities, leaving the rate of profits and rent unaltered. If this interpretation is correct, then it is quite clear that Smith's theory of value fails to take into account the constraint binding on the total income and thus makes a logical error. Against Smith's "adding-up theory" of value, Ricardo wants to establish that a rise in wages *must* lead to a fall in the rate of profits. To establish this, he proposes a labor theory of value, which suggests that natural-price ratios of commodities are proportional to their sum of direct and indirect labor required to produce the commodities.

Ricardo argues that Smith is wrong in claiming that the labor (embodied) theory of value is valid only in the context of labor being the sole factor of production as well as the sole recipient of income and that as soon as profit (and also rent) appears as an independent category of income, the labor theory of value becomes invalid by virtue of it. Ricardo goes on to show that the labor theory of value remains a valid theory of natural prices even when the rate of profits is positive as long as the ratios of direct to indirect labor remain uniform for all the industries, implying that emergence of profit as an income category does not by itself invalidate the labor theory of value, as claimed by Smith. Ricardo, however, acknowledges that when the ratios of direct to indirect labors are not uniform, then the natural prices of commodities must deviate from their labor-value ratios. But this does not deter him from arguing that even though the natural prices diverge from their respective labor-value ratios, the sole cause of changes in the natural prices is still the changes in the labor values of commodities (see Sinha 2010a for details). Given that his main concern was to show that a rise in the value of wages must lead to a fall in the rate of profits, it was sufficient for him to maintain that the changes in the value of wages itself will not have any impact on the natural prices, whatever the natural prices happen to be. But, yet again, Ricardo has to acknowledge that the same **(p. 106)** cause that makes the natural prices deviate from labor-value ratios also operates as one of the causes of change in the natural prices, and thus it cannot be denied that a rise or fall in the value of wages affects the natural prices. Ricardo apparently held the incorrect belief that the effect of changes in the value of wages on the natural prices is only apparent and is solely due to a lack of an "invariable measure of value" in nature—this problem kept him preoccupied till the end of his life (see Sinha 2010a, 2010c). In any case, in the *Principles* he takes refuge in the expedient that in the real world the effect of changes in the value of wages on the natural prices is minor and can simply be ignored. On this supposition he could then show that a rise in the value of wages must lead to a fall in the rate of profits as long as land and rent are kept out of the picture.

To "get rid" of rent from the consideration of a theory of natural prices and the proposition regarding the inverse relation between wages and the rate of profits, Ricardo proposes a theory of rent according to which the productivity of marginal land declines with extension of agriculture or employment of further doses of capital and labor on the same land beyond the optimum combination of the three factors. Ricardo argues that rent as an income category arises solely due to the natural differential productivity of land. The extent of the cultivation of land and the extent of the employment of capital and labor on any given plot of land are determined by the size of the population at any given point of time. Given the margin of land under cultivation, the extra produce on all the intramarginal land turns into rent, whereas marginal land (or the marginal dose of capital and labor) itself does not pay any rent. Ricardo argues that it is only the marginal land that is relevant in determining the natural prices in his theory, and therefore rent plays no role in the determination of natural prices.

Though the theory of differential rent is crucial to Ricardo's theory of value and distribution, it nevertheless causes a serious problem for his proposition regarding the center of gravitation. Ricardo argues that the extension of cultivation is determined by the size of the population, and hence the gravitation mechanism or the reallocation of given labor itself cannot affect the margin of cultivation and the natural prices. He, however, does not consider the

case of a manufacturing industry requiring agricultural raw materials. If the manufacturing sector requires agricultural produce as its raw materials, such as cotton, jute, and tobacco, then it cannot be denied that a reallocation of labor between industries in the manufacturing sector may affect the demand for the agricultural raw materials and hence the overall margin of cultivation. And once the margin of cultivation is affected, it must affect the natural prices as well as the rent, wages, and the rate of profits in the system. Therefore, it can no longer be argued that natural prices are independent of demand patterns or that distribution of income can be separated from natural-price determination. As Samuelson argues, "The point is obvious that any classicist who thinks he can separate 'value' from 'distribution' commits a logical blunder. He also blunders if he thinks that he can 'get rid of land and rent as a complication for pricing' by concentrating on the external margin of no-rent land: where that external margin falls is an *endogenous* variable that shifts with tastes and demand changes so as to vitiate a hoped-for labor theory of value or a wage-*cum*-profit-rate theory of value" (Samuelson 1978, 1420).

(p. 107) The Neoclassical Tradition

Though no classicist ever proved the hypothesis that the price signals in the market necessarily lead the market prices to the long-term equilibrium prices given by their natural prices, this hypothesis was never seriously challenged and was accepted by most as self-evidently true. J. S. Mill (1848) went to the extent of suggesting that "dealers" often change prices in response to changes in the cost of production in anticipation of the supply response, without supply actually having to respond. Marx ([1867] 1977) went on to call the gravitation mechanism the *law* of value. The modern marginalist or neoclassical theory of value that came into being with Jevons ([1871] 1957) and Walras ([1874–7] 1954) also does not question the classical notion of equilibrium and gravitation. Their attempt is to dethrone the classical theory of natural prices, which determines the equilibrium prices by objective data alone. They argue that equilibrium prices are determined only by the forces of supply and demand, where demands of the final goods reflect the subjectivities of the consumers. They further argue that commodities have prices not because it "costs" to produce them but rather because they are "scarce" and the scarcity of a commodity is a function of the subjectivity of the consumer. Even when they introduce production explicitly in their theories, they interpret "costs" of production from the subjective perspective as "disutility" (see Bharadwaj 1978 for more details).

Walras distinguishes all useful goods, placing them in two categories: (1) "unlimited" in supply, such as air and water, and (2) "limited" in supply. According to Walras, the "unlimited" goods are free, but all the goods with "limited" supply are "scarce" and, due to their scarcity, have positive prices. Later Wald (1951) showed that the solution of Walras's equations cannot rule out some commodities being permanently in excess supply, and thus those commodities must be assigned zero prices. The upshot of Wald's result is that commodities cannot be classified as "scarce" prior to the determination of the equilibrium prices, and therefore scarcity cannot be taken as the *cause* of positive prices. To say that all goods that have positive prices are "scarce" is at best a tautology, and, as with all tautologies, it provides us with no useful information. In any case, Walras's great achievement, at least in his own opinion, is to, for the first time, mathematically "prove" that in a perfectly competitive market at least a set of prices exists for which the respective supplies and demands of all the commodities are equal. But Walras's contention of the greatness of his achievement is not only the proof of the existence of equilibrium but rather that the equilibrium is *stable*. In other words, he argues that in a perfectly competitive market there exists an inherent mechanism that brings disequilibrium prices to their equilibrium. Walras's mathematical proofs of either the existence of equilibrium or its stability are, however, not rigorous—he simply takes the condition of equality of the numbers of independent equations and the unknowns in the system of equations as proof of the existence of a solution; and in the case of the stability of equilibrium, he simply argues that a competitive market mimics his theoretical device of an auctioneer. It should, however, be noted here that the notion of perfect competition in Walras and the neoclassical tradition in general is not the same as the notion (p. 108) of free competition in the classical tradition. In the neoclassical tradition, the notion of perfect competition implies that the agents are "price takers" or, in other words, their theoretical models take prices as parametrically given, whereas in the classical tradition, the agents actively raise or lower the prices in response to the market conditions (see Hollander 1973 and Eatwell 1987).

After the powerful paper by Wald, it became clear that the problem of the existence of equilibrium itself was highly complicated, and the profession separated the problem of "existence" from the problem of "stability." Only in the 1950s was it shown by Arrow and Debreu (1954) and McKenzie (1954) that under highly restrictive assumptions

the existence of one or multiple "equilibrium" prices for a Walras-type system of equations can be proved. However, their condition of equilibrium does not require the classical condition of equality of the rate of profits even when production is incorporated within their general exchange model. The works on the "stability" of equilibrium, however, have concluded that the stability of "equilibrium" cannot be guaranteed (Gale 1963; Sonnenschein 1972). One simple reason for this is that in the case of positive excess demand for a good, when its price is raised, it simultaneously raises the income of those who supply that commodity, and there is no way of denying a priori that the positive income effect will not be greater than the substitution effect of a price rise, resulting in contraction of its total supply rather than the required increase in it for the stability of the equilibrium in its neighborhood. Moreover, it has also been found that the process of arriving at equilibrium is contingent upon the choice of the numeraire, which makes the stability property of the equilibrium quite arbitrary (see Arrow and Hahn 1971). But once it is accepted that "equilibrium" may not be stable, then such a notion of "equilibrium" loses most of its force. Now it cannot be argued that there exists an inherent force in a perfectly competitive market that ensures that disequilibrium situations are short lived and that the market has the ability to self-correct. Thus, in this context, the notion of "equilibrium" reduces to a mere formal condition that allows for a solution of a simultaneous equation problem. Without the notion of equilibrium we do not have any means of determining the prices of all the commodities in the general equilibrium framework.

The Sraffians

Though the problem of the existence and stability of equilibrium within the Walrasian tradition was thoroughly investigated during the second half of the twentieth century, its classical counterpart remained ignored. A champion of the classical tradition, Pierangelo Garegnani (1976), goes to the extent of arguing that the notions of equilibrium of the classical and the early neoclassical traditions are the same (or at least similar) and that there is no problem with it. According to Garegnani, the fundamental problem with the theory of value in the Walrasian tradition is that, on the one hand, its competitive equilibrium condition requires that the rates of profit in all the industries must be equal, which in turn requires that all physical capital goods must be aggregated into a **(p. 109)** homogeneous unit; whereas, on the other hand, there are no means by which heterogeneous capital goods could be aggregated prior to the determination of prices. It was the problem of aggregation of heterogeneous capital goods, in Garegnani's opinion, that led the Walrasian tradition to break from the notion of equilibrium defined by the equalization of the rate of profits across industries:

> The study of the permanent effects of changes by means of comparisons between positions of the economic system characterized by a uniform rate of profits was in fact the method used by Ricardo and the English classical economists, when they explained profits in terms of the surplus product left after paying wages at the rate determined by independent economic or social circumstances. But fundamentally the same method was preserved after Ricardo, across the deep change which the theory underwent in favour of a symmetric explanation of profits and wages in terms of the equilibrium between the forces of demand and supply for labour and capital.… It was only in the last few decades that this method, which was centred on "long-period positions" of the system…was increasingly challenged:…this departure from tradition has not been due to weaknesses of the method as such, but rather to weaknesses of the dominant theory of distribution and, in particular, of the conception of capital it relies on.
>
> (Garegnani 1976, 25–26)

It was only in 1984 that Steedman (1984) raised some doubts about the viability of classical gravitation mechanism. Steedman's paper was, however, criticized from Sraffaian and Marxist quarters. Unfortunately, many of the papers (e.g., Boggio 1992; Duménil and Lévy 1985, 1987; Flaschel and Semmler 1987; Franke 2000) that try to show that the classical center of gravitation is a robust idea make a simple mistake of conflating the context of growth with the context of the gravitation mechanism (Steedman 1984 has also not conceptually distinguished the two contexts). What they effectively argue is that, given an infinite labor supply at a fixed real wage, the economy will eventually converge to a balanced growth path. But, as we have argued above, the classical economists separate the problem of allocation of labor from the problem of economic growth. The gravitation mechanism is exclusively designed to deal with the problem of allocation of labor and not with the problem of growth. The allocation context is well defined by a given set of affordable demands referred to as given "effectual demands." In the growth context, however, the set of "effectual demands" cannot be taken as given.

The classical economists, moreover, are quite clear that the techniques of production in use as well as the "natural wages" or the "natural rate of profits" and so on cannot be held constant in a growth context. For example, in the case of Ricardo, an increase in the size of the labor force must bring diminishing returns into play in the agricultural sector; and in the case of Adam Smith, the expansion of the size of the market should lead to increasing returns of one kind or the other. In Sraffa's system, the theoretical distinction between the problematic of allocation of labor and growth becomes much sharper. To any given system of production there exists a unique *Standard system*, which is a particular *reallocation of its given total labor*. This Standard system is associated with a set of all possible reallocations of the given total labor with the same techniques—that is, any such possible (p. 110) allocation can be taken as an equivalent of the given system. It is this set that defines the universe of the problem of allocation of labor pure and simple. But whenever total labor is allowed to change (given the same techniques), which must be the case in the context of growth, the Standard system must change, as the Standard system not only depends on the techniques of production but also the size of the total labor of the system. Thus even when we assume constant returns and balanced growth, we cannot maintain that the system remains the same. It must continuously be changing as its utilization of total labor changes. Furthermore, some of these papers (e.g., Dumenil and Levy, 1987; Nikaido, 1983) only deal with two-good models. If, however, the system exhibits chaotic dynamics, then such models would simply fail to capture them, as chaotic dynamics require at least three degrees of freedom, which is possible only in a system with at least three goods.

Garegnani (1997), however, argues that the classical theory of the center of gravitation is robust in the context of the given size of the economy. In his criticism of Steedman (1984), Garegnani first correctly points out that "the level of aggregate demand is assumed constant in terms of level of aggregate labour employed," but then he uses this for the wrong purpose. There is no specification of a vector of the fixed aggregate or effectual demands in his model, and he, like others who situate the problem in the growth context, simply assumes that when the rate of profits is uniform, the supplies *must* be equal to the effectual demands. He starts with an economy in disequilibrium and calculates the ratios of market prices to what would be their natural prices (m_i / p_i). He argues that the lowest of the m_i / p_i must have a rate of profit $r_i < r^*$ and the highest of m_j / p_j must have $r_j > r^*$, where r^* is the uniform rate of profits in the system. He takes a commodity with the lowest rate of profit, say r_h, and argues that the behavioral assumption of the gravitation mechanism requires that the output of sector h, say O_h, must decline. From here on he makes a specific *assumption* that a fall in O_h must immediately lead to a rise in r_h. He, however, is well aware of the fact that this assumption is unjustified, as the fall in O_h due to the behavioral assumption may be associated with a larger fall in the demand for h due to supply adjustments in other industries. In that case r_h should fall further rather than rise. At this stage Garegnani invokes the condition of given size of the economy by the total labor in use. He argues that if h is a basic good, then the demand for it cannot fall below a minimum; otherwise the system will break down. On this basis he concludes that *eventually* a fall in O_h must lead to a rise in r_h (1997, 147). It should be noted here that Garegnani by decree stops the system from breaking down. There is, however, nothing in the behavioral assumption of the gravitation mechanism that stops the system from breaking down, and Gragnani gives no reason why the adjustment mechanism of the n basic-good industries must stop before one basic-good industry contracts so much that the system breaks down. His decree leaves only two options for the system: either to converge or to oscillate around some point.

Garegnani's defense of the center of gravitation works on the argument that if it is accepted that the rate of profit of the minimum profit industry must rise, then when it equals the rate of profit of some other industry, say industry k, then r_k must also begin to rise along with the first one, r_h. This crucial hypothesis, in my opinion, is false. Recall that Garegnani had invoked the idea of minimum effectual demand for the minimum rate of profit industry to argue that *eventually* a fall in its output must lead to a rise in its (p. 111) price, but when some other commodity's rate of profit becomes equal to the rising rate of profit of the minimum industry, there is no reason to believe that its output at that stage would be at the *minimum* level required for the system to survive. Thus there is no reason to think that supply adjustments in other industries will not be such that they reduce the effective demand for commodity k more than the fall in its output O_k, thereby dragging r_k below the current level of r_h. Thus several rates of profits could keep oscillating below r^* and never get there.

Only recently Dupertuis and Sinha (2009) have shown that, in a carefully demarcated context of reallocation of labor, as opposed to the context of growth, the classical gravitation mechanism does not work. They work out eight possible different dynamic scenarios of adjustment of supplies to given effectual demands through price signals and quantity adjustments, including the specific classical scenario, while keeping the size of the economy or its

total employment constant throughout the process. They find that in all such scenarios the probability of the system of three or more basic goods converging to its center of gravitation is zero.[2]

Leaving aside the complexity of the dynamics of quantity adjustments on the basis of price signals for three or more goods with fixed aggregate labor, it can be shown that when the condition of the uniform rate of profits in the system and the role of prices are properly understood it becomes clear that the classical understanding of the gravitation mechanism is conceptually unsound. Based on my understanding of Sraffa (1960), below I first establish why the rate of profits *must* be uniform for all the sectors in a given system of physical inputs and outputs and the distribution of its net income given from outside the system. On the basis of this, I demonstrate the reason why the classical notion of the center of gravitation is not a sound concept.

Sraffa

Let us take Sraffa's example (1960, 19) of a system of production that produces a surplus: (I)

$$\begin{gathered}
90\,\text{t. iron} + 120\,\text{t. coal} + 60\,\text{qr. wheat} + 3/16\text{labor} \rightarrow 180\,\text{t. iron} \\
50\,\text{t. iron} + 125\,\text{t. coal} + 150\,\text{qr. wheat} + 5/16\text{labor} \rightarrow 450\,\text{t. coal} \\
40\,\text{t. iron} + 40\,\text{t. coal} + 200\,\text{qr. wheat} + 8/16\text{labor} \rightarrow 480\,\text{qr. wheat} \\
\hline
180\,\text{t. iron} + 285\,\text{t. coal} + 410\,\text{qr. wheat} + 1\text{labor} \rightarrow 180\,\text{t. iron} + 450\,\text{t. coal} + 480\,\text{t. wheat}
\end{gathered}$$

90 t. iron + 120 t. coal + 60 qr. wheat + 3/16 labor → 180 t. iron
50 t. iron + 125 t. coal + 150 qr. wheat + 5/16 labor → 450 t. coal
40 t. iron + 40 t. coal + 200 qr. wheat + 8/16 labor → 480 qr. wheat

180 t. iron + 285 t. coal + 410 qr. wheat + 1 labor → 180 t. iron + 450 t. coal + 480 t. wheat

And in terms of its price equations the system is represented by (I′)

$$\begin{gathered}
(90\text{Pi} + 120\text{Pc} + 60\text{Pw})\ (1 + \text{Ri}) + 3/16\,\omega\ =\ 180\text{Pi} \\
(50\text{Pi} + 125\text{Pc} + 150\text{Pw})\ (1 + \text{Rc}) + 5/16\,\omega\ =\ 450\text{Pc} \\
(40\text{Pi} + 40\text{Pc} + 200\text{Pw})\ (1 + \text{Rw}) + 8/16\,\omega\ =\ 480\text{Pw} \\
\hline
(180\text{Pi} + 285\text{Pc} + 410\text{Pw})\ (1 + \text{R}) + \omega\ =\ 180\text{Pi} + 450\text{Pc} + 480\text{Pw}
\end{gathered}$$

(90Pi + 120Pc + 60Pw) (1+Ri) + 3/16 ω = 180Pi
(50Pi + 125Pc + 150Pw) (1+Rc) + 5/16 ω = 450Pc
(40Pi + 40Pc + 200Pw) (1+Rw) + 8/16 ω = 480Pw

(180Pi + 285Pc + 410Pw) (1+R) + ω = 180Pi + 450Pc + 480Pw

(p. 112) In this system, prices cannot be determined unless the rule for distribution of the surplus is known. Sraffa asserts that the industrial rates of profit *must* be uniform. If that is so, then given wages, the two relative prices, and the uniform rate of profits of the system can be simultaneously determined. It has been almost universally accepted that Sraffa's claim that the rate of profits must be uniform is an admittance of the competitive equilibrium condition or the condition of the center of gravitation (see John Hicks 1985 for an exception).[3] Without going into exegetical arguments that Sraffa did not think in terms of equilibrium of demand and supply (see Sinha and Dupertuis 2009a and Sinha 2010a for details on this point), let me here motivate a logical argument behind the condition of the uniformity of the rate of profits independently of the notion of equilibrium of demand and supply. After this discussion, I present some evidence from Sraffa's published and unpublished writings that show he argued in a similar manner.

Let us assume an imaginary system given by (II)

$$120\,\text{t. iron} + 160\,\text{t. coal} + 80\,\text{qr. wheat} + 1/4\text{labor} \rightarrow 240\,\text{t. iron}$$
$$40\,\text{t. iron} + 100\,\text{t. coal} + 120\,\text{qr. wheat} + 1/4\text{labor} \rightarrow 360\,\text{t. coal}$$
$$40\,\text{t. iron} + 40\,\text{t. coal} + 200\,\text{qr. wheat} + 2/4\text{labor} \rightarrow 480\,\text{qr. wheat}$$

$$200\,\text{t. iron} + 300\,\text{t. coal} + 400\,\text{qr. wheat} + 1\text{labor} \rightarrow 240\,\text{t. iron} + 360\,\text{t. coal} + 480\,\text{t. wheat}$$

120 t. iron + 160 t. coal + 80 qr. wheat + 1/4 labor → 240 t. iron
40 t. iron + 100 t. coal + 120 qr. wheat + 1/4 labor → 360 t. coal
40 t. iron + 40 t. coal + 200 qr. wheat + 2/4 labor → 480 qr. wheat

200 t. iron + 300 t. coal + 400 qr. wheat + 1 labor → 240 t. iron + 360 t. coal + 480 t. wheat

And in terms of its price equations, the system is represented by: (II′)

$$(120\text{Pi} + 160\text{Pc} + 80\text{Pw})\ (1 + \text{Ri}) + 1/4\,\omega\ =\ 240\text{Pi}$$
$$(40\text{Pi} + 100\text{Pc} + 120\text{Pw})\ (1 + \text{Rc}) + 1/4\,\omega\ =\ 360\text{Pc}$$
$$(40\text{Pi} + 40\text{Pc} + 200\text{Pw})\ (1 + \text{Rw}) + 2/4\,\omega\ =\ 480\text{Pw}$$

$$(200\text{Pi} + 300\text{Pc} + 400\text{Pw})(1 + \text{R}^*) + \omega\ =\ 240\text{Pi} + 360\text{Pc} + 480\text{Pw}$$

(120Pi + 160Pc + 80Pw) (1+Ri) + 1/4 ω = 240Pi
(40Pi + 100Pc + 120Pw) (1+Rc) + 1/4 ω = 360Pc
(40Pi + 40Pc + 200Pw) (1+Rw) + 2/4 ω = 480Pw

(200Pi + 300Pc + 400Pw) (1+R*) + ω = 240Pi + 360Pc + 480Pw

System II is nothing but Sraffa's Standard system for the given empirical system I. It redistributes the total labor of the system or rescales the real system in such a way that the aggregates of its inputs and outputs come out in the same proportions. Let us assume that wages are zero; then in the above given example of system I, if the aggregate or the global rate of profits of the system is given by R, then the value of (1 + R) = (180 t. iron + 450 t. coal + 480 t. wheat) / (180 t. iron + 265 t. coal + 410 t. wheat). Now, if we multiply the physical amounts of iron, coal, and wheat by taking several arbitrary prices of iron, coal, and wheat, we find that the value of the above given ratio will change with changes in prices. However, since the physical ratio remains the same, it immediately tells us that prices can create a "nominal" effect on R (a sort of optical illusion), which is completely independent of its physical property. Nevertheless, at this level one can at least establish that the physical ratio of (R) gives us the rate of expansion of this economy, as by multiplying the aggregate of inputs with the physical ratio of (1 + R) we get exactly the aggregate of gross output of the system. Now, in the imagined system II, the *global* rate of profits or the ratio of the aggregate physical net output to the physical aggregate inputs can be known without the knowledge of prices since it is a ratio of heterogeneous goods (p. 113) made up in the same proportion. This ratio is completely independent of prices—no matter what prices prevail, it will not affect the global rate of profit of the *Standard system*. Let us say that this ratio is equal to a number R*; by our example it is equal to 1/5 or 20 percent. Thus, we come to our first conclusion that, as far as the *Standard system* is concerned, its global rate of profits is the physical property of the system of production and its value is known independently of prices. But since the real system is nothing but an *equivalent* system to the *Standard system*, the physical rate of profits in the two systems must be equal, that is, R* = R, as the real system is nothing but the rescaled Standard system. This property must hold for all the systems derived from rescaling the Standard system, and this is possible if and only if all the industrial rates of profit of the systems are uniform or equal. This is a physical property of the system, and prices must be such that this property holds. From here it is a small step to show that this property must hold when wages are positive as long as the wages are measured in the *Standard commodity*, which is a "composite commodity" made up of all the basic goods[4] put together in the *Standard* proportion. Once the proposition that distribution of

income is given from outside the system of price determination is accepted, the corollary of this proposition is that the system cannot admit any other set of prices as a solution that results in R being not equal to R*. The point can also be illustrated in another manner.

Take the empirical system I. Its Net Output to Capital ratio is given by (165 t. coal + 70 qr. wheat)/(180 t. iron + 285 t. coal + 410 qr. wheat). Though this ratio is not well defined without the knowledge of prices, it is clear that it is a technical relation of the system, and any change in the distribution of the net output between the workers and the capitalists should not affect the value of this technical ratio. Now, on the one hand, it is clear that if the distribution of net income has an effect on relative prices, then in most circumstances it will affect the value of the Net Output to Capital ratio, since the physical composition of the Net Output is not the same as the physical composition of the Capital. On the other hand, it is also clear that if prices are not affected by changes in the distribution of income, then the value of Net Output to Capital ratio also remains unaffected. Below we first argue that relative prices cannot remain constant when distribution changes (of course, in the systems with unequal ratios of industrial means of production to labor, such as our System I). Therefore, the constancy of the Net Output to Capital ratio cannot be maintained on the basis of constancy of prices. After that step, we argue that for the Net Output to Capital ratio to remain constant, the changes in prices must be such that the industrial rates of profit are always equal.

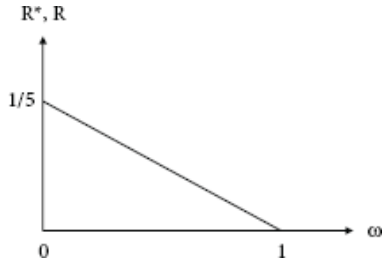


Figure 1.4.1 Wage-rate of profits relationship.

Let us take System I and begin with wages equal to the net output (i.e., 165Pc + 70Pw) and therefore, R = 0. In this case it is the technical requirement of the system that all the r's are also equal (i.e., = 0). This is because if any r were to be positive, some r would have to be negative, which would imply that the whole system was economically unviable. In this case the solution to the set of prices exists; as is well known, the prices will be in the ratios of their labor-values. Let us put (165Pc + 70Pw) = 1. Now rescale the system to its Standard proportion. We know that the solution of a system of equations does not change by rescaling the system. Thus the same labor-values or P's and r's will follow for the Standard system II. From this it follows that (40Pi + 60Pc + 80Pw) = **(p. 114)** (165Pc + 70Pw) = 1, when R = R* = 0. Now let us reduce wages by half and assume that it has no impact on relative prices. These prices would give rise to unequal rates of industrial profits in both the systems, as the ratios of means of production to labor in all the industries are not uniform. These prices would also generate a value for R, which in our example turns out to be about 10.5 percent. Now, reduce wages by half in the Standard system II′ as well. Since prices have remained constant, wages in the Standard system are given by ½(40Pi + 60Pc + 80Pw). This wage generates a value for R* = 10 percent. This rate, however, is not contingent on the labor-value prices. No matter what prices prevail, if the wage is given by ½(40Pi + 60Pc + 80Pw), then the value of R* must be 10 percent. Among all possible prices, there must be at least one set of prices that would be a solution for the real system for the wages given by ½(40Pi + 60Pc + 80Pw), if the real system has a solution. Thus if wages in System I′ are taken to be equal to ½(40Pi + 60Pc + 80Pw), then its price solution must generate R = 10 percent. However, as we have calculated above, if prices remain at their labor-values, then wages given by ½(40Pi + 60Pc + 80Pw) generates the value of R equal to about 10.5 percent (remember, since prices have remained constant at labor-value ratios, ½{40Pi + 60Pc + 80Pw} = ½{165Pc + 70Pw}), which contradicts the mathematical solution of the system. This proves that in a system where the ratios of industrial means of production to labor are unequal, relative prices cannot remain constant when the distribution of income changes.

Now I show that the ratio of Net Output to Capital remains constant if R is always equal to R*. Let us assume that wages are paid or measured in Standard Net Product in both the Standard system as well as the real or empirical system. Let us also normalize the Standard Net Product to 1, that is, (40Pi + 60Pc + 80Pw) = 1. Let us give wages in the Standard system values from 1 to zero and plot the resulting R*'s. We will plot a straight-line relationship between ω and R* with R^*_{max} = 1/5 when ω is zero. If R in the real system is always equal to R*, then it is clear

that we would draw exactly the same relationship between R and ω in the real system as well (see figure 1.4.1). The general form of this straight-line relationship is given by $R = R_{max}(1 - \omega)$. This implies that R_{max} is equal to $R / (1 - \omega)$, which is a constant, as it is a slope of a straight line. But R_{max} is nothing but the ratio of the value of net output to the value of aggregate capital, that is, the Net Output to Capital ratio. Hence we have shown that the condition of equality of global rate of profit "R" of the empirical system with the global rate of (p. 115) profit "R*" of the Standard system is the technical requirement of the system and this technical requirement can be fulfilled if and only if all the industrial rates of profits are equal.

This is a remarkable result. It shows that the production equations of basic goods along with the knowledge of wages in terms of Standard commodity have sufficient information to determine the prices irrespective of the demand conditions. Here I should point out that Sraffa's propositions are not built on the usual or mechanical cause-and-effect relationships. All the dependence and changes in variables in Sraffa's propositions describe logically necessary relationships between those variables, such as a change of ten degrees of an angle in an Euclidean triangle must be associated with ten degrees of combined changes in other two angles in the opposite direction.[5]

Below I produce some evidence from Sraffa's writings that seem to support our argument above. In *Production of Commodities*, Sraffa seems to be arguing in a similar manner when he declares that the mathematical properties of the Standard system Commute to the real system:

> But the actual system consists of the same basic equations as the Standard system, only in different proportions; so that, once the wage is given, the rate of profits is determined for both systems regardless of the proportions of the equations in either of them. Particular proportions, such as the Standard ones, may give transparency to a system and render visible what was hidden, but they cannot alter its mathematical properties.
>
> (Sraffa 1960, 23)

The reader should note that the classical condition of supplies equal to the effectual demands cannot be a "mathematical property" of the system—it is supposed to be a behavioral property of the system. It should also be noted that Sraffa could not implicitly assume that supplies were equal to their effectual demands for both the real and the *Standard* systems—it would be bizarre to assume that the effectual demands were in Standard proportion even in an imaginary world. Thus Sraffa could not impose the condition of a uniform rate of profits on his *Standard system* on the basis of the so-called implicit assumption that the system is at its center of gravitation. Hence the rate of profits of the *Standard system* that Sraffa is referring to above is the *global rate of profits* of the *Standard system* and the claim is that the two *global rates* must always be equal as long as the wages are measured by the Standard commodity. It is the proposition regarding the equality of the *global* rates of profit of the rescaled systems that allows Sraffa to directly deduce that all the industrial rates of profit *must* also be uniform in the two systems, as we have argued above. This point becomes clearer in the very next paragraph from the above-quoted passage:

> The straight-line relation between the wage and the rate of profits will therefore hold in all cases, provided only that the wage is expressed in terms of the Standard product. The same rate of profits, which in the Standard system is obtained as a ratio between *quantities* of commodities, will in the actual system result from the ratio of aggregate *values*.
>
> (Sraffa 1960, 23)

(p. 116) The reader should note that the ratios both of "quantities of commodities" and of "aggregate values" are well defined only at the *global* level and have no meaning at the local or industrial level.

Further on, in his unpublished notes written in 1955, we find that Sraffa invokes similar reasoning behind the possibility of an existence of a *Standard commodity*:

> With changes in w—
>
> The impulse towards price change is an internal one to each industry. It arises from its own internal conditions—not from those conditions *compared* with those of other industries. Hence the possibility of an *invariable* commodity.

> (Sraffa Papers D3/12/59, emphasis in original)[6]

Recall the discussion on the Standard commodity in Sraffa (1960). We start with zero profits and all income going to wages. Then wages are reduced by a certain percentage. Sraffa's argument is that this gives rise to a positive global rate of profits and all the industrial rates of profit equal to it. Given that all the industrial rates of profit must be equal, the old prices applied to the goods create surpluses and deficits in the industries given their different proportions of labor and means of production. And it is these surpluses and deficits that force the industries to adjust their prices. That is why an industry that will not have any surplus or deficit will have no compulsion to change its price and hence the possibility of an "invariable commodity." If one allows the gravitation mechanism to explain the equality of the rates of profit in the system, then no commodity could stay invariant. The difference between the two approaches is this: In Sraffa's case, the condition of equal rate of profits is given or must be applied on the system in all the circumstances, and prices change as a *consequence* of this condition. Hence the idea of change based on *comparison* with other industries is categorically denied. In the classical case, in contrast, the rates of profit eventually become equal as a *consequence* of changes in prices, which are explained precisely in terms of *comparison* with other industries.

As Sraffa in another note of 1955 writes:

> the rate of profits at the various individual levels of w will be $r = R(1 - w)$. Individual prices will move in all directions with the variation of w, but here again prices will make no difference: r is a ratio between two quantities of the same composite commodity and can actually be discovered before knowing what those prices are. The rate of profits is embedded "in the things" and no manipulation of prices could ever affect it. [There could be no more tangible evidence of the rates of profit (being, as) a non-price phenomenon (effect)].
>
> (Sraffa Papers D3/12/53, all parentheses and brackets are in original)

Yet again it is claimed that the real rate of profits must be identical to the Standard global rate of profits. This finding shows that uniformity of the rate of profits in the system has nothing to do with the equalization of the supplies with their effectual demands.[7] As a matter of fact, relative prices cannot go anywhere they like—they are completely constrained by the system of production and distribution. In some sense Sraffa's result (p. 117) points to a break in economics similar to the break from classical mechanics to quantum mechanics.[8] The classical and neoclassical economics treat individual industries as independent entities, which through their interaction generate centers of gravitation that bring a system into being. Sraffa's result shows that the system is not made up of independent industries but must be treated as an interconnected whole unit and that the properties of the whole determine the properties of its parts.

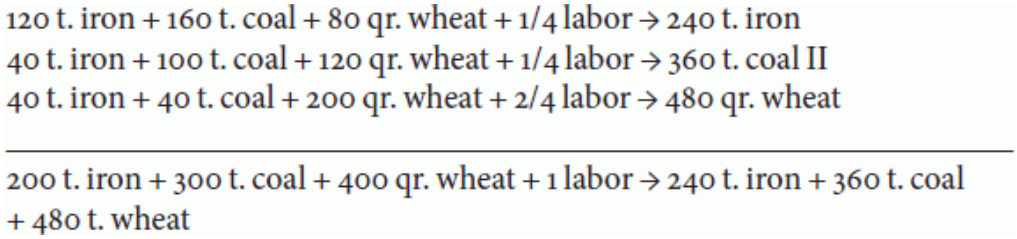
Once the role of prices and the logical condition of the uniformity of the rate of profits in the system is understood, it becomes easy to understand why the classical notion of the center of gravitation is not a sound concept. Since the movement of given supplies to their effectual demands must maintain the techniques in use and the total labor in the system constant throughout, by implication all those sets of supplies must have the same Standard system. Thus for every supply set the solution of its prices must be the same if the wages and the numeraire are kept constant. However, the gravitation mechanism requires that such supply sets throughout their movements *must* have different sets of prices. Thus the gravitation mechanism implicitly requires that every change in the set of quantities supplied is accompanied by changes in distribution of income. Now, we can work out all the price sets that are compatible with zero to the maximum wages for every supply set. If the set of the so-called market prices at any given point of time happens to be one of those sets of prices, the system can accommodate those prices by adjusting its wages. But since the gravitation mechanism requires these market prices to change continuously, it is more likely than not that the movement of market prices will soon fall outside the set of the sets of all compatible prices for the given supply set. In the above example we have allowed an arbitrary numeraire and the freedom to the system to adjust its income distribution to accommodate a given set of prices. If, however, we use the Standard commodity as the numeraire and specify wages in terms of the Standard commodity and keep them fixed throughout the adjustment process, then it is clear that the system will have a single solution to prices throughout its quantity adjustment. In this context, the very idea of any other set of market prices as signals for quantity adjustment cannot be entertained.

All these conclusions must come as a shock to most economists. The reason for this is simple. We are habituated

to think of prices in terms of sequential time; such as at time $t-1$ a set of market prices prevails and at those prices the set of inputs is purchased that in turn produces a set of outputs in time t. In this context the prices of inputs in time $t-1$ become the cost of production for the prices of outputs in time t. Not only is the classical gravitation mechanism built on this sort of reasoning about prices but even the modern intertemporal general equilibrium analysis is also based on such reasoning even though it assumes that all present and future markets clear at one point of time. It was on the basis of such reasoning that Frank Hahn (1982) claimed, "It will now be clear that Sraffa is considering a very special state of the economy where…the relative prices of 1976 wheat and barley are the same as those of 1977 wheat and barley. The neoclassical economist is quite happy with more general situations" (363–64). As a matter of fact a simple observation of Sraffa's Standard system reveals why this way of thinking about prices is flawed (for a detailed criticism of Hahn's paper, see (p. 118) Sinha and Dupertuis 2009b and Sinha 2010a). Let us look at the example of Sraffa's Standard system presented above:

$$120\,\text{t. iron} + 160\,\text{t. coal} + 80\,\text{qr. wheat} + 1/4\text{labor} \rightarrow 240\,\text{t. iron}$$
$$40\,\text{t. iron} + 100\,\text{t. coal} + 120\,\text{qr. wheat} + 1/4\text{labor} \rightarrow 360\,\text{t. coal}$$
$$40\,\text{t. iron} + 40\,\text{t. coal} + 200\,\text{qr. wheat} + 2/4\text{labor} \rightarrow 480\,\text{qr. wheat}$$

$$200\,\text{t. iron} + 300\,\text{t. coal} + 400\,\text{qr. wheat} + 1\text{labor} \rightarrow 240\,\text{t. iron} + 360\,\text{t. coal} + 480\,\text{t. wheat}$$



Assuming wages to be zero, it is clear that the maximum rate of profits in this system is equal to 1/5, or 20 percent. This is a physical property of the system independent of any prices. Any arbitrary set of prices, as long as it is applied to both inputs and outputs, is compatible with the physical property of the system. However, if we apply a different set of prices to the inputs and a different set of prices to the outputs, which is what one must do during the adjustment process described by the gravitation mechanism as well as Hahn's "general situations," then clearly the maximum rate of profits of the system will, in general, not be equal to 1/5. But this contradicts the physical property of the system. Thus input and output prices cannot be seen in a sequential time frame. Prices have only one function in the system and that is to consistently account for the given distribution of income at any point of time. It should be noted that these results are derived on two fundamental assumptions: (1) labor is homogenized by given wages and (2) wages are taken to be determined from outside the system. Sraffians now need to justify these two assumptions.

Conclusion

In this chapter we have highlighted the critical role the notion of equilibrium plays in both the classical and the neoclassical theories of value. We have, however, also noted that in the classical tradition the need for the determination of value arises in the context of accounting for the distribution of income, which is taken to be given from outside the system of price determination. It is well known that the idea of mechanical "equilibrium" did not sit well with the classicists, particularly with Adam Smith (see Groenewegen 1982 and Rothschild 2001). Smith and other classicists were mainly concerned with the evolution of the economy over historical time, particularly the movements of various categories of income. Such concern for historical trends does not sit well with the notion of mechanical "equilibrium" of forces, which is fundamentally static in nature (see Groenewegen 1982). But then the accounting of the various categories of income, whose trends they were interested in describing, required them to come to terms with the theory of value, which they could not solve without invoking the notion of equilibrium of demand and supply. Furthermore, the classicists insisted that the natural or the equilibrium prices are determined by the objective data of the economy, such as the (p. 119) production techniques in use and the distribution of income given from outside. In this context the psychological notion of demand has no role in determining the quantitative values of natural prices. However, yet again, they found themselves in choppy waters as they had to

invoke the arbitrary assumption of constant returns on the techniques in use as well as the psychological notion of "motives" behind the workings of the equilibrating mechanism. In this chapter we have shown that Sraffa was successful in dissolving both these problems. He showed that the theory of value of the classical tradition neither requires the notion of equilibrium of demand and supply and hence the assumption of constant returns nor any psychological notion of "motives" for the determination of prices. The neoclassical tradition, on the contrary, brings psychology and the notion of equilibrium to the center of the theory of value, but in the general theory the distribution of income is also determined simultaneously with prices and cannot be taken to be given from outside. Thus, following Sraffa, a clear line of demarcation can be drawn between the classical and the neoclassical theories of value, and the problem for both the theories is to justify or negate the proposition that the distribution of income is independent of price determination.

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Notes:

(1.) However, see Harcourt (1981) for an interesting discussion on Marshall, Sraffa, and Keynes in this respect.

(2.) It should be pointed out, though, that all these results do not suggest that the system can never converge. All they show is that the possibility of that happening is most unlikely—in mathematical terms the probability of convergence is zero.

(3.) "Sraffa leaves us to find out what his prices are, but I doubt if they are equilibrium prices. They seem to be prices which are set upon products, by their producers, according to some rule. Now it is perfectly true that we are nowadays familiar with that method of price-fixing, by 'mark-up'; but when that method is used, the rate of profit that is used to establish the mark-up is conventional. Now it may be that Sraffa wants us to think of his rate of profit as being conventional; and that the uniformity of the rate of profit throughout his system, of which he makes so much, is just a uniformity of convention" (Hicks 1985, 306).

(4.) A basic good is a good that enters directly or indirectly as input in the production of all the commodities, whereas a non-basic good does not enter directly or indirectly in the production of any basic good, though it could enter as input in the production of the subset of non-basic goods.

(5.) Sen (2003, 1253) has also argued, "The temptation to see Sraffa's contribution as a causal theory of price determination…must be resisted…. The sense of 'determination' invoked by Sraffa concerns the mathematical determination of one set of facts from another set."

(6.) The Piero Sraffa Papers are held in the Wren Library, Trinity College, University of Cambridge.

(7.) Joan Robinson (1961) came closest to understanding this, as she claimed that the "clue" to understanding the *PCMC* could be found in the "corn model" of Sraffa's (1951) introduction to Ricardo's *Principles*. In the "corn model," e.g. 1 ton of corn produces 1.5 tons of corn; the rate of profit is 50 percent no matter what is the final demand for corn. This physical relationship between inputs and outputs that is palpably evident in a single basic good model is obscured in an n-basic goods model. But Sraffa's analysis with the help of the Standard system reveals that the insight of the corn model remains valid in a more general case as well.

(8.) It may be noted that Sraffa was well aware of the developments in quantum mechanics. As early as 1928, he had noted down a passage from H. S. Allen's paper on "The Quantum Theory" published in *Nature*, where Allen writes, "Heisenberg put forward the demand that only such quantities as are observable should be represented in the mathematical formulation of atomic theory…. This led to the development of the matrix mechanics, every term in a matrix corresponding to something which is, at least ideally, observable." Of course, Sraffa makes the same demand for economic theory.

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[–] Abstract and Keywords

John Maynard Keynes was a student of Alfred Marshall. Accordingly, his "Principle of Effective Demand," the basis of his *General Theory of Employment, Interest and Money*, involved the intersection of aggregate supply and demand functions constructed from Marshallian micro demand and supply functions. Unfortunately, the immediate post–World War II "Keynesians" such as Paul Samuelson failed to comprehend the aggregate supply implications for the causation of inflation and the importance of uncertainty as well as the importance of liquidity for understanding the basis of the propensity to consume in Keynes's analysis of aggregate demand. Post-Keynesians, in contrast, beginning with Professor Sidney Weintraub's writings in the 1950s, have rectified these omissions by creating a post-Keynesian macroeconomic analysis that is logically compatible with Keynes's emphasis on Marshallian micro demand-and-supply analysis and the importance of uncertainty and liquidity in a money-using, market-oriented entrepreneurial economy. This chapter discusses Keynesian foundations of post-Keynesian economics, focusing on how uncertainty and liquidity revoke Say's Law.

Keywords: John Maynard Keynes, supply and demand, post-Keynesian economics, uncertainty, liquidity, Say's Law, Paul Samuelson, Alfred Marshall, Sidney Weintraub, money

John Maynard Keynes was a student of Marshall. Accordingly, his "Principle of Effective Demand," the basis of his *General Theory of Employment, Interest and Money*, involved the intersection of aggregate supply and demand functions constructed from Marshallian micro demand and supply functions. Unfortunately, the immediate post–World War II "Keynesians" such as Paul Samuelson did not comprehend Keynes's effective demand principle and so built their neoclassical "Keynesian" theories on a Walrasian foundation instead.[1] Accordingly these early "Keynesians" failed to comprehend (*a*) the aggregate supply implications for the causation of inflation and the importance of uncertainty and (*b*) the importance of liquidity for comprehending the basis of the propensity-to-consume aspect of Keynes's analysis of aggregate demand.

Post-Keynesians, in contrast, beginning with Professor Sidney Weintraub's writings in the 1950s, have rectified these omissions by creating a post-Keynesian macroeconomic analysis that is logically compatible with Keynes's emphasis on (1) Marshallian micro demand-and-supply analysis and (2) the importance of uncertainty and liquidity in a money-using, market-oriented entrepreneurial economy.

Uncertainty and Liquidity Revoke Say's Law

The nineteenth-century economic proposition known as Say's Law is the foundation of the Walrasian classical argument that a competitive market with flexible wages and prices is the mechanism that ensures that market forces will inevitably bring the economy to (p. 123) a situation where all available resources are fully employed. Say's Law evolved from the writings of a French economist, Jean Baptiste Say, who in 1803 stated that "products always exchange for products." In 1808, the English economist James Mill translated Say's French-language dictum

as “supply creates its own demand.” Mill’s phraseology has since been established in economics as Say’s Law.

The sole classical Walrasian explanation of why people produce, that is, work to supply things to the market, is to earn income. Work and engaging in income-earning productive activities are presumed to be disagreeable. In contrast, people obtain pleasure (utility) solely from the purchase and consumption of producible goods and services. People, therefore, will be willing work only if they can earn sufficient income for each unit of work effort to buy enough products of industry to provide the buyers sufficient pleasure to offset the unpleasantness of their income-earning efforts.

In other words, all income-earning workers would not be maximizing their individual economic welfare if they engaged in the disagreeable act of contributing to the production process in order to earn income, if these income earners did not intend to spend every penny that they earned on pleasure-yielding goods and services produced by industry. Say’s Law presumes that if people have their own self-interest in mind and wish to maximize the utility or happiness they obtain from their economic endeavors, then all income earned in the market from the production and sale of goods and services will be spent to buy (demand) things produced by industry. There is never a lack of effective demand for all the products that an economy can produce when it fully employs its resources.

Keynes (1936, 26) declared that Say’s Law is not the true law relating the aggregate demand (for goods and services) with the aggregate supply function (of goods and services produced). “If, however, this is not the true law, there is a vitally important chapter of economic theory that remains to be written and without which all discussions concerning the volume of aggregate employment are futile.”

With this declaration, that the Say’s Law homily that everything supplied in an economy created its own demand was not a “true law,” Keynes threw down the gauntlet to classical economists. Keynes was arguing that the basis of classical theory in Say’s Law is not applicable to the economic world of experience. Instead Keynes suggested that he would provide the vitally important chapter of a general theory of employment where an increase in supply (produced by industry) did not create automatically an equivalent increase in demand for the products of industry.

Keynes’s argument was that if one accepted the fundamental axioms underlying classical theory, then Say’s Law was not formally (logically) wrong. Indeed, Says’ Law is a logically consistent “special case” that could be obtained from Keynes’s *General Theory* by adding three restrictive axioms: (1) the neutral money axiom, (2) the gross substitution axiom, and (3) the ergodic axiom. These three classical theory axioms, however, are not applicable to a monetary economy where entrepreneurs organize the production process. Consequently, Say’s Law was not applicable to an entrepreneurial economy, and therefore classical theory’s restrictive special case’s “teaching is misleading and disastrous if we attempt to apply it to the facts of experience” (Keynes 1936, 3).

(p. 124) In *The General Theory* (1936), Keynes set himself the task of explaining why supply did not create its own demand even in a hypothetical purely competitive economy with instantaneously flexible wages and prices of the products of industry. Keynes, therefore, had to explain why utility-maximizing households would engage in the unpleasant activity of working or otherwise contributing to the production process to earn income, if they planned to save a portion of their income, where Keynes defined saving as refraining from spending all of one’s hard-earned current income on utility-providing producible goods from industry.

In developing his general theory analysis, it became obvious to Keynes that the classical concept of saving was a vague notion that often meant different things in different contexts. By developing a new classification system, Keynes could explain why Say’s Law was a special case whose teachings would be calamitous if made the foundation of economic policies.

Nevertheless, to communicate and convince his classical theory-oriented professional colleagues, Keynes tried to salvage as much of the tools of classical economic theory as possible.

In *The General Theory of Employment, Interest and Money* (1936), Keynes attempted to utilize Marshallian micro demand-and-supply function to develop (for the total economy) an aggregate supply function and an aggregate demand function. The intersection of these aggregate demand and supply functions Keynes called the point of effective demand. This effective demand point, Keynes argued, was the aggregate equivalent of Marshall’s micro equilibrium solution. The point of effective demand indicated the equilibrium level of aggregate employment and output, where buyers would purchase just enough output from business enterprises at profitable prices to justify

hiring the specific number of workers necessary to produce the volume of output being purchased.

In a monetary economy, it was Keynes's contention, this point of effective demand need not coincide with the full employment of all workers in the economy. If the point of effective demand was at less than full employment, then even if the existence of flexible wages and prices was built into the aggregate supply function, Keynes argued, the point of effective demand would not move toward the full employment level unless the wage and price (supply) downward flexibility automatically generated additional market demands to be added onto the initial aggregate demand function. Consequently, Keynes argued, it was the analysis of the components of an independent aggregate demand function that had been ignored by classical theorists in their belief that aggregate supply automatically creates an equivalent amount of aggregate demand. Consequently, Keynes believed that the aggregate demand function required further study.

The bulk of *The General Theory* is devoted to developing the distinctive components of the aggregate demand function. The components of the aggregate demand function have some distinguishing characteristics and properties that are not identical with those associated with the aggregate supply function. One cannot, therefore, be assured that supply will always create its own demand.

If, though, Say's Law was true and applicable so that aggregate supply always created its own demand at each and every level of employment, then the aggregate demand function would have the same value as the value of aggregate supply function at each level of (p. 125) employment, that is, the aggregate supply function and the aggregate demand function would be identical for all possible levels of employment (Keynes 1936, 25–26). But Keynes (1936, 21) warned that this assumption of equality of aggregate demand and supply at all possible employment levels was necessary to support traditional claims regarding the economy reaching a full employment equilibrium and support "the unqualified advantages of *laissez-faire* in respect of foreign trade and much else we shall have to question."

Keynes's revolutionary analysis, therefore, stems from his belief that, in a monetary economy, the aggregate demand function differs from, and is *not* coincident with, the aggregate supply function over all levels of possible employment. Consequently the aggregate demand function had to be analyzed as a function independent of the characteristics and properties of the classical aggregate supply function.

Why would any utility maximizer engage in the unpleasant task of working to earn income, if all of his or her income was not to be spent on the only things that are assumed to provide utility, namely the products of industry? Keynes's answer was that, in our world, using income to purchase certain *nonproducible* things could also provide utility. In classical theory, only producibles provide utility. Consequently, classical theory argues that any additional supply of the products of industry must increase people's income pari passu, and therefore, every increase in supply must create an exact equivalent additional total demand for the products of industry[2] by utility-maximizing buyers. Classical economic theory must assume that the aggregate supply and demand functions are identical, and Say's Law prevails.

If, however, as Keynes claimed, Say's Law is not applicable to the real world, then "it was the part played by the aggregate demand function which has been overlooked" (Keynes 1936, 89) by classical theorists in their assumption that only producible goods provide utility for income earners. Keynes's aggregate demand function (D) specifically indicates what the total of all buyers of the products of industry plan to spend on producibles at every alternative possible level of employment (N). More importantly, Keynes's analysis is, as we will explain, of a world where the future is uncertain and income earners can obtain utility not only by spending income on the products of industry, but also by saving to purchase things that are not produced by industry, namely liquid assets. These assets, as we will explain, provide security for income earners if they should encounter some unforeseen substantial contractual obligations in the uncertain future. Possession of liquid assets assured holders that they could buy producible things at any unspecified future date even if at that date they did not earn sufficient income for such a purchase.

It is in the discussion of aggregate demand and its components that Keynes's taxonomy differs significantly from the classical view of spending and saving out of income. In the classical view, the only reason an income earner would save a portion of today's income is because he or she knows *with certainty* that he or she will want to purchase some specific producibles at a specific price and at a specific future date. And at that future date, today's saver knows that he or she will not have sufficient income on that specific date to make all of his or her

planned purchases. In other words, classical theory claimed that utility-maximizing income earners saved only to fill in the periods where their known income receipts would be less than their "known" future consumption expenditure (p. 126) plans. In the long run, total income earned by a household would be entirely spent on the products of industry.

Keynes (1936, 210) argued that "An act of individual saving means—so to speak—a decision not to have dinner today. But it does *not* necessitate a decision to have a dinner or to buy a pair of boots a week hence or a year hence or to consume any specified thing at any specified date. Thus it depresses the business of preparing today's dinner without stimulating the business of making ready for some future act of consumption. It is not a substitution of future consumption-demand for present consumption-demand,—it is a net diminution of such demand."

Keynes argued saving occurred because the future was uncertain and savers wanted to protect themselves from being unable to meet unforseen needed future purchases (or other contractual commitments) if either income should decline or a saver's consumption need should suddenly be in excess of incoming income. Or as it is often said in the vernacular, income earners are putting away some of today's income in the form of savings for the proverbial uncertain future rainy day.

Keynes defined the decision to save out of income merely as a decision *not* to spend today's income on today's products of industry. In Keynes's taxonomic system, the decision to save is not a simultaneous decision to order a specific producible good or service at a specific future date. The next question then became, "If a household saved by not consuming all of current income on today's products of industry, what did the household do with this fund of savings?"

To respond to this query, Keynes defined a two-stage spending decision-making process for those who save out of current income (see figure 1.5.1). At the first stage the income-earner decides how much of current income to spend *today* on produced goods and how much of current income will *not* be spent on currently produced goods and services, that is, how much of current income will be saved. Classical economists call this first stage of the spending decision process the *time preference decision*, for, in classical theory, today's saving supposedly reflects how much consumers *prefer* to substitute spending on specific producible goods at a specific future *time* (date) rather than spend today's saving on today's products of industry.

Keynes's theory differed from the classical theory in regards to the motivation for saving. In order to highlight this difference Keynes called this first stage of the spending decision process, which involved what proportion of current income to spend immediately on newly produced consumer goods, the *propensity to consume* rather than the time preference decision. This label does not imply any desire to necessarily spend today's savings on any producible goods and services at any specific date in the future. In Keynes's taxonomic view of this consumption-saving decision process, he who hesitates (to spend today) may make a purchasing decision at any other (unspecified) future day. Accordingly, Keynes's propensity-to-consume categorization provides a stark contrast to classical theory's view that this spending-saving decision process reflects a specified exact time preference for spending all income on the products of industry by income earners committing their current saving to specific consumption purchases at specific future dates.

(p. 127) In Keynes's analysis, once the propensity-to-consume decision is made to save a portion of current income, savers are required to make a second decision—the liquidity preference decision. To carry their saved (unused) spending power of current income forward in time, savers have to decide on one or more vehicles (time machines) for moving this unspent purchasing power into the indefinite future. If the future is uncertain and cannot be reliably predicted, then savers can never be sure when, if ever, they will want to utilize the spending power of these savings to make purchases at any future specific date(s). Consequently, savers will look for time machines to transport the spending power of their savings to the indefinite future. In order to minimize the real cost of utilizing these time machines, these savings vehicles must be durables that require zero or a minimum of carrying costs (e.g., maintenance, repair, insurance, and warehousing costs) for the period of time that these savings are held and not spent.

At some future unspecified date, if a saver decides to use savings to purchase some products of industry, and if the saver has not stored saving in the form of money, then at some future date the saver will have to sell his or her time machine vehicle for money in order to finance the purchase of the producible good at that future date. Thus,

savers will search for time machines that not only incur a minimum of carrying costs but also incur a minimum of transactions costs of buying initially the vehicles and then reselling these time machines when they are later, if ever, sold to obtain money to be used in a specific future goods purchase or other contractual obligation settlement.

In sum, in a money-using, entrepreneurial economic system, savers will use liquid time machines to transfer the purchasing power of their current savings to the indefinite future. Liquid assets (time machines) are only those things that are traded in a market and that have small or negligible carrying costs *and* small or negligible transactions costs of buying and reselling. *Liquid assets* can be defined as durables that have minimal carrying costs and that can be quickly and readily resold for money (liquidated) while incurring small or negligible net transactions costs for purchase and resale. For a durable to be a liquid asset, therefore, there must a well-organized and orderly market in which this asset can be bought and resold at any time. The holders of liquid assets can feel assured that they can always make a fast exit from holding the asset to holding money.

Consequently, in an economic environment where income earners "know" that they cannot reliably predict the future, in that first-stage spending-saving decision process that Keynes called the propensity to consume people decide on how much of current income is to be spent on consumer goods and how much is saved, that is, not spent today on producible goods. In the second stage of the decision process—the liquidity preference decision—savers decide how to allocate their savings among alternative liquid assets that are available to them as vehicles for storing and moving savings to the future.

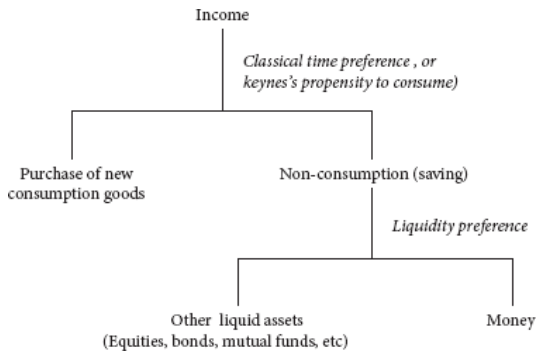

Figure 1.5.1 Decisions about the use of current income.

Anything that is, by definition, durable can be carried into the future. Durable real assets such as plant and equipment and consumer durables, however, have very high carrying costs. Moreover, although the transactions costs of purchasing new real durables may, or may not, be very large, the costs of reselling these durables at future dates can be very large if these durables can be sold at all in secondhand markets. Durable goods that cannot be readily resold are called *illiquid assets*. Most real durable products of industry (p. 128) are illiquid assets and therefore are not useful time machines for moving saved purchasing power into the indefinite future. Accordingly, given Keynes's definition of saving, illiquid assets including producible durables (e.g., investment goods) are not vehicles used to move savings to the future.

In an economy with a developed financial system, there are many possible time machines (liquid stores of value) available to savers where both the transactions and carrying costs of holding are relatively small. Liquid financial assets such as money, equities traded on organized orderly security markets, negotiable bonds, shares of mutual funds, and so on are among the most obvious time machines. Keynes's liquidity preference decision stage indicates that each saver will decide how to allocate unspent income (saving) among alternative time machines that can transport generalized purchasing power from today to the indefinite future. Figure 1.5.1 provides a schematic view of Keynes's spending-savings-liquidity two-stage decision process.

Keynes developed this theory of liquidity preference late in his evolving general theory analysis when he recognized that to explain the existence of involuntary unemployment required specifying "The (Two) Essential Properties of Interest and Money" (Keynes 1936, chap. 17). These "essential properties" clearly differentiate Keynes's general theory from classical theory. Keynes (1936, 230–33) specified these essential properties in the following way:

1. The elasticity of production associated with all liquid assets including money is zero or negligible.[3]

2. The elasticity of substitution between liquid assets (including money) and reproducible goods is zero or negligible.[4]

The zero elasticity of production means that when some portion of income is "saved," these savings will be used to purchase things that are not producible by the use of labor (p. 129) in the private sector, especially since durable producibles are typically associated with large carrying and transactions costs.

What is the implication for employment of the availability of liquid assets with these essential elasticity properties? The following hypothetical example may help the reader to understand the importance of these essential properties. Suppose a significant number of people suddenly decide to buy fewer space vehicles (automobiles) and use this unspent income (savings) to buy additional time machines (liquid assets) instead. As a result, sales and therefore employment in the automobile industry decline while, all other things being equal, there can be no increase in private sector employment to produce additional time machines (liquid assets).

A zero elasticity of production means that *money* (or any other liquid asset) *does not grow on trees*. Consequently, private sector entrepreneurs cannot employ workers to pluck more money from the money trees whenever the demand for money (liquidity) increases as aggregate saving occurs. Or as Keynes wrote: "money … cannot be readily reproduced; labour cannot be turned on at will by entrepreneurs to produce money in increasing quantities as its price rises" (Keynes 1936, 230).

In other words, current resources are never used (employed, consumed) to satisfy this liquidity demand by savers reducing their demand for producibles. In Keynes's lexicon, in a money-using entrepreneurial economy, a decision to save out of current income involves a decision to save in the form of nonproducible money or other liquid assets. Given the zero elasticity of production of money and all other liquid assets, a decision to save out of current income implies a reduced demand for the products of industry, while liquid assets have a zero elasticity of production and so saving does not create a demand for more workers to be hired to produce additional money or other liquid assets. Contrary to Benjamin Franklin's adage, a penny saved is a penny not earned.

All other things being equal, any reallocation away from the spending on the products of industry toward increasing one's savings increases the demand for liquid assets, but workers cannot be hired in the private sector to produce more liquid assets in response to the hypothesized increase in demand. In a money-using economy, the decision to save a portion of one's income in terms of nonproducible liquid time machines (financial assets) involves what Hahn (1977, 39) has labeled "a non-employment inducing demand"—a type of demand that is incompatible with Say's Law.

But why was it necessary for Keynes to identify a second essential property of money and all other liquid assets, namely that the elasticity of substitution between liquid assets and producible goods is zero or negligible? When saving out of current income occurs, the demand for liquid assets increases. If liquid assets are nonproducibles, then their supply cannot increase, and hence the price of liquid assets must rise with any increase in demand for liquid assets. If the durable products of industry were good substitutes (had a high elasticity of substitution) for liquid assets as a store of value, then the rising price of liquid assets would reallocate the demand for liquidity toward producibles, and therefore employment would increase in the industries producing good substitutes for liquid assets. But as we have already noted, the high transactions and carrying costs (p. 130) mean that durable producibles can never be a good substitute for liquid assets as liquidity time machines, hence, the zero elasticity of substitution.

This zero elasticity of substitution between reproducible durables and the liquid assets that savers use as time machines ensures that the portion of income that is not spent on the products of industry, that is, saving, will find, in Hahn's (1977, 31) terminology, "resting places" in the demand for nonproducibles. Some forty years after Keynes, Hahn rediscovered Keynes's point that a stable involuntary unemployment equilibrium could exist *even in a classical general equilibrium (Walrasian) system with flexible wages and prices* whenever there are "resting places for savings in other than reproducible assets" (Hahn 1977, 31).

Hahn rigorously demonstrated what was logically intuitive to Keynes. Hahn (1977, 37) showed that the view that with "flexible money wages there would be no unemployment has no convincing argument to recommend it.… Even in a pure tatonnement in traditional (classical) models convergence to (a general) equilibrium cannot be generally proved" if savings are held in the form of nonproducibles. Hahn (1977, 39) argued that "any non-

reproducible asset allows for a choice between employment inducing and non-employment inducing demand." The existence of a demand for money and other liquid nonreproducible assets (that are *not* gross substitutes for the products of the capital goods-producing industries) as a store of "savings" means that all income earned by households engaging in the production of goods is not, in the short or the long run, necessarily spent on the products of industry. Households that want to store that portion of their income which they do not consume (i.e., that they do not spend on the products of industry) in the form of liquid assets are choosing, in Hahn's words, " a non-employment inducing demand" for their savings.

Just as in non-Euclidean geometry, lines that are apparently parallel often crash into each other. In the Keynes/post-Keynesian, non-Euclidean economic world, an increased demand for "savings," even if it raises the relative price of nonproducibles, will not spill over automatically into a demand for producible goods. Consequently, when households save a portion of their income, they have made a choice for "non-employment inducing demand" that is incompatible with Say's Law.

Keynes (1936, 241) argued that the "attribute of 'liquidity' is by no means independent of these two (elasticity) characteristics." Thus, as long as wealth owners demand any liquid asset that has "low elasticities of production and substitution and low carrying costs" (Keynes 1936, 238) as a resting place (store of value) for their saving out of current income, (involuntary) unemployment equilibrium is possible even in the long run. In a money-using, entrepreneurial economy, saving from earned income is held in the form of nonproducible financial assets rather than spent on the products of industry.

Classical theory, in contrast, assumes that *only* producible goods and services provide utility. Why then would rational human beings engage in unpleasant income-earning activities only to store that portion of their income that they save in the form of nonproducible liquid assets that classical theorists insist provide no utility to the saver? In the classical long run, only an irrational lunatic would behave this way and make a fetish of the liquidity of one's portfolio. Yet in the world of experience, sensible people do store (p. 131) their savings in nonproducibles such as currency, bank deposits, and a plethora of other liquid financial assets traded on well-organized, orderly financial markets.

In a world where the ergodic axiom is not applicable, people recognize that they do not "know" and cannot know the future in a statistically reliable sense. Decision makers may fear a future that they "know" that they cannot know. It is, therefore, sensible for decision makers to store some portion of their income in money and other nonproducible liquid assets that can be readily converted into money as long as future liabilities can be expected to be legally discharged by the tendering of money. Sensible behavior of savers implies that they do not use all their earned claims on industry's products and resources today. The more liquid the asset used to store savings today, the more readily it can be used another day to command resources in the future.

If, as Keats wrote, "A thing of beauty is a joy forever," then one can never have too many beautiful things. Similarly, if liquidity is a cushion against an uncertain economic future, then in a world of uncertainty, one can never have too much liquidity. If decision makers fear an uncertain, unpredictable future, then the possession of nonproducible liquid assets is a security blanket providing the holder with considerable utility in a way that producibles cannot, for the latter require using up one's claim on resources today.

The existence of savings in the form of money and other liquid assets breaks the Say's Law proposition that supply must create its own demand. The reason that savings are stored in these non-employment-inducing liquid assets is, according to Keynes, the recognition by income recipients that the future is uncertain and that one must protect oneself against unforeseen and unforeseeable future contractual commitments and eventualities by storing savings that possess zero or relatively negligible carrying costs and transactions costs.

The existence of money and other liquid assets that have the essential elasticity properties identified by Keynes provides savers with the privilege of not having to spend all their income immediately on goods and services if they do not want to do so.

Marshallian Microfoundations

Marshallian demand and supply functions for each firm are detailed in terms of prices and quantities, assuming (1)

a homogeneous labor force, (2) stock of equipment unchanged, (3) given factor prices, especially money wages, (4) given aggregate income, and (5) given production functions and technology. Since the quantity of output of each firm is assumed homogeneous, the firms' supply functions can readily be summed to produce an industry supply function for each industry.

Keynes (1936, 41) argued that to produce aggregate supply and demand functions, money value and employment were the two "fundamental units of quantity," and therefore in developing his theory of employment Keynes proposed "to make use of only (these) two fundamental units." Keynes, however, never explicitly developed these aggregate demand and supply functions from Marshallian micro functions, which (p. 132) used price and quantity units as the fundamental units. This herculean task was left for Weintraub (1958) to demonstrate.

Deriving the Aggregate Supply Function

The aggregate supply function relates the aggregate number of workers (N) that profit-maximizing entrepreneurs would want to hire for each possible level of expected sales proceeds (Z)—given the money-wage rate, technology, the degree of competition (or monopoly), and the degree of integration of firms.

For any given degree of integration, gross domestic product (GDP) is directly related to total sales proceeds. If each firm is fully integrated from raw material production to finished product sales, then aggregate sales proceeds equals GDP.

The aggregate supply function is specified as (1.5.1)

$$Z = f_1 = (w, N)$$

$Z = f_1 = (w, N)$

(1.5.2)

$$Z_w = f_2(N),$$

$Z_w = f_2(N),$

where Z is measured in money units and Z_w is in terms of wage units, while N is hiring in terms of employment units and w is the money wage.

For purposes of simplicity and ease of comparability with the ordinary Marshallian micro supply function, only the form of equation (1.5.1) will be developed. (Equational form (1.5.2) of the aggregate supply function can be derived by dividing all money sums expressed in equation (1.5.1) by the money-wage rate.)

The Marshallian flow-supply curve for each firm indicates the profit-maximizing output possibilities for alternative market demand conditions facing the firm. The profit-maximization condition is (1.5.3)

$$p = (1 - [1/E_{df}])(MC_f),$$

$p = (1 - [1/E_{df}])(MC_f),$

where p is the market price, E_{df} is the absolute value of the price elasticity of demand facing the firm for any given level of effective demand, $1/E_{af}$ is a measure of the firm's degree of monopoly (μ_f), and MC_f is the marginal cost schedule facing the firm. The supply schedule of any profit-maximizing firm (s_f) is related to its marginal cost and its degree of monopoly (1.5.4)

$$s_f = f([1/E_{af}](MC_f)).$$

$s_f = f([1/E_{af}](MC_f)).$

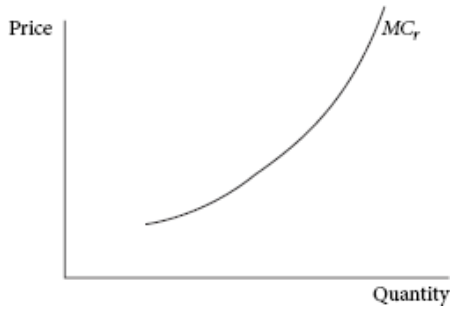

figure 1.5.2 The firm's marginal cost curve

Assuming labor is the only variable input in the production process, the firm's marginal cost equals the money wage (w) divided by the firm's marginal productivity of labor (mp_f), where the latter is a function of hiring by the firm and the laws of returns involved in the technology of the firm, that is, (1.5.5)

$$(MC_f) = w/mp_f.$$

$(MC_f) = w/mp_f$

(p. 133)

For any given "law of returns" facing the firm, there will be a different marginal production cost structure. With diminishing returns, marginal production costs increase with increasing output. With constant returns to labor, marginal production costs are constant. With increasing returns, marginal costs decline with increases in output and employment.[5] Figure 1.5.2 represents the traditional marginal costs under a diminishing returns situation.

For a perfectly competitive firm, $E_{df} = \infty$, and therefore the firm has no monopoly power ($E_d\mu_f = 0$). In this case, the marginal costs schedule of the firm is its flow-supply curve. For conditions of less than perfect competition, the degree of monopoly will vary between zero and 1, as $1 > E_d < \infty$. Whenever $0 > E_{df} < 1$, both marginal costs and monopoly power affect the firm's supply curve offerings at alternative market prices.[6] If the firm is in a purely competitive market, then the marginal cost curve in figure 1.5.2 represents the firm's supply function. If the firm has some degree of monopoly power, the supply function is the marginal cost schedule of figure 1.5.2 multiplied by some scalar equal to ($1/1\ E_{df}-\mu$).

The Marshallian industry flow-supply schedule (s) is simply obtained by the usual lateral summation of the individual firms' supply curves. The industry supply schedule is, therefore, related to the average industry markup or "average" degree of monopoly ($E_{df}\mu$) *and* the industry's marginal costs schedule (mc), that is, (1.5.6)

$$s = f(mc, E_{df}\mu).$$

$s = f(mc, E_{df}\mu).$

Given each firm's production technology, the money wage, an (E_{df}) average degree of monopoly based on specified market conditions for any given potential output and employment level, a unique industry supply function can be derived as depicted in figure 1.5.3a.

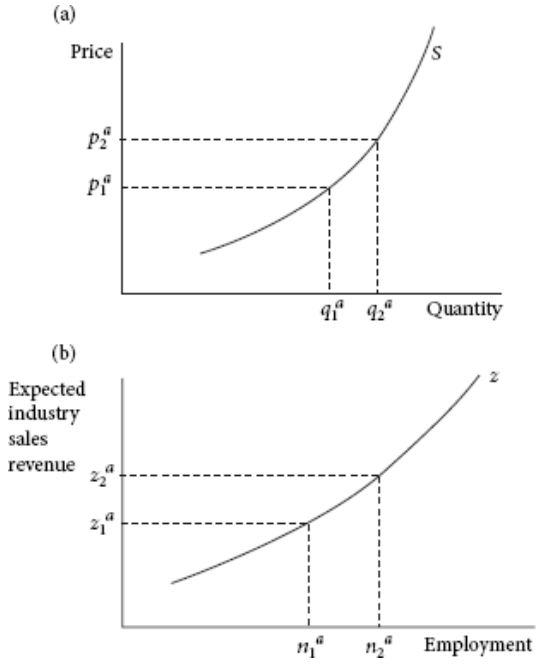

figure 1.5.3 Marshallian industry supply curve

Output across firms in the same industry may be homogeneous and therefore can be aggregated to obtain the industry supply schedule in figure 1.5.3a. Keynes rejected this homogeneity of output assumption as the basis for summing across industries to obtain the aggregate supply function. It is necessary to convert the Marshallian industry supply function, *s*, which relates prices (*p*) and quantities (*q*), to a function (which we may call **(p. 134)** Keynes's industry supply function) whose units can be aggregated across industries to obtain an aggregate supply function. Keynes's industry supply function in figure 1.5.3b relates total industry sales proceeds in money terms (*z*) with total industry employment hiring (*n*), that is, (1.5.7)

$$z = f_3(n).$$

$z = f_3(n).$

Given productivity, the money wage, and the degree of monopoly, every point on the Marshallian industry supply function is associated with a unique profit-maximizing price-quantity combination whose product equals total expected sales proceeds (i.e., $pxq = z$). Every industry output level (q) can be associated with a unique industry hiring level, that is, $q = f(n)$. Given industry A's supply curve in figure 1.5.3a, if entrepreneurs of that industry expect a price of p_1^a, they will produce q_1^a, expecting a total sales revenue of z_1^a (= p_1^a q_1^a). To produce q_1^a output, n_1^a workers will have to be hired in the A industry. Consequently,z_1^a and n_1^a describe the coordinates of one point on Keynes's industry supply function in figure 1.5.3b.

In a similar manner, every point of the Marshallian industry supply function in the *p* versus *q* quadrant (e.g., p_2^a q_2^a in figure 1.5.3a) can be transformed to a point on the Keynes industry supply curve in *pq* versus *n* space (e.g., z_2^a n_2^a) in figure 1.5.3b.

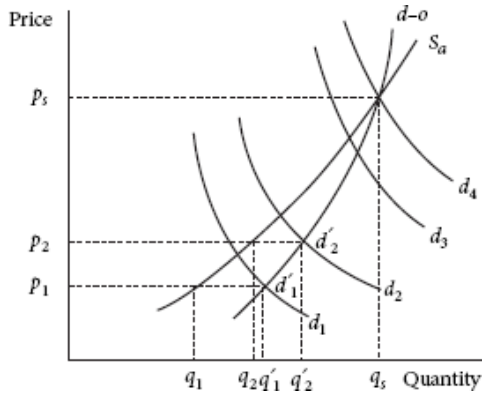

figure 1.5.4 Keynes's industry supply curve.

For every industry where a traditional Marshallian flow-supply function can be formulated, a Keynes industry supply function can also be uniquely specified. All of **(p. 135)** Keynes's industry supply functions can then be aggregated together to obtain the aggregate supply function in terms of aggregate money proceeds (*Z*) and the aggregate quantity of employment units (*N*), provided one reasonably assumes that corresponding to any given point of aggregate supply there is a unique distribution and employment between the different industries in the economy (Keynes 1936, 282).

The Propensity to Consume from Marshallian Micro Demand Curves

The propensity to consume suggests that as aggregate income (Y) rises, total consumption expenditures increases, that is, C is an increasing function of Y. Unlike this upward-sloping aggregate consumption demand curve, the Marshallian micro demand curve facing an industry is normally downward sloping in price-versus-quantity space. Despite these different slopes and different fundamental units, the aggregate consumption demand curve can be derived from a Marshallian micro demand-and-supply analysis.

A Marshallian demand curve is based on the assumptions of given tastes, given other industry demand and supply conditions, and *given the aggregate effective demand*. As Keynes (1936, 259) noted, the Marshallian micro demand schedule for this industry "can only be constructed on some fixed assumption as to the nature of demand and supply in other industries and as to the amount of the aggregate effective demand." In figure 1.5.2, the upward-sloping Marshallian industry supply curve, s_a, is drawn. At an expected price of p_1, entrepreneurs in industry *a* will produce q_1 output, will hire n_1 workers, and expect a total revenue of z_1 (= p_1q_1). If entrepreneurs in industry *a* expecting p_1 choose to produce q_1, there must be implied concomitant prices and outputs of all other industries that will generate a level of aggregate income such that the demand curve facing industry *a* will be d_1.

(p. 136) At the supply price of p_1, the quantity buyers demand would be q_1'. Buyers's intended demand-outlay is d_1' (= p_1q_1'). At the supply price of p_1, intended demand-outlay exceeds expected sales ($d_1 > z_1$). The supply price p_1 is less than the equilibrium price, given the implicit assumption regarding demand and supply in other industries and the level of effective demand this assumption entails.

At an alternative expected supply price of p_2, entrepreneurs in representative industry *a* expect to sell q_2 output for a total revenue of z_2 (= p_2q_2) and will hire n_2 workers. This increased output and employment in representative industry *a* will be associated with similar increases in all other industries. The result will be larger factor incomes throughout the economy associated with supply price p_2 compared to supply price p_1. The larger aggregate factor payments mean more total consumption of goods in the marketplace and therefore imply that a new, higher Marshallian demand curve is the relevant demand curve facing industry *a*. At the supply of p_2, consumers intend to purchases q'_2 output, and intended demand-outlay is d_2' (= $p_2q'_2$). Intended spending still exceeds expected sales revenue ($d_2' > z_2$).

In this way, an intended demand-outlay can be developed from a family of Marshallian demand curves for each supply price. Connecting the relevant demand-outlay points at alternative supply prices, the demand-outlay curve d-o is obtained. This upward-sloping demand-outlay function is the industry analogue of Keynes's aggregate consumption demand curve. At any level of aggregate employment, aggregate demand is the summation of

intended demand outlays over all industries.

Implicit in this analysis is that any expenditure (D_2) other than consumption is a fixed sum and does not change with income. Thus the Marshallian demand curves facing firms producing output for D_2 spending remain unchanged, while all the Marshallian demand curves representing D_1 markets are rising as employment and output expand in each industry; aggregate factor incomes rise and the quantity of aggregate consumption demand plus D_2 demand increases. Every movement up the given aggregate consumption demand curve associated with an alternative higher level of employment and output generates a higher member of the Marshallian family of industry demand curves. As long as the marginal propensity to consume is less than 1, the increase in aggregate demand-outlay (including the fixed spending on D_2) will rise slower than the increase in aggregate factor incomes. At some supply price (p_5) the Marshallian demand-outlay function intersects the industry supply curve in each market, and intended outlay just equals expected sales. This point of intersection is the industry analogue to the point of effective demand (where the aggregate demand curve intersects the aggregate supply curve) for the economy as a whole.

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Notes:

(1.) Samuelson specifically stated that he did not understand Keynes’s paradigm so he merely assumed it involved a Walrasian system where prices were fixed in the short run (see Colander and Landreth 1996, 159–60).

(2.) In an intertemporal setting with gross substitutability over time, agents plan to spend lifetime income on the products of industry over their life cycle. Thus the long-run tendency of classical life cycle theories is that income earners will spend all their income earned on the products of industry. At one minute before death, a rational utility-maximizing income earner would spend the last penny of income earned sometime during his or her life cycle. In economist jargon, in a classical theoretical world, at least in the long run all earned income is spent on the products of industry.

(3.) The negligible production elasticity applies to those economies that adopt a commodity form of money. The commodity chosen will be one where even if the demand for the commodity increases, additional production of the commodity will be difficult if not impossible. As Keynes ([1931] 1972, 162) pointed out, “Gold is, and always has been, an extraordinarily scarce commodity. A modern liner could convey across the Atlantic in a single voyage all the gold which has been dredged or mined in seven thousand years.”

(4.) A zero elasticity of substitution implies that the gross substitution axiom is not universally applicable to all demand functions (i.e., specifically the demand function for liquidity), and therefore, as Arrow and Hahn (1971, 361) have demonstrated, in the absence of ubiquitous gross substitution all existence proofs of general equilibrium are jeopardized.

(5.) The latter two cases are incompatible with perfect competition; they require some degree of monopoly and hence some positive markup, ($k > 0$) over marginal costs, so that market price covers average unit costs. If marginal user costs (MUC) are not negligible, then $MC_f = (w/MP + MUC)$.

(6.) In the simplest case, when aggregate demand changes, the demand curve facing the firm shifts without altering the degree of monopoly of the firm. For example, for the purely competitive case, shifts in the firm's demand curve do not alter the competitive market conditions. In more complex cases, the degree of monopoly may vary as aggregate demand changes and the firm's demand curve shifts, i.e., $\mu_f = f_2(n)$.

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Money

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[–] Abstract and Keywords

This chapter examines three fundamental propositions regarding money. First, money buys goods and goods buy money, but goods do not buy goods. Second, money is always debt; it cannot be a commodity from the first proposition because if it were, that would mean that a particular good is buying goods. Third, default on debt is possible. The approach taken here is not meant to replace the more usual post-Keynesian economics and institutionalist approach, but rather is meant to supplement them. For example, this discussion is linked to Hyman Minsky's (1986) work, to the endogenous money approach of Basil J. Moore (1988), to the French-Italian circuit approach, to Paul Davidson's (1978) interpretation of John Maynard Keynes that relies on uncertainty, to the approaches that rely heavily on accounting identities—and the "K" distribution theory of Keynes, Michał Kalecki, Nicholas Kaldor, and Kenneth Boulding, to the sociological approach of Geoffrey Ingham, and to the chartalist or state money approach. Hence, this chapter takes a somewhat different route to develop more-or-less heterodox conclusions about money.

Keywords: money, goods, debt, default, post-Keynesian economics, Hyman Minsky, John Maynard Keynes, uncertainty, Michał Kalecki, Nicholas Kaldor

The exposition here will rely on three fundamental propositions regarding money:

1. As Clower (1967, 207–8) famously put it, "money buys goods and goods buy money; but goods do not buy goods."
2. Money is always debt; it cannot be a commodity from the first proposition because if it were, that would mean that a particular good is buying goods.
3. Default on debt is possible.

These three propositions will provide sufficient structure to build a theory of money. I will link the discussion to common themes in the heterodox literature on money. The approach taken here is not meant to replace the more usual post-Keynesian (Davidson 1978; Harcourt 2008; Kaldor and Trevithick 1981) and institutionalist (Dillard 1980) approaches but rather is meant to supplement them. For example, this discussion will be linked to Minsky's (1986) work (which relied heavily on his dissertation advisor, Schumpeter 1934), to the endogenous money approach of Moore (1988), to the French-Italian circuit approach (Graziani 1990; Lavoie 1985; Parguez 2002), to Davidson's (1978) interpretation of Keynes that relies on uncertainty, to the approaches that rely heavily on accounting identities (Godley)—and the "K" distribution theory of Keynes ([1936] 1964; [1930] 1976), Kalecki (1954, Targetti and Kinda-Hass, 1982), Kaldor (1955–56), and Kenneth Boulding (1950; 1985), to the sociological approach of Ingham (2000; 2004), and to the chartalist or state money approach (Innes 1913; Knapp 1924; Goodhart 1998; Wray 1998; 2004). Hence, we will take a somewhat different route to develop more-or-less heterodox conclusions about money.

1. Goods Don't Buy Goods

The typical orthodox story of money's origins is too well known to require much reflection: because of the inefficiencies of barter, traders choose one particular commodity to serve as (p. 139) the money numeraire (Innes 1913; Wray 1998; Ingham 2000). A hypothetical evolutionary process runs through the discovery of a money multiplier (notes issued on the basis of reserves of the money commodity) to government monopolization of the commodity reserve and finally to the substitution of commodity money by a fiat money (Wray 2004). What's important is not the historical details of this transformation but rather the view of the role played by money. Since the market and commodity production analytically precede money, money is not essential, although it plays a lubricating role. This is why it is tempting to do "real analysis" and to presume that in the long run money must be neutral. Note that it is not only neoclassical economics that falls victim to this mistake (see Kregel 1985).

If we begin with the proposition that goods cannot buy goods, then we must look elsewhere for the nature of money. And we cannot presume that markets come before money for the simple reason that until money exists there cannot be "exchanges" (sales). Further, money is not something that is produced—it is not a commodity that is produced by labor (otherwise it would be a "good buying a good"), nor is it something sought to directly satisfy the kinds of individual needs or desires that motivate production of commodities. At most, we can say that we seek money because it provides access to the commodities that satisfy those desires. (To be sure, post-Keynesians follow Keynes in asserting that money hoards "quell the disquietude"—but that in turn is because possession of money provides some measure of certainty in an economy that limits access to livelihood to those with money.)

Readers will recognize the similarity to Keynes's argument that money has "a zero, or at any rate a very small elasticity of production," meaning it "cannot be readily produced" so that "labour cannot be turned on at will by entrepreneurs to produce money" ([1936] 1964, 230), and as well to the argument that "Unemployment develops, that is to say, because people want the moon;—men cannot be employed when the object of desire (i.e., money) is something which cannot be produced and the demand for which cannot be readily choked off" ([1936] 1964, 235). He also notices that "the characteristic which has traditionally supposed to render gold especially suitable for use as the standard of value, namely, its inelasticity of supply, turns out to be precisely the characteristic which is at the bottom of the trouble" ([1936] 1964, 235–36).

Keynes is making a slightly different point here—he is linking money to unemployment that cannot be resolved by shifting displaced labor to the production of the money commodity. Yet elsewhere—especially in the drafts for the *General Theory*—he explicitly presumed that the *purpose* of production in a monetary economy is to accumulate money (Wray 1990; 1998). Indeed, this recognition must underlie these statements above, for it is the desire for money that causes its return as the "rooster" that sets the standard to rise above what can be obtained on nonmoney assets. That, in turn, is what causes effective demand to be so low that unemployment results, and it is because labor is not involved in any significant way in the production of money that labor cannot be diverted to its production. Hence, Clower's argument that "goods do not buy goods," that money is not a commodity produced by labor, must underlie Keynes's view.

The claim that a capitalist economy is a "monetary production economy" is of course also adopted by Marx and Veblen and their followers (Dillard 1980). The purpose of production is to accumulate money—not to barter the produced commodities for other (p. 140) commodities. As Heilbroner (1985) argues, this provides a "logic" to production that makes it possible to do economic analysis. Analysis from Marx's departments to the circuit approach to Godley's (1996) sectoral balances and stock-flow consistency, to Kalecki's (1971) profits equation, and even to GDP accounting all rely on this "logic." On one level, this is obvious. We need a unit for accounting purposes to aggregate heterogeneous items: wages, profits, rents; investment, consumption, government spending; apples, oranges, and widgets. As Keynes ([1936] 1964, chap. 4) argued, there are only two obvious units of account at hand—labor hours or the money wage unit. The Classical tradition focused on the first, while most of Keynes's followers focused exclusively on the second, although some like Dillard followed Keynes's lead by using both.

But the Marx-Veblen-Keynes monetary theory of production means to say something more than that we need a handy universal unit for accounting purposes. Money is the *object* of production—it is not merely the way we measure the value of output. It is because money does not take any particular commodity form that it can be the purpose of production of all particular commodities. It is the general representation of value—it buys all

commodities and all commodities buy (or, at least attempt to buy) money. Actually, if a commodity cannot buy money, it really is not a commodity—it has no market value. Commodities obtain their value—they *become* commodities—by exchanging for the universal representation of social value, money. By the same token, obtaining money allows us access to all commodities that are trying to buy money.

This presents the possibility of disappointment: the fruits of production enter the market but fail to buy money. There are consequences following on the failure to sell produced commodities, including a decision to cease production. Labor power, itself, is a produced commodity (separate from the free laborer, of course, who cannot be bought or sold) that seeks to exchange for money but may find unemployment instead. However, not only is the purpose of production to obtain money, but the production process itself is one of "production of commodities by means of commodities" as Sraffa (1960) put it. And those commodities (including labor power as well as other produced means of production) can only be purchased with money. In other words, the production process, itself, begins with money on the expectation of ending up with more money (M-C-C′-M′). Not only is production required to result in sales for money, but it must begin with money. Production is thoroughly monetary. It cannot begin with commodities, because the commodities must have been produced for sale for money. Analysis must also therefore begin with money.

We cannot begin with the barter paradigm. We cannot remove money from the analysis as if it were some veil hiding the true nature of production. We cannot imagine that in some hypothetical long run money will somehow become a neutral force, just as it was back in the days when Robinson Crusoe bartered with Friday.

2. Money Is Debt

I have argued that money is not a commodity, but I have not said much about what it is, beyond arguing that it is a unit of account. However, a unit of measurement is not (p. 141) something that can ever be obtained through a sale. No one can touch or hold a centimeter of length or a centigrade of temperature. I have said that we buy money by selling commodities, but it is clear that if money is just a unit of account—the dollar, the euro, the yen—that is impossible.

We can get somewhat closer if we think of the analogy to the electronic scoreboard (with an array of LED lights that can display numbers) at a sporting match—say American football. When a team scores a touchdown, the official scorer awards points, and electronic pulses are sent to the appropriate combination of LEDs so that the scoreboard will show the number six. As the game progresses, point totals are adjusted for each team. The points have no real physical presence, they simply reflect a record of the performance of each team according to the rules of the game. They are valuable because the team that accumulates the most points is deemed the "winner"—perhaps rewarded with fame and fortune. Further, sometimes points are taken away after a review by officials determines that rules were broken and that penalties should be assessed. The points that are taken away do not really go anywhere—they simply disappear as the scorekeeper deducts them from the score.

Similarly, in the game we call the "economy," sales of commodities for money lead to "points" credited to the "score" that is (mostly) kept by financial institutions. Unlike the game of football, in the game of life every "point" that is awarded to one player is deducted from the "score" of another—either reducing the payer's assets or increasing her liabilities. Accountants in the game of life are very careful to ensure that financial accounts always balance. The payment of wages leads to a debit of the employer's "score" at the bank, and a credit to the employee's "score," but at the same time, the wage payment eliminates the employer's obligation to pay accrued wages as well as the employee's legal claim to wages. So, while the game of life is a bit more complicated than the football game, the idea that record keeping in terms of money is a lot like record keeping in terms of points can help us to remember that money is not a "thing" but rather is a unit of account in which we keep track of all the debits and credits—or "points."

However, the financial institution is not simply an uninterested scorekeeper. The "scores" on its balance sheet are liabilities—its IOUs are the points credited to players. We will have much more to say about the role played by financial institutions in the next section. Here we only want to focus on the "dual" debt nature of the money "scores."

First, as discussed above, production must begin with money; and that money is a "score" that represents an IOU.

Typically, it is a demand deposit liability of a bank. It is matched on the other side of the bank's balance sheet by a loan, which represents the debt of the borrower in whose name the bank's IOU is issued. In other words, one who wants to undertake production of commodities (by means of purchasing commodities) must issue an IOU to the bank (a "loan" held as the bank's asset) and obtain in return a bank deposit (the bank's liability). The commodities to be used as means of production are then purchased by transferring the deposit (the bank debits the producer's deposit and credits the deposits of the sellers of means of production). When the producer finishes the production process and sells the produced commodities, her deposit account is credited, and the purchasers of the sold commodities have their deposit accounts debited. At this point, if the producer desires, she can use her deposit account to "repay" the loan (the bank simultaneously debits the demand deposit and the loan). All of this **(p. 142)** can be done electronically and is rather like our scorekeeper who takes points off the scoreboard.

However, if we end up back where we started—with the deposit and the loan wiped clean—the producer seems to have engaged in an entirely purposeless endeavor, borrowing to produce commodities sold to repay the loan. The money created in the first step is simply retired in the last. That of course is not the monetary production economy of Marx, Keynes, and Veblen—which must aim to end up with more money than it starts with. Further, the bank's engagement in this process would also be senseless—it accepted an IOU and created one and finally ends up with all "scores" back at zero. Hence we have to account for profits of producers and interest (hence, profits) earned by banks. In a moment we will turn to that issue. For now let us conclude that the debt of the producer is retired by selling the produced commodities ("realizing" the monetary value) and retiring the loan by surrendering its deposits accumulated through the sales. The bank cancels its debt (demand deposit) at the same time that it cancels the producer's IOU (loan).

The second sense in which the producer is indebted is Schumpeterian: the producer commands some of society's means of production at the beginning of the production process before actually contributing to society. The producer's IOU (held by the bank) represents a social promise that she will temporarily remove commodities on the condition that she will later supply commodities to society. We can view all commodity production as social, beginning with commodities that were already socially produced in order to combine them in some manner to produce a (usually) different set of commodities. When those newly produced commodities find a market (buying money), the entrepreneur's social debt is redeemed. Schumpeter (1934) argued that when the entrepreneur removes means of production from the sphere of circulation, this can lead to temporary inflation. However, if the production process actually results in commodities of greater total value, the redemption of the debt to society more than makes up for the temporary inflation, imparting a long-term deflationary tendency.

For Schumpeter, this is expected when the entrepreneur innovates—a new production process that increases capacity to produce commodities. Hence, Schumpeter focused on the role played by banks in financing innovation—providing credit to allow the entrepreneur to claim social productive resources for a new production process that will increase social production. While he recognized that all production begins and ends with money, he did not view money as very important when it comes to normal production and circulation of commodities. A given quantity of money can circulate a given amount of production, as something like Keynes's ([1937] 1973, 208) "revolving fund of finance." But new credit allows the innovative entrepreneur to break free from the circular flow, creating new purchasing power that shifts resources from some existing use toward the innovative practice. If successful, the debt is repaid—in both senses: The producer can retire her debt to the bank and to society as a whole.

As Minsky (1993) argued, Schumpeter's "vision" did not really allow him to see how profits (and interest) are generated at the aggregate level—because he did not have a theory of effective demand. However, in his departments approach, Marx anticipated **(p. 143)** the "K" theory of Keynes, Kalecki (1971), Kaldor (1955–56), and Kenneth Boulding (see Boulding 1985), which recognizes the social creation of a "surplus" from which profits and interest are derived. There are many ways to approach this, but the most straightforward is through the Kalecki equation: aggregate profits equals the sum of investment plus the government deficit plus the trade surplus plus capitalist consumption (or, consumption out of profits) and less worker saving (saving out of wages). There is no need to go through this in detail. The basic idea is that because the wages received by workers who produce consumption goods represent only a part of the receipts from the sales of those goods (in other words, workers in the investment, foreign trade, and government sectors also buy consumer goods), the capitalists producing consumption goods receive gross profits (equal to total sales receipts less costs of producing the goods—which can be simplified to equal the wage bill in the consumption goods sector). A great number of extensions can be made—workers can save and receive profits; capitalists can consume; we can analyze distributional effects as

well as equilibrium growth paths; and so on. (See Dixon and Toporowski, as well as Chick and Dow, this volume.)

We can also return to our initiating bank loan and analyze a complete monetary circuit to repayment of the loan, as discussed above. (See Graziani 1990; Lavoie 1985; Parguez 2002; Parguez and Seccareccia 2000.) It can be shown that if we have two sectors (investment and consumption), profits can be realized in the form of bank deposits by one sector (consumption) equal to the wage bill in the other (investment). These profits can then be used to purchase the output of the second sector (i.e., investment goods—the production of the investment goods generates the profits needed to finance their purchase). However, it is more difficult to show how the second sector gets profits, and how interest on loans can be paid. A variety of solutions has been offered—banks pay interest on deposits so firms can pay equivalent interest on loans (which begs the question of bank profitability, sometimes resolved by having banks serve as a third sector that buys commodities). Or everything can be put in terms of rates of growth: the profits "deux ex machina" can be found in heterogeneous and overlapping production periods and circuits (only a portion of outstanding loans are retired), or by having ever-growing bank balance sheets (with interest essentially lent).

One of the most interesting approaches is that of Vallegeas (2004), who follows actual accounting practice and argues that we should not take the "ending up with more money" dictum of monetary production too literally. Much production remains within the firm (for example, inventories) and is valued at market price—adding to accounting profit ("more money"). It is the "record keeping" that matters: profits are accounted for in monetary terms but do not have to be literally realized in the form of accumulated bank deposits. In any event, all of this amounts to technical detail that is not necessary for our exposition here.

We conclude: money is debt. It need not have any physical existence other than as some form of record—mostly, an electrical entry on a computer. Money always involves two entries: debt of the issuer and asset of the creditor. Delivering an IOU back to the debtor results in its extinction: the debt is stricken, and so is the asset of the creditor. In practice, creation of money usually requires four entries: a prospective producer issues **(p. 144)** an IOU to a bank and receives a demand deposit as an offsetting asset; the bank holds the producer's IOU as its asset and issues the demand deposit as its liability. By convention we say that the producer is a "borrower" and the bank is a "lender"; we call the bank's acceptance of the borrower's IOU a "loan," and the bank's IOU "money." However, that is rather arbitrary because both have borrowed and both have lent; both are debtors and both are creditors.

If money is debt, then as Minsky (1986, 228) said, anyone can create money by issuing an IOU denominated in the social unit of account. The problem is to get it accepted, that is, to get someone to hold your IOU. To become a debtor requires finding a creditor willing to hold the debt. But there are two sides to the equation: each must be willing to "create money" (issue an IOU), and each must be willing to "hold money" (hold the other's IOU). And that raises many issues, of which we can only touch on a few. In the next section we address two issues related to willingness to hold money IOUs: liquidity and default.

3. Liquidity and Default Risks on Money IOUs

In an excellent essay, Goodhart (2008) argued that the reason that orthodoxy cannot find a role for money or for financial institutions in its rigorous models is because default is ruled out by assumption. All IOUs are equally safe because all promises are always kept as all debts are always paid. (This is the so-called "transversality condition." Indeed, many such models employ a representative agent who is both debtor and creditor and who quite rationally would never default on herself in a schizophrenic manner!) This means that all can borrow at the risk-free interest rate and that any seller would accept a buyer's IOU; there is no need for cash and never any liquidity constraint. Nor would we need any specialists such as banks to assess creditworthiness, nor deposit insurance, nor a central bank to act as lender of last resort. Obviously, almost all interesting questions about money, financial institutions, and monetary policy are left to the side if we ignore liquidity and default risk.

Let us begin with the most fundamental question about debt: just what is owed when an IOU is issued? All IOUs share one common requirement: the issuer must accept back her own IOU when it is presented (Innes 1913; Wray 2004). As we discussed above, the bank takes back its own IOU (demand deposit) when a debtor presents it to pay off a loan. If you issue an IOU to your neighbor for a cup of sugar, the neighbor can present it to you to obtain sugar. Refusing your own debt when submitted for payment is a default.

Another promise that many *monetary* IOUs carry is convertibility on demand (or on some specified condition such as a waiting period) to *another* monetary IOU or even to a commodity. For example, on a gold standard the government might promise to convert its currency (an IOU stamped on coin or paper) to so many ounces of precious (p. 145) metal. Or a country on a fixed exchange rate might promise to convert its currency to so many units of a foreign currency. Banks promise to convert their demand deposit IOUs to domestic high-powered money (currency or reserves at the central bank).

It is important to note, however, that a promise to convert is not fundamental to issue of an IOU—it is in a sense voluntary. For example, modern "fiat" currencies on floating exchange rates are accepted with no promise to convert. Many attribute this to legal tender laws. Historically, sovereign governments have enacted legislation requiring their currencies to be accepted in payments. Indeed, paper currency issued in the United States proclaims "this note is legal tender for all debts, public and private"; Canadian notes say "this note is legal tender"; and Australian paper currency reads "This Australian note is legal tender throughout Australia and its territories." By contrast, the paper currency of the UK simply says, "I promise to pay the bearer on demand the sum of five pounds" (in the case of the five-pound note; the promise appears to be the queen's, whose picture appears on the note). On the other hand, the euro paper currency makes no promises and has no legal tender laws requiring its use.

Further, throughout history there are many examples of governments that passed legal tender laws but still could not create a demand for their currencies—which were not accepted in private payments, and sometimes even rejected in payment by government. (In some cases, the penalty for refusing to accept a king's coin included the burning of a red hot coin into the forehead of the recalcitrant—indicating that without compulsion, the population refused to accept the sovereign's currency.) (See Wray 1998 and Knapp 1973.) Hence, there are currencies that readily circulate without any legal tender laws (such as the euro) as well as currencies that were shunned even with legal tender laws. Further, as we know, the US dollar circulates in a large number of countries in which it is not legal tender (and even in countries where its use is discouraged and perhaps even outlawed by the authorities).

Modern currencies are often called "fiat currencies" because there is no promise made by government to redeem them for precious metal—their value is proclaimed by "fiat" (the government merely announces that a coin is worth a half-dollar without holding a reserve of precious metal equal in value to a half-dollar). Many students in economics courses are shocked when they are first told that there is "nothing" backing the currency in their pockets. While they had probably never contemplated actually taking the currency down to the treasury to exchange it for gold, they had found comfort in the erroneous belief that there was "something" standing behind the currency—perhaps a reserve of precious metal available for redemption. The UK currency's "promise to pay the bearer on demand the sum of five pounds" appears to offer a sound basis, implying that the Treasury holds something in reserve that it can use to make the promised payments. However, if one were to actually present to the UK government a five-pound note, the Treasury would simply offer another five-pound note, or a combination of notes and coins to sum to five pounds! Any citizen of the United States or Australia would experience the same outcome at their own treasuries: a five-dollar note can be exchanged for a different five-dollar note, or for some combination of notes and coins to make five dollars. That is the extent of the government "promise to pay"!

(p. 146) If currency cannot be exchanged for precious metal in many countries, and if legal tender laws are neither necessary nor sufficient to ensure acceptance of a currency, and if the government's "promise to pay" really amounts to nothing (except exchanging its currency for its currency), then why would anyone accept a government's currency? One of the most important powers claimed by sovereign government is the authority to levy and collect taxes (and other payments made to government including fees and fines). Tax obligations are levied in the national money of account—dollars in the United States, Canada, and Australia. Further, the sovereign government also determines what can be delivered to satisfy the tax obligation. In all modern nations, it is the government's own currency that is accepted in payment of taxes. While it appears that taxpayers mostly use checks drawn on private banks to make tax payments, actually, when government receives these checks it debits the *reserves* of the private banks—reserves that are the central bank's IOU.

Effectively, private banks *intermediate* between taxpayers and government, making payment in currency and reserves on behalf of the taxpayers. Once the banks have made these payments, the taxpayer has fulfilled her obligation, so the tax liability is eliminated.

We are now able to answer the question posed above: why would anyone accept government's "fiat" currency? We accept it because the government's HPM (currency plus reserves) is the main thing (and usually the only thing) accepted by government in payment of taxes. It is true, of course, that government currency can be used for other purposes: coins can be used to make purchases from vending machines; private debts can be settled by offering government paper currency; and government money can be hoarded in "piggy banks" for future spending. However, these other uses of currency are all *subsidiary*, deriving from government's willingness to accept its currency in tax payments. It is because anyone with tax obligations can use currency to eliminate these liabilities that government currency is in demand and thus can be used in purchases or in payment of private obligations. The government cannot really force others to use its currency in private payments or to hoard it in "piggy banks," but government can force use of currency to meet tax obligations that it imposes.

For this reason, neither reserves of precious metals (or foreign currencies) nor legal tender laws are necessary to ensure acceptance of the government's currency. All that is required is imposition of a tax liability to be paid in the government's currency. The "promise to pay" that is engraved on UK pound notes is superfluous and really quite misleading. The notes should actually read, "I promise to accept this note in payment of taxes." We know that the UK Treasury will not really pay anything (other than another note) when the five-pound paper currency is presented. However, it will *and must* accept the note in payment of taxes. This is really how government currency is *redeemed*—not for gold, but in payments made to the government. Like all debtors, the government must accept its own IOUs when presented to it, so tax obligations to government are met by presenting the government's own IOUs to the tax collector. This is the fundamental requirement of debt: the issuer must take it back in payment. A promise to convert can be added—as discussed below—but the promise to "redeem" its IOU in payment is primary.

(p. 147) We can conclude that *taxes drive money* (Wray 1998). The government first creates a money of account (the dollar, the pound, the euro) and then imposes tax obligations in that national money of account. In all modern nations this is sufficient to ensure that many (indeed, most) debts, assets, and prices will also be denominated in the national money of account. The government is then able to issue a currency that is also denominated in the same money of account, so long as it accepts that currency in tax payment. It is not necessary to "back" the currency with precious metal, nor is it necessary to enforce legal tender laws that require acceptance of the national currency. For example, rather than engraving the statement, "This note is legal tender for all debts, public and private," all the sovereign government needs to do is to promise "This note will be accepted in tax payment" in order to ensure general acceptability.

This gets us part way to an explanation of why money IOUs are almost without exception denominated in some state's money of account—what Goodhart (1998) calls the "one nation, one money" rule that is rarely violated. The sovereign power chooses the money of account when it imposes a tax liability in that unit. Keynes also recognized the state's role in choosing the money of account when he argued that the state "comes in first of all as the authority of law which enforces the payment of the thing which corresponds to the name or description in the contracts. But it comes in doubly when, in addition, it claims the right to determine and declare what thing corresponds to the name, and to vary its declaration from time to time—when, that is to say, it claims the right to re-edit the dictionary. This right is claimed by all modern states and has been so claimed for some four thousand years at least" (Keynes [1930] 1976, 1:4). Enforceability of monetary contracts is part of the reason nongovernment money IOUs are written in the state's money of account.

In addition, money IOUs are often made convertible to the state's IOUs—high-powered money. This can make them more acceptable. Here's the problem, however: merely agreeing to accept your own IOU in payment is a relatively easy promise to keep. But promising to convert your IOU to another entity's IOU (especially on demand and at a fixed exchange rate—which is necessary for par clearing in a money of account) is more difficult. It requires that one either maintain a reserve of the other entity's IOUs, or that it have easy access to those IOUs when required to do the conversion. Failure to meet the promise of conversion is a default. Hence, there is additional default risk that arises from a promise to convert, to be weighed against the enhancement to its general acceptability.

This gives rise to the concept of liquidity: how quickly can an asset be converted with little loss of value? Generally, the most liquid asset is the state's own IOUs, so the conversion of other liabilities is often to HPM. Banks hold some HPM so that they can meet demands for conversion, but it is access to deposit insurance as well as to the central bank that makes the bank's promise to convert secure. We can think of a pyramiding of liabilities on banks—IOUs issued by other institutions and households are convertible to bank liabilities (Bell 2001; Foley 1989).

These other entities then work out arrangements that make it more likely that they can meet demands for conversion, such as overdraft facilities. Everything is then pyramided on the state's IOUs—we can think of that as a leveraging of HPM (Wray 1998).

(p. 148) All promises are not equally valid, however—risk of default varies on the IOUs. There is another fundamental principle of debts: one cannot pay one's debt using one's own IOUs. As discussed, when the sovereign is presented with its own IOU, it promises to exchange that IOU for another of its IOUs, or it allows the presenter to "redeem" it in payment of taxes. To be sure, the state can retire its liabilities—by running a budget surplus—but it does not have to pay them down by using another's IOU. All other entities must provide a second-party or third-party IOU to retire debt. For most purposes, it will be the liability of a bank that is used to make payments on one's debt.

Default risk on a bank's IOUs is small (and nonexistent in the case of government-guaranteed deposits); hence bank liabilities are widely accepted. Banks specialize in underwriting (assessing creditworthiness of) "borrowers"—those whose IOUs they hold. Not only do banks intermediate between government and its taxpayers but they also intermediate by accepting borrowers' IOUs and issuing their own IOUs. The IOUs they hold generally have higher default risk (except in the case of government debt) and are less liquid than the IOUs they issue. For this service, they earn profits, in large part determined by their ability to charge a higher interest rate on the IOUs they hold than the rate they must pay on their own. Again, the image of a debt pyramid is useful—those lower in the pyramid use the IOUs issued by entities higher in the pyramid to make payments and to retire debt.

This leads us to the interest rate, which as Keynes said is a reward for parting with liquidity. Since government-issued currency (cash) is the most liquid asset, it does not have to pay interest; bank demand deposits can be just as liquid and for many purposes are even more convenient, so they do not necessarily need to pay interest (in some cases banks charge fees for checking accounts; in others they do pay positive interest—this has to do with regulation and competition, issues we will not address). Other IOUs that are less liquid must pay interest to induce wealth-owners to hold them. In addition, interest compensates for default risk; this is in addition to the compensation for illiquidity of the asset. In chapter 17 of *The General Theory* Keynes ([1936] 1964) develops a theory of asset pricing based on a preference for liquidity in a world in which the future is uncertain. Asset prices adjust (causing yields to change) until all of them are held. "Money," the most liquid of these, sets the standard because it best satisfies the preference for liquidity. He goes on to explain how the desire for liquidity constrains effective demand and results in unemployment—topics beyond our scope (Keynes [1936] 1964; Davidson 1978).

We return to Goodhart's (2008) argument that orthodoxy has no room for money because there is no default risk. For Keynes, neoclassical economics (what he called "classical" economics) lacks a plausible theory of money holding precisely because there is no fundamental uncertainty, which is necessary to explain why liquidity has value. The two arguments are related and explain why financial institutions are important: they issue liquid IOUs with little (or no) default risk. This is the reason why their IOUs are frequently classified as "money" while the money IOUs of others are not—in apparent contradistinction to Minsky's (1986, 228) claim that "everyone can create money"; but he goes on: "the problem is to get it accepted" (228).

(p. 149) Banks are special in another way: almost all the assets they hold are purchased by issuing IOUs. Typically, a bank has 5–8 percent equity against its assets, meaning that its liabilities are equal to 92–95 percent of the value of its assets. This is an extremely high leverage ratio (its asset-to-capital ratio is from 12.5 to 20). As Minsky (1986) put it, they finance their positions in assets by issuing debt. Without guarantees of access to the central bank (to make their liabilities more liquid) and to government insurance (to reduce default risk on their liabilities), banks could not operate with such leverage ratios.

(Note also that banks are strange firms: they do not produce commodities and mostly do not utilize commodities in their "production"—they are not a case of Sraffa's "production of commodities by means of commodities." They are true "intermediaries," making profits not out of commodity production but rather by providing the liquid "money" needed for commodity production—creating their IOUs to purchase the IOUs of others, and reaping profits from the interest rate differential. It is this "alchemy" that leads to so much suspicion about the legitimacy of banks that seem to create "money" out of "thin air." To be sure, it is also the potential source of financial crisis—another topic beyond our scope but one whose importance was highlighted with the financial crisis that began in 2007!)

Finally, IOUs are not just held or presented for payment (of your own liability). They are also to varying degrees

transferable. For example, your neighbor might transfer your sugar IOU—perhaps in payment of some sugar debt—to another neighbor, who could present it to you with a demand for sugar. Transferability of your IOU is limited to those who know you well and who trust that you are good for the sugar. Since "money" is commonly associated with transferability of a debt among third parties, it is not surprising that government currency as well as bank liabilities are most often included in definitions of money. The liabilities of nonfinancial corporations or households are not usually called money because they do not circulate readily among third parties. (Securitization of home mortgage loans—as well as various kinds of insurance plus certified credit ratings—made them transferable to some degree.) What the layperson usually identifies as money is usually even narrower, something that can be used in a market as a medium of exchange—to buy a commodity. And that, of course, must be a monetary IOU that is highly acceptable—a government IOU, a bank IOU, or an IOU closely backed by a bank (such as your credit card debt).

4. Conclusion

This brings us back to Clower's dictum: money buys goods and goods buy money, but goods do not buy goods. That surprisingly insightful statement has led us on a long path through theory, institutions, and even a bit of monetary history and law. To be sure, we just barely scraped the surface of many of the issues of what turns out to be a complex and contentious topic. Indeed, "money" is arguably the most difficult and controversial subject in macroeconomics—what is money, what role does it play, and what should (p. 150) policy do about it are the questions that have busied most macroeconomists from the very beginning. The three basic propositions examined in this chapter have allowed us to construct the beginnings of answers to these questions.

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[–] Abstract and Keywords

Four approaches to money in the macroeconomy have appropriated the name of Keynes or the label "post-Keynesian": liquidity preference, circuit theory, and the two forms of endogenous money, structuralism and accommodationism. Despite the common appeal to Keynes, there is little apparent common ground between these approaches. Horizontalists reject the very idea of the demand for money to hold, which is at the core of liquidity preference; circuitists reject uncertainty as the source of the existence of money, one of Keynes's strongest assertions; structuralists reject an unconstrained supply of money, the core of the horizontalist approach. There is even disagreement about the definition of money. This chapter conducts a ground-clearing exercise in order to establish where we all agree: that bank loans create deposits. This exercise is followed by an argument that, contrary to the belief of some horizontalists, liquidity preference is not incompatible with loan-to-deposit causality. The chapter then rehearses the different concepts of money held by circuitists and liquidity preference theorists.

Keywords: Post-Keynesian economics, economic theory, loans, deposit, money, credit, liquidity preference, circuit theory, structuralism, accommodationism

Introduction

Four approaches to money in the macroeconomy have appropriated the name of Keynes or the label "post-Keynesian": liquidity preference, circuit theory, and the two forms of endogenous money, structuralism and accommodationism. These approaches share a principle of fundamental importance: money is mainly created when banks make loans. And yet there are also important differences, and it is unfortunate that more has not been done to try to establish relationships between these approaches (see, however, Jespersen 2009). In terms of the characterization of responses to different theories (Chick 1997), there is a lot of rejection about: horizontalists reject the very idea of the demand for money to hold (Moore 1998a, 1998b; Lavoie 2006), which is at the core of liquidity preference; circuitists reject uncertainty as the source of the existence of money (Seccareccia 1996)—arguably one of Keynes's strongest conclusions—and play down the role of money as an asset (Graziani 1996; Gnos 2006; Realfonzo 2006); structuralists reject an unconstrained supply of money, the core of the horizontalist approach. Exceptions to the rule of rejection are Fontana (2000, 2003, 2009) and Palley (1991, 1996, 1998). The spirit in which we propose to analyze these different approaches here is to pursue their agenda in looking for further potential for common ground, as well as clarifying remaining differences in such a way as to foster further debate along constructive lines.

We begin by exploring the shared view that loans create deposits. But we argue, further, that the common ground is potentially much larger than is commonly apparent. We argue that, contrary to common belief of some horizontalists in particular, liquidity preference *is* compatible with money being created by bank loans. But there

are differences, for example in understandings of the concept of money itself. The third section (p. 153) therefore concerns the different concepts of money held by circuitists and liquidity preference theorists. We limit the scope of the analysis, however, by not dealing directly with issues relating to the origins of money, on which there is a significant post-Keynesian literature (see, for example, Heinsohn and Steiger 2007; Ingham 2004; Wray 1990).

While we hope to convey the extent of common ground, we hope also to clarify the differences that remain. These differences are deeper than mere theory: different ontologies and methodologies, and even a difference of view as to what constitutes theory, are at issue. But such considerations go beyond the scope of this chapter. Our approach here is to refer back to Keynes as a common reference point for post-Keynesian monetary theory, but also to take account of changes in the system of money and banking since his time.

Loans Create Deposits

Three of the four approaches to money listed above, circuit theory and the two forms of endogenous money theory, are explicitly based on the understanding that bank lending creates deposits. This understanding is the opposite of Cannan's famous "cloakroom rule" (1921), whereby banks could only increase their lending if their deposits increased, thus making banks no more than financial intermediaries. The argument that displaced the cloakroom rule was, ironically in the light of later developments, the money multiplier. The classic sources always cited are Crick (1927) and C. A. Phillips (1920), though Laidler (1999, 89) shows that the money multiplier has a much longer history: he cites works from 1829 and 1877 (see also Humphrey 1987; Chick 2005). The money multiplier showed that banks taken collectively could indeed lend well beyond the level of their deposits.[1] This was Keynes's point too: banks "moving forward in step" are not limited in their expansion (1930, I:23).

There can be little doubt, for anyone reading *A Treatise on Money* (1930), that Keynes fully accepted the causality from loans to deposits. The neoclassical counterrevolution managed to subvert this understanding in two ways. First, if banks are discussed at all, it is as individual firms, not in the macroeconomic context; there, money is portrayed as the creature of the government, either directly (as monopoly suppliers of cash) or through the money multiplier, where banks are constrained by reserves supplied by the authorities. Second, the money multiplier is portrayed as being set in motion by an injection of new cash presented by individuals for deposit; thus new deposits create the capacity for new lending. But from a macroeconomic point of view, the sources of new cash injections for the banking system as a whole must be (1) a new supply from the authorities (or, equivalently, a reduction in the reserve requirement), (2) a surplus on the balance of payments, or (3) a shift in the public's preferred cash-to-deposit ratio. Insofar as the neoclassical story relates to the banks as a system, it appears to rely on the last of these.

The deposits-create-loans story might have been reasonable in an early stage of banking development, when cash was widely held outside the banking system and the (p. 154) banking habit was being established: the preferred cash-deposit ratio was systematically falling as confidence in banks grew. Against this background, someone presenting cash for deposit may well represent a permanent shift to the banks of part of the pool of cash. Today a deposit of cash is more likely to represent a transfer of deposits with a brief interlude of cash-holding. A change in the aggregate cash-deposit ratio is likely to be small and probably transitory or seasonal, rather than a significant or reliable base for bank expansion. This leaves the other two sources of cash acquisition as the appropriate exogenous instigators of bank credit expansion. But even more important than this shift of the main source of exogenous cash are the various mechanisms that the banks have developed to obtain cash at their own behest.

This conception of money as policy-determined and banking as "passing on" deposits has returned to the mainstream and has been foisted onto textbook-Keynesian macroeconomics. It has come to the fore again recently in policy discussion with respect to the present policy of "quantitative easing" (Bank of England 2009). Endogenous money theorists have worked hard to reestablish the earlier consensus.[2] In attempting to make connections between the different forms of post-Keynesian monetary theories, we should pay particular attention to the difference between the reaction against the neoclassical conceptions that appear in textbooks and what is compatible with Keynes's own formulations.

It has been suggested by some endogenous-money theorists (e.g., Kaldor 1982) that liquidity preference theory is the odd one out, being incompatible with endogenous money. But we will argue, not only that endogenous money ("loans create deposits") is a common feature of all four post-Keynesian approaches to money, including liquidity

preference theory, but also that liquidity preference theory has the potential to be a common feature of all these approaches. The common ground is potentially large.

Liquidity Preference and Endogenous Bank Money

One of the distinctive characteristics of horizontalism is an accommodationist analysis of the money supply that contrasts with an interpretation of Keynes's *General Theory* (Keynes 1936) as an analysis of the demand for money relative to an exogenous supply. Indeed this distancing from Keynes is evident from an absence of reference to Keynes's work (see e.g., Lavoie 2006). We will argue rather that, far from treating the money supply in *The General Theory* as purely policy-driven and unexplained (the widely believed verticalist interpretation),[3] Keynes's position can be understood to be more complex and subtle.

On the face of it, the theory of the monetary circuit and liquidity preference also could not be farther apart. The former concerns the finance of working capital by bank credit. The expenditure of the resulting money (which equals the wage bill) on consumption returns most of the money to firms, which repay the banks. Insofar as workers save, they (p. 155) buy securities; the proceeds of those securities allow firms to complete their repayment. There is a more elaborate investment circuit, constituting initial finance of the production of capital goods and later funding of the additions to the capital stock, but the basic principle is the same: the circuit is closed when firms repay the banks. Since some horizontalist authors cite working capital as the prime source of a demand for credit, an alliance between circuit theory and horizontalism has been forged (Rochon and Vernengo 2001).

The proponents of both horizontalism and circuit theory take the side of Dennis Robertson, who chided Keynes for concentrating so much on the incentives to hold money that he nearly forgot that the point of money was to spend it (Robertson 1940, 12). Liquidity preference of course does include money to spend: it is represented by transactions demand. It is true, however, that Keynes in *The General Theory* concentrated on the speculative demand, because transactions demand was already well understood, and because his purpose there was to create a new, liquidity theory of the rate of interest. There is little focus in *The General Theory* on the use of money and none on its creation and/or circulation as a by-product of the productive process. Even in the later work on the finance motive (1937a, 1937b; 1938; 1939) Keynes analyzes the role of cash accumulation prior to investment expenditure, not credit to finance production. It is thus ironic that circuitists have taken Keynes's (1933) characterization of what was to become *The General Theory*, a monetary theory of production, as the label for their own process.

Somewhere in the middle ground between circuit theory / accommodationism and liquidity preference we have the structuralist approach to endogenous money. Structuralists argue that, in a longer time frame (Arestis and Howells 1996; Fontana 2003), banks' willingness to supply credit is constantly shifting outward as, through innovation, they find ever easier and cheaper ways to release the constraints on their lending, especially the reserve constraint. Thus monetary policy may be effective for a time but is undermined by banks' capacity to circumvent regulation by innovation.

The Money Supply Process

Circuit theorists sometimes accuse post-Keynesians of not taking account of the whole of Keynes's monetary theory, concentrating narrowly on the monetary theory of *The General Theory* rather than on Keynes's monetary thought as a whole (e.g., Graziani 1996, 142). This point is well taken. Just as Keynes in *The General Theory* did not give much space to the transactions demand for money because it had been well developed by Marshall and was a commonplace of Cambridge economics, so did he not revisit the rich material on banking that we find in *A Treatise on Money*. It is this latter material that circuit theorists are intent on restoring.

Although it is true that banks hardly figure at all in *The General Theory*, the following statement, however widely accepted, could be regarded as an exaggeration: "As (p. 156) is well known Keynes in *The General Theory* explicitly assumed that the money supply was exogenously determined by the monetary authorities" (Moore 1996, 92). This interpretation is not supported unambiguously anywhere in *The General Theory*. On pages 245–47 there is a list of "givens" and dependent and independent variables in his theory: the money supply is not among them.

Indeed, "Our independent variables are, in the first instance, the propensity to consume, the schedule of the marginal efficiency of capital and the rate of interest, though… these are capable of further analysis" (245). Over the page he explores the interrelationships between these factors. "[T]he rate of interest depends partly on the state of liquidity preference… and partly on the quantity of money measured in terms of wage units. Thus we can sometimes regard our ultimate independent variables" as (1) the propensity to consume, liquidity preference, and long-term expectations, (2) the wage-unit as determined by bargaining "and (3) the quantity of money as determined by the action of the central bank." But Keynes is quite ambiguous in most of his statements about the money supply in *The General Theory*. Of the many relevant passages, only the one just cited can be read as supporting the conception that Moore (and many others) thought was the case, and it supports it only "sometimes." A few pages earlier (245), the *rate of interest* was chosen as one of the independent variables; this underlines the fact, emphasized by far too few commentators (Kregel 1976 being the pioneering exception), that there is more than one model in *The General Theory*, and that, between models, the categories independent/dependent or exogenous/endogenous are not fixed.[4]

Our point, however, is that even if Moore's interpretation had been systematically followed throughout *The General Theory* instead of only "sometimes," it is still possible to argue that money, even when exogenous to his theory and determined by the monetary authorities, is compatible with a banking system that creates deposits through its credit operations (see Dow 1997). A period opens with an inherited money stock. Now consider a "market" for credit, with the banks' willingness to supply being determined, inter alia, by the rate of interest on loans and a downward-sloping demand curve for loans against the same variable. Together these determine the volume of new credit.[5]

The new credit creates deposits. The amount of new money as it now impinges on the market for existing financial assets (the traditional liquidity preference, LP, space), is given. More precisely, it is *predetermined* in the credit market. It shifts the existing money supply curve, which is vertical in LP space, as the money supply is determined by bank interest rates (on loans and deposits); these are different from the rates that govern asset markets. The money supply is created by bank credit, according to endogenous-money theory, and yet the quantity of money, viewed from the asset market, is given.[6] If the banking part of the story is not explicitly part of the theory—if it is left out, as in *The General Theory*—the change in the money supply is exogenous in the proper sense of the term (Desai 1987): it is not explained in the model.

But not only is liquidity preference compatible with endogenous money theory (all four approaches agree that bank loans create deposits), liquidity preference can also be embedded in the analysis of credit creation itself. This is most clear in the structuralist approach, where the scope for banks actively to expand credit is emphasized (Dow 2006). **(p. 157)** In *The General Theory*, liquidity preference pertained to the portfolios of the nonbank public, but by 1937 he was explicitly referring to the liquidity preference of the banks as a factor in determining the rate of interest (Keynes 1937a, 220). Bibow (2000a) has a convincing (and empirically sound) argument for a given money supply based on bank behavior: that the banks in Keynes's time responded to changes in their expectations not so much by altering the size of their balance sheets as by changing the structure of their assets, moving out of advances (loans) into investments (securities) when pessimistic, for example. This is classic asset management or bank liquidity preference (see further Bibow 2006). But since then the concept of banks' liquidity preference has been extended to reflect changing conditions of banking (Dow and Dow 1988; Hawkins 2003, chap. 3). The banks may exercise liquidity preference in the disposition of their assets between loans and investments (which does not affect the volume of deposits) but also in deciding on the size of their balance sheets, which does affect deposits.

While horizontalists assume that banks accommodate all demands for credit from creditworthy borrowers, some circulationists acknowledge the issue of perceived credit risk as a cause of credit rationing (Realfonzo 2006). Yet the significance of uncertainty about risk assessment is not treated as central to credit provision. Keynes's (1936, 144) concept of lender's risk, built on by Minsky (1975), raises the issue of systematic changes in banks' perception of risk and thus their willingness to increase their exposure to it, either by expanding lending or by buying more securities. The notion of "creditworthiness," which is passive in horizontalist theory, thus has the potential to become active; similarly there is no reason why it should not enter more prominently into the analysis of the beginning of the circuit in the circuitist approach along with borrowers' assessment of their risks. Fontana (2009) has used the concept of uncertainty as a core concept in post-Keynesian economics in order to explore the scope for synthesis among the different approaches. Indeed he makes the important methodological point that,

if we take the general uncertainty of knowledge seriously, then any analysis is bound to be partial. He thus considers the different post-Keynesian approaches as focusing on different aspects of money and banking in a way that need not (and indeed should not) be mutually exclusive.

Monetary Policy

Having demonstrated that the loans-create-deposits story is not incompatible with a money supply curve that is vertical with respect to the bond rate, we now wish to show that monetary policy that targets either the money stock or the interest rate is also compatible with Keynes's story. If the monetary authorities do not favor the new quantity of money or the rate of interest that results from banks' credit operations, they can "mop up" the new money to the extent they wish, assuming that so doing would not conflict with their other objectives and that they have a sufficient portfolio to do the job; similarly, they can increase the quantity of money further. Thus we see that, provided the **(p. 158)** authorities have sufficient power to manipulate the market, they can ultimately determine the quantity of money, no matter what its original source. In 1930s Britain, however, monetary policy was centered on the rate of interest, using the open market to "make Bank Rate effective," that is, to bring market rates into line with the rate at which the Bank would discount. These open market operations change the quantity of money, and the quantity of bills outstanding, as a by-product.

As a result of the change in the money supply following banks' credit operations, "the" rate of interest (the one that governs liquidity preference) will change, ceteris paribus, or mutatis mutandis if the authorities also act in the open market. Naturally, if the rate in the money and securities markets changes, this will cause banks to reconsider their lending and deposit rates. The position of the supply-of-loans curve will shift next period, for, although it is not made explicit in Dow (1996, 1997), many articles on the theory of bank behavior have demonstrated the dependence of the profit-maximizing lending rate on the bond rate (e.g., Monti 1972). Finding equilibrium in this iterative process might be tricky; the process may not even converge. But for present purposes what matters is the compatibility of liquidity preference with both an interest rate policy and at least one version of endogenous money.

There would be no reason for horizontalists to object to this analysis provided only that the supply-of-loans curve is flat (see also n. 6). However, this account differs in giving credence to the demand to hold money once it is created. This in no way challenges the proposition that all money created must be held somewhere in the system: indeed it is this property that allows banks to grant credit without worrying whether its by-product will be accepted.[7] But according to liquidity preference theorists, acceptance and demand are not the same thing (Goodhart 1989; Arestis and Howells, 1996). To some horizontalists (Moore 1988a; Lavoie 2006), they are. Moore (2001)[8] has objected that to allow a demand for money is to set up an iterative process between the credit "market" and liquidity preference. Indeed this is so; this is the tricky problem just referred to. But we argue that intractability is not sufficient reason for rejecting something relevant. He further rejected a demand for money or the idea of portfolio adjustments (liquidity preference) on the grounds that they were derived from and imply exogenous money. This objection confuses a necessary condition for a theory's validity with the circumstances (or believed circumstances) of a theory's genesis. The above demonstration that money creation by banks is compatible with liquidity preference theory should show this objection to have no substance.

There is one problem with the merging of a credit-driven money supply and liquidity preference that to our knowledge has not been addressed in any literature on liquidity preference: any major change of either the quantity of money or the quantity of other assets will shift not only the money supply curve but also the liquidity preference curve. Speculative demand is a choice between comparatively capital-safe financial assets and financial assets that are not capital-safe ("money" and "bonds"). More or less the same division will serve for the liquidity needs on precautionary account, and only money is held for transactions purposes. Thus the liquidity preference diagram has a finite horizontal axis given by the total quantity of "money" and "bonds." Another "vertical" axis[9] could be drawn at the endpoint. The liquidity preference curve is fixed in that space as long as **(p. 159)** neither quantity changes very much or the quantities change only in exchange for one another. Thus liquidity preference is ideally suited to analyze open market operations by the authorities or by the banks, because bonds are exchanged for money and vice versa but the total changes little; in other cases, however, significant changes in the money stock or the quantity of "bonds" will lengthen or shorten the horizontal line and shift the liquidity preference curve with it, as well as changing the position of the money-supply curve as the dividing line

between money and bonds. In addition, the purpose for which the credit was given will affect the position of the liquidity preference curve. If the counterpart was an income-creating activity, transactions demand will increase, shifting the curve to the right, whereas it will be stable if the new money represents the monetization or demonetization of assets. For these reasons as well as the feedback loop between the "credit market" and liquidity preference, perhaps Keynes was wise to suppress the role of the banks!

What Is Money?

It is remarkable to feel the need to revisit the question of the nature and definition of money, but although all four groups of theorists agree on their vision of bank operations, and on the accounting relationships to which they give rise, they are not unified in their idea of money. There is a divergence between the circuit theorists and the rest that is likely to cause much confusion.

Circuit theory concentrates on the role of money in the industrial circulation. Its role as a store of value is underplayed.[10] For circulationists as for accommodationists there is no problem of the terms on which the economy is willing to hold the new money generated, because it stays in existence only for a single circuit. Time is packaged, analytically, into circuits that end with outstanding loans being repaid and the corresponding deposits extinguished. Thus there is either no money to hold at the end of the period, if the period is the same for all agents, or money is held only because there are overlapping circuits.

In the previous section we distinguished between money (mainly deposits) and credit (mainly bank advances), terminology that we believe to be common to all approaches except that of the circuitists. All four approaches accept not only that loans create deposits but also the fundamentals of bank accounting: that advances and investments are assets and deposits are liabilities; but they diverge in what to identify as money.

Money and Credit

Deposits are today universally included in definitions of money compiled by central banks and statistical offices; indeed in most countries they constitute the bulk of the assets included, supplemented by a small amount of high-powered money issued by the authorities and also originating in credit. Endogenous money and liquidity preference **(p. 160)** theorists accept this definition. But circuitists refer to "credit-money"; by so doing they create two confusions: (1) there is a similar term, "credit money" (no hyphen), that is well established in the literature and (2) the distinction between the two sides of banks' balance sheets is blurred.

The term "credit money" has long been used to mean money that is the counterpart of a debt. There is no hyphen in this term because it is composed of an adjective and a noun.[11] "Credit" (the adjective) indicates the type of money: modern bank and central-bank money in contrast to full-bodied coin. With a hyphen, "credit-money" becomes a compound noun: credit or advances are conflated with deposits, and a particular type of money is confused with a method of generating money.[12] The two sides of banks' balance sheets, and the entirely different social significance of a bilateral credit and a generally acceptable asset that can circulate as well as cancel debts, are impossible to see clearly.

Indeed, some circuitists would omit the qualifier "modern," asserting that "money" has always been credit money, and that an economy using commodity money is indistinguishable from a barter economy (Graziani 1990; Realfonzo 1998). This seems unnecessarily dualist, even essentialist. The rhetorical device they use to fix this idea is to quote Keynes to the effect that the Indian rupee is "a note printed on silver" (Graziani 1990, 10; Graziani 1996, 145; Realfonzo 1998, 44). Although it is true that Keynes was no metalist, what he actually said was "*In existing conditions* the rupee, *being a token coin*, is virtually a note printed on silver" (Keynes 1913, 26, emphasis added). This statement hardly endorses the view that money was always credit; indeed it poses the contrast between the rupee "in existing conditions" with the rupee as full-bodied coin.

Functions of Money

The conflation of bank credit with deposits follows from a desire to concentrate on the medium-of-exchange or purchasing-power attribute and to play down the store-of-value or wealth function, with which circuitists associate

some theoretical pitfalls (see Graziani 1996). These functions are seen as opposites, rather than, as in *The General Theory* and in most monetary literature down the years, as complements (another dualism?). In an overdraft system,[13] both credit and deposits are purchasing power: payments to workers may be made by credit, and workers pay with deposits; the transfer of deposits as goods are sold allows firms to pay back the banks; the deposits are extinguished.[14] Since bank credit and deposits play the same role, they can be considered as one and the same: credit-money.

This conflation blurs the distinction between media of exchange and means of payment (Palley 1996 uses the term "means of settlement" for the latter, which is less ambiguous). The former group is much broader and includes not only bank credit but the now nearly ubiquitous credit card as well as specialized credit such as store cards and trade credit. Credit, even bank credit, is not a means of payment, defined as anything whose transfer signals the end of the transaction and which therefore extinguishes any need for (p. 161) further contact between the parties (Shackle 1971; cf. Hilferding [1910] 1981). Money does serve as a medium of exchange but is not distinguished thereby. It is uniquely allied to the concept of means of payment. In circuit theory, as in life, firms need to pay the banks back, and they pay with deposits. So the distinction between credit, a medium of exchange, and money, a means of payment, is implicitly acknowledged in circuit theory despite an ambiguous terminology.

It would seem that the other three Keynes-inspired approaches to money accept both the distinction between money and credit and the dual functions of money—to spend and to hold—though for horizontalists, holding money is not a subject for decision.[15] Keynes certainly accepted both roles for money, as remarked earlier. A property of money important even to the circuitists' own case unifies the disparate functions of money: general acceptability. It is the general acceptability of bank deposits, gained through years of the evolutionary development of banking, that allows banks to guarantee to pay their clients' bills, in effect substituting their name for that of their clients, without anyone refusing to accept either checks on empty accounts, honored by the banks under overdraft agreements, or the deposits that result when these checks clear. This is the central contribution of banking: to convert a bilateral contract between their clients and themselves (credit) into an asset (a deposit) that is acceptable to a wide constituency. And yet this conversion, this creation of money by credit issued by a select group of institutions, is not on the mind of any of the parties to it: neither the bank manager, nor the client, nor the acceptor of the client's check. Bank money is indeed a "chance change."[16] Perhaps it is the supply of money rather than the demand for money that should be regarded as nonvolitional.

Conclusion

We can see from the above arguments that there is no necessary incompatibility between circuit theory and liquidity preference, provided only that the former can accept that if positive holdings of deposits exist for longer than the duration of the circuit, and in real life they surely do, there should be some theory about them, of which liquidity preference is one. Circuit theory and liquidity preference can then be seen as simply concerned with different phases of the monetary process.

Let us suggest some "new combinations" that have come out of this exploration:

1. Endogenous creation of money by banks is compatible with liquidity preference, even with the money stock being determined by the authorities, whether for its own sake or in pursuit of some interest rate policy. If the latter, a link needs to be made between the short rate, which is the subject of policy, and the long rate, which is determined by liquidity preference (Chick and Dow 2002). In Keynes's time the yield curve may have been quite stable; it is not so now. A further link needs to be forged between these two market rates and the deposit and lending rates.

(p. 162) **2.** A circuit theory of the finance of production is compatible with liquidity preference, provided that it is recognized that production does not start from a clean slate and money is allowed to remain in existence at the end of a particular period of finance.

3. Accommodationism could be compatible with liquidity preference, provided only that endogenously created money is allowed to play a role in a consciously managed portfolio. The feedback relations between the securities markets and the banks would need to be worked out

4. Horizontalism and structuralism can be made compatible when their different time horizons are respected. Structuralism suggests that monetary management is game-theoretic, with the banks finding new and more

profitable ways to release their lending constraints on a semicontinuous basis and the authorities, if they have any pretensions to controlling bank credit, having to find new constraints. This conception is consistent with observation. The trick for liquidity preference theory (indeed for any theory) is to judge when bank behavior or the balance between the banks and the authorities has changed so much that liquidity preference theory is no longer appropriate. The use of repurchase agreements rather than open market operations alters the story by loosening the connection between the official rate and banks' deposit and loan rates, and relies for its transmission on the liquidity preference of all holders of securities, including the banks (Chick and Dow, 2002, 602–5). The comparative diminution of central bank power certainly does: we do not think Keynes would have made the apparently flat statement that we can "sometimes regard" as among our independent variables "the quantity of money as determined by the central bank" (Keynes 1936, 247), which has got his theory into so much trouble, if he were writing *The General Theory* now. To say that the money supply today is determined through the interplay between the banks and the central bank, workers and consumers, is not to destroy liquidity preference, but rather to enrich it. It is necessary, however, to back up liquidity preference with the loans-create-deposits story.

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Notes:

(1.) The demonstration of this point may be one of the first instances of truly macroeconomic thinking.

(2.) The return to "Cannan causality" (Cannan 1921) is remarkable. Its opposite, the loans-create-deposits view, was a textbook commonplace when one of us was a student in the late 1950s and early 1960s. It was eclipsed by, say, the mid-1970s (partly because of the rise of monetarism at that time?), after a good forty years of being the consensus: Ellis (1934, 394) refers to the fact that the loans-to-deposits causality was well understood among Anglo-Saxon economists in the late 1920s to early 1930s, while German economists lagged a bit behind, though see Schumpeter (1954, 1113–17). (See also Chick 2005.)

(3.) Bibow (2000b, 817 n. 16 and references cited there) maintains that Moore quite misunderstands Keynes on this point.

(4.) This mutability characterizes open-system theorizing. To those accustomed to Cartesian fixed categories (Dow 1988, 1996) and closed-system models, it appears as inconsistency.

(5.) Dow's (1997) account makes no provision for loans being paid back. Interpret the credit demand and supply curves as net of repayments.

(6.) Although supply and demand played an equal part in the above account, horizontalists could be accommodated by making the supply-of-loans curve flat.

(7.) Keynes (1936, 174) writes that "the amount of hoarding must be equal to the quantity of money…; and the quantity of money is not determined by the public. All that the propensity of the public towards hoarding can achieve is to determine the rate of interest at which the aggregate desire to hoard becomes equal to the available cash." To say that M is not determined by the public does not imply that it is determined by the authorities. This passage only says that whatever the amount of money supplied (by the authorities or by the banks), it must be held somewhere in the system unless used to extinguish a loan. Only the terms (i.e., the rate of interest) are at issue. This passage is compatible with the loans-create-deposits story.

(8.) Oral communication, Conference, "Monetary Theory and Policy in a World with Endogenous Money," Free University of Berlin, 2001.

(9.) Tobin (1958) has pointed out that since the value of securities varies with the rate of interest, this "axis" will not be vertical; indeed it is asymptotic to the horizontal axis. So the length of the horizontal axis and the position of the second "vertical" axis are really only defined at or near the existing valuation of securities, i.e., at the current rate of interest.

(10.) Recently, some of the Italian circuitists have allowed for "cash reserves" to be held during the circuit, and even from one circuit to the next (e.g., Realfonzo 2006).

(11.) Not since Davidson's invention of "Post Keynesian" has there been this much fuss about a hyphen.

(12.) Schmitt (1966) goes even further than other circuitists: he does not accept that deposits are money; they are a form of wealth. For him, money only exists in the instant that a payment is made. See also Cencini (1995).

(13.) The sequence of events in a loan, as opposed to an overdraft, system is slightly different, though the final effect is the same.

(14.) Moore has also proposed a rapid extinction of deposits as a way of fending off portfolio adjustments to changes in the volume of deposits (i.e., liquidity preference). The mechanism is similar to that of circuit theory: all firms have overdrafts, so purchases from firms (consumption), extinguish deposits. In challenging Moore, Howells (2006) also explores the institution-specificity of such arguments, noting the relevance of the increasing proportion of unsecured household debt.

(15.) Hicks (1967) similarly maintained that the transactions demand from money was not voluntary. For the methodological consequences of dealing with the transactions demand under uncertainty, see Chick (1990).

(16.) For Keynes (1936, 196–97), "it is by playing on the speculative-motive that monetary management (or, in the absence of management, chance changes in the quantity of money) is brought to bear on the economic system." Here it is clear that the change in M can be brought about either by policy or by "chance changes"; since the only other creators of money in a closed system are the banks, they must be responsible for "chance changes."

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The Oxford Handbook of Post-Keynesian Economics, Volume 1: Theory and Origins
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Abstract and Keywords

It is shown that New Keynesian monetary theory is a scientific illusion because it rests on moneyless Walrasian general equilibrium microfoundations. Walrasian general equilibrium models require a Walrasian or an Arrow-Debreu auction, but this auction is a substitute for money and empties the model of all the issues of interest to regulators and central bankers. The New Keynesian model perpetuates Patinkin's "invalid classical dichotomy" and is incapable of providing any guidance on the analysis of interest rate rules or inflation targeting. In its cashless limit, liquidity, inflation, and nominal interest rate rules cannot be defined in the New Keynesian model.

Keywords: Walrasian-Arrow-Debreu auction, consensus model, Walrasian general equilibrium microfoundations, cashless limit

1. Introduction

Until very recently many monetary theorists endorsed the scientific approach to monetary policy pioneered by Clarida, Galí, and Gertler (1999), and this approach was extended by Woodford (2003) and reasserted by Galí and Gertler (2007) and Galí (2008). Furthermore, Goodfriend (2007) outlined how the "consensus" model of monetary policy based on this scientific approach had received global acceptance.

Despite this consensus, the global financial crisis focused attention on the state of contemporary monetary theory by raising questions about the theory that justified current policies. Buiter (2008) and Goodhart (2008) are examples of economists who make some telling criticisms. Buiter (2008, 31 n. 9) notes that macroeconomists went into the current crisis singularly unprepared, as their models could not ask questions about liquidity, let alone answer them, while Goodhart (2008, 14 n. 11) wonders how central bankers got suckered into believing in the "consensus model" of monetary policy.[1] These criticisms are in stark contrast to the earlier glowing endorsement of the "consensus" model.

In this chapter I argue that the New Keynesian version of the "consensus" model is indeed a scientific illusion based on flawed microeconomic foundations and perpetuates a fatal flaw in the approach to monetary theory that has dogged the profession for the last seventy years, if not longer. Furthermore, the arguments apply, mutatis mutandis, to all applications of quantitative dynamic stochastic general equilibrium (DSGE) models based on Walrasian general equilibrium microfoundations.[2]

The embrace of microfoundations by contemporary monetary theorists amounts to the de facto embrace of Walrasian or Fisherian general equilibrium theory as "the" (p. 168) method of economic theory to the exclusion of other approaches. Interestingly, Solow (1986) warned about confusing the need for microfoundations with the adoption of Walrasian general equilibrium microfoundations. What happened to the Marshallian microfoundations employed by Keynes? In any event, the embrace of Walrasian general equilibrium microfoundations has had devastating consequences for monetary theory. The reason for this lies with an often tacit and unstated assumption that is required to employ the Walrasian general equilibrium model. This assumption is the Walrasian, Arrow-Debreu, or time-0 auction that underpins all forms of Walrasian general equilibrium theory.[3]

The consequences of this auction were recognized immediately by Frank Hahn (1953; 1965), who repeatedly reinforced the message in Hahn (1973a; 1973b and 1982), as did Arrow in Arrow and Hahn (1971). Essentially, models based on the Walrasian or Arrow-Debreu auction have no role for money, credit, liquidity, banks, or a central bank. Money or credit has no role because the Walrasian auction reduces the model to perfect barter and the Arrow-Debreu extension to a world of complete markets, and Arrow securities eliminate uncertainty. Under a Walrasian auction all commodities are equally liquid, and the concept of liquidity as the conversion of an asset into money without loss is not defined—see Lucas (1984) and Buiter (2008, 25–33). Consequently, and this is often overlooked, Walrasian general equilibrium models therefore have nothing to say about theories of the price level or inflation let alone provide the foundations for a theory of monetary policy. Yet this is precisely what we are expected to believe by New

Keynesian monetary theorists and some exponents of the Walrasian general equilibrium analysis of financial crises.[4]

To elaborate on what Goodhart (2008) has described as the continuing muddle in monetary theory, this chapter examines the New Keynesian framework for the analysis of monetary policy presented by Jordi Galí (2008). It is shown that the New Keynesian framework is a recasting of the old classical dichotomy in new clothes and perpetuates all the logical and conceptual muddles associated with attempts to integrate money and Walrasian general equilibrium theory—an impossible task. Although general equilibrium theory based on Walrasian microeconomic foundations is perceived by many to be "the" method of contemporary monetary theory because it provides rigorous scientific foundations for numerical DSGE models, these models are empty of anything of interest to monetary theorists, bankers, regulators, and central bankers.

The remainder of the chapter proceeds as follows. Section 2 briefly outlines the history of the logical and conceptual muddles thrown up by attempts to enforce a role for money in models where no money is required. Section 3 outlines the New Keynesian approach to monetary theory. Section 4 exposes the scientific illusion of New Keynesian monetary theory and policy by revealing its logical and conceptual flaws generated by earlier attempts to enforce a role for money in Walrasian general equilibrium models where it is not required. Section 5 briefly reviews the "approximation theorem" defense of moneyless models as a foundation for a theory of monetary policy. Section 6 concludes.

(p. 169) 2. Money and Walrasian General Equilibrium Theory

The fundamental incompatibility between monetary and Walrasian general equilibrium theory was well stated by Hahn (1982, 1) and Arrow and Hahn (1971, 356–77), who stress the importance of *money contracts* for the foundations of monetary theory. Essentially what Hahn and Arrow and Hahn were telling us is that under a Walrasian or Arrow-Debreu auction there is no role for any of the functions of money. That auction effectively replaces all the functions of money, credit, and banks in a world of *perfect barter*. The usual real-world frictions that accompany barter, such as the double-coincidence of wants, or asymmetries of information or externalities and bankruptcies that are of interest to regulators and central bankers in monetary economies cannot arise under a Walrasian or Arrow-Debreu auction. As Laidler (1990) explained, money and the Walrasian or Arrow-Debreu auction are substitutes, not complements!

Instead, under such auctions, not only can anything in a consumption bundle be traded directly today, but consumption goods (if there is more than one) can be traded for consumption goods in the future. Such trades obviously cannot be executed in reality but are permitted in the model under the Walrasian and Arrow-Debreu auctions, which are isomorphic with the Fisherian perfect market for commodity loans, that is, how much jam can be given up today in exchange for a unit of jam at a future date—see Samuelson (1967). There is no role for money, credit, or banks in DSGE models built on Walrasian microfoundations, and failure to recognize this simple fact accounts for almost all the confusion that has characterized attempts to introduce money into Walrasian general equilibrium models at least since Patinkin (1965), and probably earlier.

The most famous attempt to square this circle was indeed Patinkin's introduction of money into the utility function as a means of integrating monetary and value theory (for value theory read Walrasian general equilibrium theory). Although many contemporary monetary theorists still follow Patinkin's lead, it is now generally understood that, under a Walrasian auction, it is not possible to give money utility that is distinguishable from the utility of a consumption good. But in reality money has utility because it gives access to trades, production, and security that would not be available without it. By contrast, under a Walrasian or Arrow-Debreu auction, inserting money in the utility function cannot be justified unless money can be consumed. But that rather defeats the purpose of monetary theory.

Clower (1967) recognized some aspects of this shortcoming to Patinkin's analysis of "money-in-the-utility-function" and proposed his famous aphorism that: "money buys goods and goods buy money but goods do not buy goods." This is obviously true in the real world but now equally obviously not true under a Walrasian auction that produces a world of perfect barter. Consequently, Clower's proposal—to impose a cash-in-advance (CIA) constraint—merely compounded the confusion by converting money into a (p. 170) friction in Walrasian general equilibrium models. This happens because imposing a CIA constraint on a model with a Walrasian or Arrow-Debreu auction imposes an additional constraint on agents that is not required under those auctions and thereby converts money into a welfare-reducing friction. But as everyone knows, money is an invention that overcomes frictions. As Clower (1984, 275) later realized, imposing a CIA constraint was contra common sense and two hundred years of conventional wisdom. Unfortunately, by then the horse had bolted and the idea of a CIA had been blessed by Lucas (1984) and adopted by the profession.

With hindsight this was obviously the fundamental mistake that explains much of the muddle that describes contemporary monetary theory. Macroeconomics as a discipline based on Walrasian general equilibrium theory in its DSGE reincarnation has largely retreated to the logically secure cocoon offered by real business cycle theory—a moneyless model. In addition, by embracing Walrasian general equilibrium foundations, macroeconomics and monetary theory has abandoned its raison d'être—recognition that aggregate behavior cannot be predicted or understood solely by the study of microeconomic behavior. Kirman (1989) explained how aggregate Walrasian analysis raised questions about the uniqueness of equilibrium, and later, Kirman (1992) noted that, although the representative agent approach circumvents these questions, it is unable to deal with issues of aggregation that are central to macroeconomics. The representative agent analysis based on Walrasian general equilibrium foundations is incapable of dealing with asymmetries in information, externalities, or any of the paradoxes thrown up by aggregate behavior—such as thrift

and liquidity. The consequence is that monetary and financial economics has become trapped in a "looking glass" world where the English language is tortured until everyday words mean what the theorist wants them to mean.[5] The net result is a bad dose of cognitive dissonance where concepts and definitions that economists thought they understood take on new meanings.

A couple of prominent examples will illustrate the point. It has been long known that Walrasian general equilibrium theory has no use for the price level; it deals only in commodity relative rates of exchange.[6] The price level is of interest only to agents who use money and are concerned about the stability of its purchasing power. Under a Walrasian or Arrow-Debreu auction, since agents have no use for money, they have no use for the concept of a price level. Despite this there have been many attempts to debate theories of the price level in the context of Walrasian general equilibrium models. The most notorious was the recent fiscal theory of the price level.[7] The lesson that should have been learned from this debate was that Walrasian general equilibrium theory is incapable of generating any theory of the price level let alone adjudicating between a monetary and a fiscal theory.

Another example causing some degree of puzzlement is the practice of using so-called frictionless models as a basis for the analysis of monetary policy and the reference to "monetary frictions" in such models.[8] The wild duck has really taken a turn for the worse here! On inspection a frictionless model turns out to be nothing more than a "well-specified Walrasian general equilibrium model." But as we now know, a well-specified Walrasian general equilibrium model has no use for money and the price (p. 171) level, and following the widely held practice of adding a CIA constraint converts money into a friction.

Finally, and what is more perplexing, we are asked to believe that moneyless models can provide a sound theoretical foundation for a theory of monetary policy or can approximate such a theory in the guise of a calibrated (empirical?) stochastic general equilibrium model.[9] But in its moneyless state the New Keynesian model is a real business cycle model that has nothing to say about monetary policy. Using the model with a CIA constraint or equation of exchange attached creates "monetary frictions" and is contra common sense (not to mention logic). How it is possible to conduct standard welfare analysis with such a model is never explained. At best the ad hoc attachment of a monetary equation to a Walrasian general equilibrium system confuses the neutral money doctrine with a "money irrelevance" doctrine. At worst it introduces a role for monetary policy into a model where no such role is required.[10] Consequently the analysis is reduced to storytelling parading as rigorous theory. Unfortunately, it appears that this is what we are now expected to take on trust by exponents of the "science" of New Keynesian monetary policy.

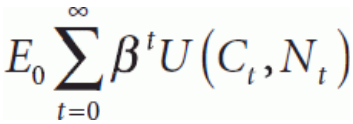
3. New Keynesian Walrasian Microfoundations for a Theory of Monetary Policy

Galí (2008, 1) introduces his book as an attempt to provide the reader with an overview of modern monetary theory from a New Keynesian perspective. The New Keynesian monetary framework provided by Galí has a core structure that corresponds to a real business cycle model on which a number of Keynesian elements are superimposed. The key New Keynesian elements are the introduction of nominal rigidities (based on the introduction of monopolistic competition), as this is seen as sufficient to overcome the limitations of the RBC model that generally predicts neutrality of monetary policy.[11] Keynesians (old and New) are keen to demonstrate what they call the short-run nonneutrality of money. They all accept the long-run neutrality of money as the economy (model?) adjusts to its (unique?) natural equilibrium. But this way of proceeding to construct a theory of monetary policy, be it New Keynesian or anything else, is bound to fail because it commits all of the conceptual mistakes made by Patinkin (1965), plus some. Before we consider those in detail consider how Galí moves from what he calls classical monetary theory to his New Keynesian framework.

Classical monetary theory is said to apply to a world of perfect competition and fully flexible prices in all markets. Although this model is known to generate counterfactual predictions, it is nevertheless treated by Galí as a useful "benchmark to be applied when some of its strong assumptions are relaxed." It is never explained how a model that makes (p. 172) "counterfactual predictions" could be used as benchmark. Nevertheless, following the practice of the recent literature, Galí begins by restricting the role of money in his competitive model of classical monetary theory to that of the numeraire or unit of account only.[12] But the only model where such assumptions are possible is the Walrasian general equilibrium system or its variants, where the Walrasian auction provides a shortcut around the need to model money, any institutional detail, or market behavior.

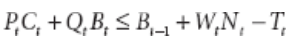
The representative household is modeled in contemporary fashion with the household maximizing an objective function (1.8.1)

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t)$$



subject to a budget constraint (1.8.2)

$$P_t C_t + Q_t B_t \leq B_{t-1} + W_t N_t - T_t$$



and a solvency or no bankruptcy constraint[13] (1.8.3)

$$\lim_{T\to\infty} E_t\{B_T\}, \forall_t.$$

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The variable C_t represents the quantity consumed of a single consumption good, P_t is said to be *the price* of the consumption good, W_t the *nominal wage*, and B_t represents the quantity of one-period, nominally riskless discount bonds purchased in period t and maturing in period $t + 1$. Each bond is said to pay *one unit of money* at maturity, and its price is Q_t. Finally, T_t is a lump-sum transfer (from or to the government) said to be *expressed in nominal terms*. Deriving the intertemporal optimizing conditions (Euler equation) and taking a linear approximation to the condition involving the bond price, consumption, and "prices" in periods t and $t + 1$, under a particular form of the utility function, Galí derives the condition (1.8.4)

$$c_t = E_t\{c_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - \rho).$$

$c_t = E_t\{c_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - \rho).$

Lower case variables correspond to the natural logs, that is, $c_t = \mathbf{log} C_t$ and, $\pi_t = \log P_{t+1} - \log P_t$, $\rho \equiv -\log \beta$, while $i_t \equiv -\log Q_t$ is described as the nominal rate of interest, Galí (2008, 18 n. 2).

Of course, with only the numeraire function of "money" the model does not contain any nominal values, so Galí is at best guilty of the loose use of language. At worst he is engaged in self-delusion. As there is no money as yet in the model represented by equations (1.8.1)–(1.8.3), there can be no nominal rate of interest, and as there are no nominal or money prices, inflation cannot be defined. What Galí is doing here is attributing real-world properties to his model when such properties are not defined in the model. What is going on here is reminiscent of what Fritz Machlup dubbed "the fallacy of misplaced concreteness." At worst, failure to interpret expression (1.8.1) correctly inevitably leads Galí into deeper conceptual muddles. (p. 173) The use of money and nominal values is, however, belatedly introduced when Galí suggests that it will sometimes be convenient to include an ad hoc money demand equation with a log-linear form: (1.8.5)

$$m_t - p_t = y_t - \eta i_t$$

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In expression (1.8.5), which can be interpreted as the equation of exchange, demand for money equation, or a variant of the CIA constraint, m_t is the log of the quantity of money, p_t is the log of the price level, y_t is the log of output, i_t is the nominal rate of interest, and η is said to be the nominal interest semielasticity of money demand. Clearly, nominal magnitudes can now be defined in the model, but that ability has come at the expense of the contradiction that money is a friction in the model.

Money is converted into a friction because appending (1.8.5) to the model described by expressions (1.8.1)–(1.8.3) imposes a CIA constraint on agents that is not required under the Walrasian auction that is *necessary* to write down equations (1.8.1)–(1.8.3). expression (1.8.5) means that agents in the model must use money to make exchanges, although no such action is required under the Walrasian auction. Thus, expression (1.8.5) is a concession to naive realism that is not required by Walrasian general equilibrium theory. Galí's New Keynesian model therefore embodies what Patinkin (1951; 1965) called the "invalid classical dichotomy"—the practice of attaching expression (1.8.5) to the otherwise real equations of a Walrasian general equilibrium system. By adopting Walrasian general equilibrium microfoundations in expressions (1.8.1) to (1.8.3) there is little alternative. Unfortunately this means that the degree of conceptual dissonance rises significantly when New Keynesian elements are added to this neoclassical (Walrasian) monetary model.

Galí objects to the neoclassical monetary model, not on the conceptual and logical grounds sketched above, but because it does not "predict" the short-run nonneutrality of money. The short-run nonneutrality of money is taken as gospel by New Keynesians, so Galí follows contemporary practice by introducing two distortions that lead to inefficient equilibria relative to the efficient or optimal equilibria of classical monetary theory. This vision itself reflects distortions in the thinking of contemporary monetary theorists, as neutrality is not a concept that has any meaning in Walrasian general equilibrium theory. In Walrasian general equilibrium theory money is irrelevant, although it may be an inessential addition to the model.[14] Also, optimal policy is defined solely with reference to the efficient allocation of resources, as it must be in Walrasian general equilibrium theory, where the notion of involuntary unemployment and unutilized resources is not defined.[15] A model constructed on Walrasian microfoundations is essentially all about the "efficient allocation" of resources and has nothing to say about unemployed resources.

Galí's (2008, chaps. 3–4) basic New Keynesian model consists of two sectors: the nonpolicy sector and the policy sector. The latter consists of some form of interest rate rule, as in equation (1.8.9) below, which is a simple Wicksell Rule. Formally, the nonpolicy sector contains a New Keynesian Phillips curve that is said to incorporate expectations of future inflation and an output gap

between the natural and actual allocations (or (p. 174) levels) of output; a dynamic IS (DIS) equation that relates the actual output gap to the expected output gap and the gap been the Fisherian real rate of interest and the natural rate; and the natural real rate determined by the time preference and productivity (productivity and thrift for short) and expected productivity shocks that drive the natural rate. Note here that the term "output gap" can be misinterpreted if it is thought to imply unemployment. In the New Keynesian Walrasian microfoundations there is no unemployment, just inefficiently allocated labor. The "output gap" refers to an inefficient allocation of resources relative to the Pareto-efficient allocation.

The equations in the New Keynesian framework are the following:

Nonpolicy sector:

(1.8.6)

$$\pi_t = \beta E_t \{\pi_{t+1}\} + \kappa \bar{y}$$

$$\pi_t = \beta E_t \{\pi_{t+1}\} + \kappa \bar{y}$$

New Keynesian Phillips curve

(1.8.7)

$$\bar{y} = E_t \{\bar{y}_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - r_t^n)$$

$$\bar{y} = E_t \{\bar{y}_{t+1}\} - \frac{1}{\sigma}(i_t - E_t \{\pi_{t+1}\} - r_t^n)$$

Dynamic IS equation

(1.8.8)

$$r_t^n \equiv \rho + \sigma \psi_{ya}^n E_t \{\Delta a_{t+1}$$

$$r_t^n \equiv \rho + \sigma \psi^n_{ya} E_t \{\Delta a_{t+1}$$

Natural rate of interest

Policy sector:

(1.8.9)

$$i_t = r_t^n$$

$$i_t = r_t^n$$

Interest rate rule

Expressions (1.8.6) to (1.8.9) are representative of the consensus model of monetary policy, and as nominal magnitudes are included, the model is based on the microeconomic foundations in expressions (1.8.1) to (1.8.3), to which has been attached the ad hoc money demand equation, expression (1.8.5), despite the fact that it implies that money is a friction in the model.

The variables are defined as follows: $\pi_t = \frac{P_{t+1} - P_t}{P_t}$ is inflation; y^-_t is the "output gap" defined as, $y_t \neq y_t^{nNK}$; i_t is the nominal rate of interest; r_t^n is the natural rate of interest; and E_t is the expectations operator. The parameters in the model are determined by the assumptions made about tastes (the utility function) and technology (the production function). The parameter $\kappa \equiv \left[\frac{(1-\theta)(1-\beta\theta)}{\theta}\right]\left[\sigma + \frac{\psi+\alpha}{1-\alpha}\right]$ in the New Keynesian Phillips curve, expression (1.8.6), depends on the degree of price stickiness as measured by the parameter θ. However, note that κ is not defined for θ = 0, and inflation appears to be unbounded, as θ → 0.

The two distortions introduced into the classical "monetary" model to produce the New Keynesian model are captured by the

parameters μ which represents the degree of competition, and θ, which represents the degree of price flexibility. Galí (2008, 48) then argues that "when μ = 0 (perfect competition) the natural level of output corresponds (p. 175) to the equilibrium level of output in the classical economy." And in the limiting case of no nominal rigidities, $\theta = 0$ Galí (2008, 44) describes this situation as the desired or *frictionless* markup. Thus the New Keynesian model can be in various states depending on the values taken by these parameters.[16] In particular also note that the model can always be placed in the moneyless, frictionless state or cashless limit when it is convenient, by dropping expression (1.8.5). Of course, when this is done, there are no nominal values, no inflation, and no nominal interest rate rule. Effectively the New Keynesian Phillips curve then vanishes, as does the Fisherian real rate of interest in expression (1.8.7) and the policy sector, expression (1.8.9), leaving a simple real business cycle model.

To make this clear it is apparent that when the parameter values μ=θ=0 are imposed the model collapses to the classical "monetary" model and in that state the model can readily be placed in the moneyless, cashless or frictionless limit by conveniently dropping the money demand equation, (1.8.5). That establishes the New Keynesian model as an exercise in Walrasian general equilibrium theory that incorporates the dichotomy of classical monetary theory. It also illustrates that money, expression (1.8.5), is an inessential addition to the model in the sense of Hahn (1973a; 1973b).

In the case of flexible prices under imperfect competition ($\theta = 0$ and $\mu > 0$) Galí (2008, sec. 3.2.2) shows that marginal cost is constant and given by $mc = -\mu$. These conditions then define the natural level of output in the New Keynesian model. That is, the natural level of output in the New Keynesian model is defined with imperfect competition but flexible prices. Thus imperfect competition introduces a distortion into the classical model by depressing the natural level or efficient allocation of output. So in the New Keynesian model the new natural level of output is derived as[17] (1.8.10)

$$y_t^{nNK} = \psi_{ya}^n a_t + \vartheta_y^n$$

$y_t^{nNK} = \psi_{ya}^n a_t + \vartheta_y^n$

where $\psi_{ya}^n \equiv \frac{1+\varphi}{\sigma(1-\alpha)+\varphi+\alpha}$ and $V_y^n \equiv -\frac{(1-\alpha)(m-\log(1-\alpha))}{s(1-\alpha)+\varphi+\alpha}$.

The only difference between this result and the equivalent derivation for the classical model is the presence of μ in the term V_y^n, and as Galí (2008, 48) notes, the introduction of imperfect competition has the impact of reducing output uniformly relative to the classical model so $y_t^{nNK} < y_t^{nC}$ without changing its sensitivity to technology shocks. So when $\mu > 0$, market power distortions exist in the New Keynesian model. but when the parameter $\mu = 0$, the distortion of imperfect competition is removed and the New Keynesian natural level of output collapses to the classical natural level of output, $y_t^{nNK} = y_t^{nC}$—the Pareto-efficient allocation.

The introduction of imperfect competition alone is therefore of no particular significance as it leads only to a redefinition of a less efficient New Keynesian natural level of output relative to the classical model.[18] Resources including labor may be inefficiently allocated, but they are not unemployed, that is, left idle. What is important in the New Keynesian vision is the role of nominal rigidities, as it is these that are the key (p. 176) to producing an additional distortion between the actual and New Keynesian natural level of output. The distortion due to staggered nominal price setting is introduced in the form of Calvo (1983) constraints on firms resetting prices. In this case the parameter θ is the measure of price stickiness, and when $\theta = 0$, prices are said to be perfectly flexible (for perfect flexibility read Walrasian auction). But with Calvo constraints in place, that is, with nominal rigidities, $0 < \theta < 1$, a further distortion occurs because some firms will produce an output other than that consistent with y_t^{nNK}, as they cannot charge for or produce their profit-maximizing output. Nominal rigidities imposed on price-setting firms then produce output distortions such that $y_t \neq y_t^{nNK}$.

The "output gap" in the New Keynesian model therefore arises because binding Calvo constraints on some firms means that shocks to marginal cost, induced by shocks to the productivity of labor (see equation (1.8.8)), will force those profit-maximizing firms to produce an output that differs from the New Keynesian natural level as defined in expression (1.8.10). To understand what is happening here note that as firms have some market power they determine prices as a markup over marginal cost, where the markup is determined by the elasticity of the demand curve. That is, $P_t = M \frac{W_t}{MPN}$, where M is the markup over the marginal cost, W_t/MPN_t, and $M \equiv \frac{\varepsilon}{\varepsilon-1}$, where ε is the elasticity of the demand curve. Galí (2008, 44) describes M as the desired or frictionless markup.

Galí (2008, 72–74) also explains how it is possible to eliminate the two distortions by using an efficient employment subsidy and, ignoring another source of price distortion, proposes that the task of optimal monetary policy is to achieve the state $M_t = M$; the average markup must equal the frictionless markup. For in that case there is no incentive for firms to change price and inflation will be zero. Unfortunately there is no mechanism in the model by which monetary policy can bring the average markup into equality with the frictionless markup. To confirm this conclusion, consider the following properties of the New Keynesian model.

4. The Scientific Illusion of the New Keynesian Model

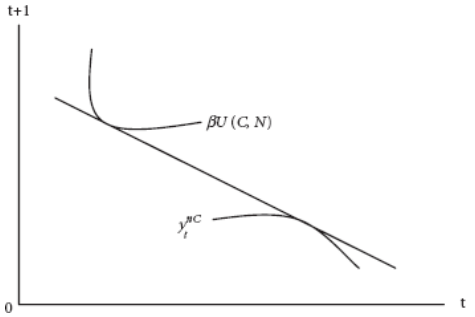

figure 1.8.1 The classical (Fisherian) nonmonetary solution to Galí's model.

The essential point to be made here is that New Keynesian monetary theory presented by Galí (2008) requires either that we accept that a moneyless model can provide the foundations for a theory of monetary policy, or that money is a friction. Neither of these choices is attractive, but these are the only choices available to exponents of attempts to find a role for money in models with the Walrasian general equilibrium microfoundations embedded in expressions (1.8.1)–(1.8.3). The embrace of such microfoundations by New Keynesian monetary theorists effectively empties their model of all the issues of **(p. 177)** relevance to policymakers. In addition, the New Keynesian model contains numerous logical slips and examples of conceptual dissonance that raise serious doubts about its relevance in numerically calibrated simulations.[19] The logical slip in Galí's and all other similar analysis arises when the money demand equation in expression (1.8.5) is added to the model, as it perpetuates what Patinkin (1951; 1965) called the invalid classical dichotomy, and it represents an inessential addition to the model in the sense of Hahn (1953; 1965; 1973a; 1973b). This means that money and all nominal magnitudes have no influence on the real equilibrium solution to the model—either in the short or the long run. In fact it is not clear what the latter distinction means in the New Keynesian framework.

To make these points consider first the correct interpretation of expression (1.8.1). Expression (1.8.1) means that a technology exists to which the household (a representative self-employed artisan) can apply labor, which generates disutility, but which transforms present into future consumption. Households compare present with future consumption, taking into account the discount rate, which embodies their subjective time preference, and a perfectly competitive intertemporal market (the Walrasian auction) allows consumers to trade consumption in period t for consumption in period $t + 1$, for all t. The equilibrium solution to the problem in expressions (1.8.1) to (1.8.3) is, of course, nothing more than a description of Fisher's (1907) triple equality that is usually reflected in contemporary dress as the Euler equation. The marginal rate of transformation between present and future consumption is equated with the rate at which consumption can be traded (often mistakenly called the rate of interest) and equated with the marginal rate of substitution between discounted future consumption and present consumption. The model is entirely nonmonetary, as the assumption of "perfect competition," the perfect market for intertemporal trade in consumption goods, is isomorphic with the Walrasian auction, as Samuelson (1967) explained. The state of the model is illustrated in figure 1.8.1. **(p. 178)** The fact that the nominal rate of interest is an inessential addition to the core Walrasian microfoundations in expressions (1.8.1) to (1.8.3) then leads to problems with the interpretation of expression (1.8.7)—the dynamic IS curve (DIS). The DIS represented by equation (1.8.7) states that, given the expected "output gap" is zero, the actual "output gap" is a function of the gap between the Fisherian real rate, $i_t - E_t\{\pi_{t+1}\}$, and natural rate of interest, r^n_t. But from the microfoundations of the model sketched by Galí the "output gap" is not generated by the interest rate gap but by the interaction between productivity shocks, represented by fluctuations in the natural rate of interest, and the Calvo constraint that prevents firms from responding to the shock and producing the natural level of output. As some firms are always restrained each period under a Calvo constraint, this means that even the New Keynesian natural level of output or allocation cannot be achieved. But there is no role for the nominal rate of interest in this process.

Thus the DIS represented by equation (1.8.7), which is derived from the optimizing behavior of households via expression (1.8.4), is the origin of the inability of monetary policy in the model to achieve the condition $M_t = M$. The conversion of the equilibrium condition in equation (1.8.4) to the "output gap" form, where the "output gap" is $\bar{y}_t \equiv y_t - y_t^{nNK}$, introduces the Fisherian real rate of interest in equation (1.8.7) but carries over the redundant role for the nominal rate of interest from the classical "monetary" model.[20] *Hence the redundant nominal rate of interest introduced by* equation *(1.8.4) has been incorporated in the DIS, but there is nothing in the microfoundations of the model to explain why anything other than the natural rate is needed*.

The rate of interest that appears in the Euler equation in any Fisherian interpretation of the model is the natural rate—there is no need for a nominal rate or Fisherian real rate as the inflation-adjusted nominal rate. The term $i_t - E_t\{\pi_{t+1}\}$ in expression (1.8.7) is thus an inessential addition to the model in the sense of Hahn (1973a, 1973b). There is nothing we can say about the equilibrium of the model with this term that could not be said without it. In other words, there is no need for the nominal rate in expression (1.8.7) for the same reason that there is no need for expression (1.8.5) under the Walrasian or Arrow-Debreu auction that enables us to write expression (1.8.1). Making the inessential addition of the nominal rate is the logical flaw that was inherited from the classical "monetary" model, and it is not resolved by introducing sticky nominal prices in the New Keynesian model. This aspect of Galí's story is pure illusion.

To confirm this conclusion, note that, from expression (1.8.8), fluctuations in the natural rate of interest cannot be avoided. When

the natural rate changes, the average markup in the model with binding Calvo constraints will differ from the frictionless markup, and there is nothing the monetary authority can do about it. The monetary authority can move the nominal rate of interest all over the place, but it will not restore the condition $M_t = M$. In particular, the condition $i_t = r_t^n$ does not imply $M_t = M$, as Galí (2008, chaps. 3 and 4) often suggests when discussing optimal monetary policy. In a model with active Calvo constraints, $M_t \neq M$ under expression (1.8.8), and that is the end of the matter. There is nothing monetary policy can do because money and nominal magnitudes have no influence on the real equilibrium solution of the model even when that equilibrium has been distorted by the illicit introduction of price-setting agents into **(p. 179)** a model based on a Walrasian auction. That was the essence of the old classical dichotomy that carries over to the New Keynesian dichotomy.

The inability of the nominal rate of interest to influence the average markup also means that it cannot influence inflation in the New Keynesian model. Inflation in the New Keynesian "monetary" model occurs when productivity shocks change the price and output decisions of firms. Galí (2008, 44) makes that clear:

> The previous equation makes clear that, in the present setup, inflation results from the fact that firms re-optimizing in any given period choose a price that differs from the economy's average price in the previous period. Hence, and in order to understand the evolution of inflation over time, one needs to analyse the factors underlying the price setting decisions of firms.

The nominal rate of interest does not appear anywhere in Galí's analysis of the price-setting behavior of firms and therefore can have no influence over inflation in the New Keynesian model.

In view of these properties of the New Keynesian model it makes no sense to claim that monetary policy is nonneutral in the short run. Money and monetary policy continue to be irrelevant in the model. The imposition of Calvo constraints on agents in an otherwise RBC model results in an inefficient outcome relative to the efficient classical outcome that would occur if these additional and ad hoc constraints did not exist. The New Keynesian version of the model is illustrated in figure 1.8.2, where imperfect competition depresses the production transformation curve below that of the classical solution and, in addition, the Calvo constraints on some firms force the model to operate below the New Keynesian production transformation frontier, y_t^{nNK}.

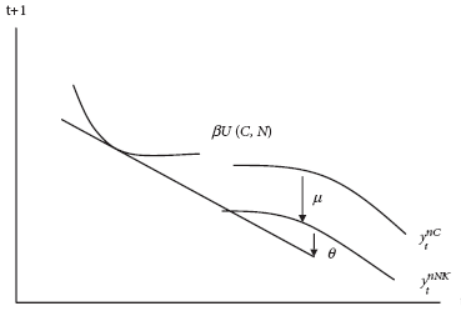

figure 1.8.2 The New Keynesian inefficient allocation outcome.

Throughout this exercise there is no change to the discount factor or the rate of time preference, ρ, so the natural rate as defined by expression (1.8.8) remains unaltered. **(p. 180)** Therefore, the only way to eliminate inflation in the sticky-price version of the New Keynesian model is to eliminate fluctuations in the natural rate of interest; but this would obviously be incompatible with the RBC core of the model. In addition, the notion of short and long run has no time dimension in a model with Walrasian general equilibrium microfoundations. In the context of the New Keynesian model the short run describes the state where Calvo constrains are interacting with fluctuations in the natural rate. There is no long run unless this process of interaction ceases.

To confirm these conclusions from a different angle, consider the model in a "monetary" state where there are no market power or Calvo price-setting distortions; that is, $\mu = \theta = 0$. If $\theta = 0$, there are no Calvo distortions and all firms can reset their prices and there can be no "output gap" relative to the New Keynesian "efficient" allocation, y_t^{nNK}, and therefore no inflation in the NKPC equation (1.8.1). When $\theta = 0$ it is also apparent that the parameter κ on the "output gap" is not defined and the NKPC breaks down. If $\mu = 0$, there is no market distortion from market power and the classical efficient allocation results, so aggregate level of output is always y_t^{nC}. See figure 1.8.2. In this case the model collapses back to figure 1.8.1. In either case, moving the nominal rate of interest rate around according to any form of interest rate rule in equation (1.8.9) has no impact on this result in the model, so it is tempting to describe the interest rate rule as neutral. But this is to confuse neutrality with irrelevance. There is nothing we can say about the real equilibrium of New Keynesian model with money that could not be said about the model without money, so nominal interest rate rules are irrelevant, *not* neutral.

On reflection the conclusions reached above are not surprising in view of the ad hoc attachment of the money demand equation to the New Keynesian model when it proves convenient. At the moneyless or cashless limit the New Keynesian model collapses to the classical RBC model as the ad hoc money demand equation is dropped, taking with it all nominal values and the notion of a price level. At least then the model is logically consistent, but unfortunately it has nothing to say about monetary theory or policy.

The ironic aspect of the New Keynesian reliance on Walrasian general equilibrium microfoundations is that they are entirely redundant. There is nothing to stop anyone from simply writing down the model (1.8.6) to (1.8.9) without any reference to Walrasian

microfoundations at all. Phillips and Taylor certainly didn't appeal to Walrasian microfoundations, so there is nothing to stop anyone calibrating and simulating a model just like that outlined in expressions (1.8.6) to (1.8.9) without any reference to the New Keynesian-Walrasian microfoundations. There is an interesting question related to "observational equivalence" here.

5. The Failure of the New Keynesian "Approximation Theorem"

Perhaps in anticipation of a critique along the lines sketched above, Galí (2008, 34) defends the practice of not including money explicitly in the analysis. He argues that (p. 181) in his analysis the *main role* played by money is that of a unit of account, and that "such model economies can be viewed as a limiting case (the cashless limit) of an economy in which money is valued and held by households. Woodford (2003) provides a detailed discussion and forceful defence of that approach."

This defense of the use of moneyless models (the cashless limit) by Woodford is simply crooked thinking, as explained by Buiter (1999) and Rogers (2006) and outlined above. Woodford (1998) gave three reasons why it was sensible to ignore money when writing the Euler equations, of which two are worth considering here (see Rogers 2006 for further discussion). Discounting the appeal to authority, Woodford argues that moneyless models are useful when

1. analyzing an economy with a highly developed financial system, or,
2. because the cashless limit is better reason for excluding money than the use of an additively separable utility function.

Neither reason withstands scrutiny. Reason 1 tacitly assumes that the monetary economy is converging on the moneyless model of the Walrasian auction. Although often expressed, this belief is unfounded. The fact that the world is evolving to the use of electronic transfer and smart cards means only that the form of money is evolving, not that it is disappearing. The world is not converging on the properties of the Walrasian or Arrow-Debreu auctions. There is no degree of computing power that can or could acquire the information necessary to replicate a Walrasian or Arrow-Debreu auction. If such capability existed, central planning would be a reality. Reason 2 is beside the point because under a Walrasian auction, money has no utility in any form of the utility function.

The desire of New Keynesians to abandon the quantity theoretic vision clearly motivated Woodford's (2003; 2007) search for a post-monetary-aggregate world. But by embracing the nonmonetary world of the Walrasian or Arrow-Debreu auction, New Keynesians have abandoned not only monetary aggregates but monetary theory as well. They have slipped without noticing through the looking glass with Alice.

The New Keynesian blind spot can also be explained by the failure to see that the cashless limit—the moneyless Walrasian general equilibrium system—cannot be interpreted as the limit of an economy in which money is valued. Take the monetary state of Galí's model. In that state, it was explained previously why money cannot be given any "value" in the utility function under the Walrasian auction. Alternatively, if expression (1.8.5) is attached, money imposes an additional constraint on agents, one not required by the Walrasian auction, so it cannot be valued by households or anyone else. Money has become a friction. How can a friction have value in this context? For "money" to have value under a Walrasian auction it must be a consumption good. Thus it is simply incorrect to argue as Galí (2008, 34) does that the moneyless state of his model is the limit of a model economy in which money has value. The cashless limit is in fact the moneyless Walrasian general equilibrium system that rests on the Walrasian auction that is necessary to write the microfoundations represented by expressions (1.8.1) to (1.8.3). Such a (p. 182) model exists in a "space" orthogonal to a monetary economy. *It is not the cashless, mathematical or conceptual limit of a monetary economy.*

Embracing the microfoundations represented by expressions (1.8.1) to (1.8.3) means that there is no need to introduce a role for money because all the functions of money are performed by the Walrasian auction. There is no money in Debreu's theory of value or the Arrow-Debreu model because none is required. Unfortunately the Walrasian and Arrow-Debreu auctions cannot be replicated in the real world, as everyone concedes. But that also means that models based on those auctions cannot provide the foundations for monetary policy in a monetary economy. Money exists because the Walrasian and Arrow-Debreu auctions do not (Laidler 1990).

6. Concluding Remarks

This chapter has outlined the consequences for New Keynesian macroeconomics and monetary theory of adopting Walrasian general equilibrium microfoundations. The same conclusions apply to Walrasian microfoundations in their modern dress as DSGE models with a real business cycle core onto which some Keynesian distortions have been imposed. But such core RBC models are moneyless models of perfect barter, as they all rest on the use of a Walrasian or Arrow-Debreu auction. Hence those who seek the microfoundations of monetary theory in the moneyless Fisherian or Walrasian traditions face a dilemma. Either the model is logically consistent, but with no foundations for monetary theory, or an inessential monetary component can be "added to" the real microfoundations and logical inconsistency results because money has been imposed on a model where it is not required. Many contemporary monetary theorists opt for logical inconsistency.

The New Keynesian monetary model presented by Galí (2008) is an example of the choice for logical inconsistency (but Galí is not alone; there are many others). The New Keynesian model introduces arbitrary and contradictory constraints on firms that forces output to deviate from the efficient intertemporal allocation. Imposing arbitrary constraints on the ability of firms to set prices after

they were explicitly introduced into the model to set prices is an example of the sort of inconsistency that results when the monetary sector is simply "tacked on" to the real sector of a Walrasian or Fisherian general equilibrium system. Furthermore, the New Keynesian model inevitably creates a New Keynesian version of the "invalid classical dichotomy." The relationship between the Fisherian and natural rates of interest cannot generate an "output gap." When New Keynesians make that assertion, they misinterpret the DIS equation in the model.

The New Keynesian "output gap" is better described as an inefficient allocation and is generated in the model when firms face technology shocks that disturb their marginal costs but some are prevented from responding by changing their prices. The inefficient allocation is a function of the interaction of the natural rate of interest and the Calvo constraints and is independent of the nominal interest rate. Firms assumed to be profit (p. 183) maximizers are prevented from so acting by the imposition of an arbitrary Calvo constraint. In this respect the New Keynesian model is reminiscent of Patinkin's attempt to explain involuntary unemployment in a model where the concept is not defined by forcing households off their utility-maximizing labor supply curves. The only difference in the New Keynesian setup is that firms, supposedly with some market power, cannot exercise that power and are forced away from their profit-maximizing price and output.

The logical and conceptual flaws then lead to an incorrect interpretation of the role of monetary policy in the model. Galí claims that in the New Keynesian model monetary policy is nonneutral in the short run and optimal nominal interest rate rules can be found that will ensure that the efficient allocation is attained as the unique equilibrium outcome. These claims are incorrect. Monetary policy is irrelevant to the "short-run" equilibrium solution to the model irrespective of whether prices are sticky or flexible. Under flexible prices the nominal rate of interest and therefore monetary policy can have no impact on the real equilibrium. Under sticky prices, the Calvo constraint, it is fluctuations in the natural rate, and not the nominal rate of interest, that interact with the Calvo constraints to cause the inefficient allocation.[21] The nominal rate of interest and the degree of nominal price stickiness have no influence on the natural rate as defined in the model. Consequently the microfoundations of price stickiness do not support the inclusion of the nominal rate of interest in the dynamic IS equation. The nominal rate of interest is redundant, as agents in the model already have access to the Fisherian perfect loan market for intertemporal exchange of consumption bundles at a rate equal to the natural rate. That is a consequence of the Walrasian auction that enables us to write down expressions such as (1.8.1)–(1.8.3) and the associated Euler equations. Consequently it is not possible to conclude anything about the properties of nominal interest rate rules in Galí's New Keynesian model. The properties of interest rate rules that do emerge are entirely independent of the Walrasian microfoundations of the model as a consequence of the New Keynesian dichotomy inherited from "classical" monetary theory.

To avoid the dilemma of classical and New Keynesian "monetary" theory it is necessary to abandon the dichotomy between the real and monetary sectors. The minimum changes required to take that step are to completely abandon Walrasian microfoundations and to replace the natural rate of interest as generated by the RBC model with the Fisherian concept of the rate of return over cost or Keynes's marginal efficiency of capital. As Keynes (1936) noted, that will integrate money as a "real factor" in the determination of equilibrium and resolve the classical dichotomy by adopting the principle of effective demand. This approach has several advantages: it avoids the operational limitations that are typical of search theoretic analysis; it avoids the logical inconsistencies that arise from the use of Walrasian microfoundations; it allows the application of much of the existing analytical technique; and it allows for the reconciliation between theorists and practitioners—regulators and central bankers. In short, it offers an approach to *aggregate* monetary theory that generalizes existing theory and circumvents the inherent logical inconsistencies associated with the classical dichotomy and Walrasian microfoundations.

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Notes:

(1.) An earlier critique of the "consensus model" by Arestis and Sawyer (2005) is also revealing.

(2.) See Rogers (2006; 2007; 2011) for a critique of frictionless models of money. The conceptual confusion is not confined to the New Keynesians, as McCandless (2008, chap. 8, p. 184, chap. 9, p. 236, emphasis added) accounts for the mistreatment of money in RBC models along the following lines: "The requirement that money be used to purchase goods, or at least some goods, is simply imposed. *Nothing in the model explains why money is used or what particular benefit comes from using money*. However, for most practical purposes, the same can be said about how most of us use money day to day. There is nothing in daily life that much explains why we use money except that it is what our employer gives us for the labor we provide and what the grocer accepts in exchange for the food we want to consume. This is usually a good enough reason for using money day to day and the reason we use it in this chapter [on the CIA model]….

Adding money to the model creates an additional complication in solving the model. *The presence of money puts a friction into the economy* so that equilibrium will not necessarily be that of a frictionless competitive equilibrium."

In chapter 9, dealing with money in the utility function, he goes on to observe: *"Putting money into general equilibrium microfoundations model is not easy*. In the cash-in-advance model, it was simply assumed that money had to be used to make certain types of purchases, in our case, consumption goods. There was no real theoretical rationale for that assumption other than the empirical observation that we seem to find money being used on one side of most transactions. *If one takes this empirical observation as a given, then the cash-in-advance models are fine*." Under a Walrasian auction there is no need for money in the utility function of a cash-in-advance constraint.

What more can be said about this form of crooked thinking?

(3.) The simple Walrasian auction is based on recontracting to establish equilibrium exchange ratios, while the Arrow-Debreu model is based on a time-0 auction. For a description of the time-0 auction in the Arrow-Debreu model see Ljungqvist and Sargent (2004, 217).

(4.) See for example Allen and Gale's (2007, chap. 2) analysis of the efficient allocation of risk on Euclidean space or the definition of liquidity as the conversion of a unit of jam today into a unit of jam tomorrow.

(5.) Brian Loasby (1976, 27) noted that to be a good economist at that time (is it any different today?) one had to aspire to the White Queen's standard in *Alice Through the Looking Glass* and be capable of believing six impossible things before breakfast.

(6.) Even the term "prices" is misleading here, as the relative "prices" determined by the model are actually commodity rates of exchange, how much jam must be given up today for an apple or a unit of jam tomorrow. Furthermore there is no need for a numeraire under a Walrasian auction, although one is often introduced. See Rogers (2008)

(7.) See the critique by Buiter (1999; 2002) and Rogers's (2007) critique of Cochrane's (2005) defense of the FTPL in a "well-specified Walrasian general equilibrium model."

(8.) Woodford (2003) seems to be the leading offender here, but he is not alone. Recall McCandless (2008).

(9.) However, Hoover (1995) and Summers (1991) have raised concerns about the calibration methodology.

(10.) For those who are not already convinced, Wallace (2004) shows why it is impossible to find a role for a central bank in a "cashless" (meaning moneyless) Arrow-Debreu economy.

(11.) What New Keynesians have overlooked here is that the RBC model does not "predict" the neutrality of money but the irrelevance of monetary policy. The RBC model as a variant of the Walrasian general equilibrium model has no role for money or monetary policy. Money is irrelevant to a RBC model, not neutral. The model has nothing to say about the neutrality of money, which is a claim about the properties of a monetary economy.

(12.) Patinkin (1965), McCallum (1985), and Buiter (1999) all provide clear explanations of how to interpret the role of a numeraire in a moneyless model. As Buiter (1999) notes, in such a model the numeraire need not exist, so it could be something like phlogiston—a nonexistent substance once thought to cause combustion.

(13.) Goodhart (2004) points out that including (1.8.3) precludes bankruptcy and thereby eliminates one of the primary concerns of regulators.

(14.) Many contemporary monetary theorists who employ Walrasian general equilibrium foundations seem to be deceived by what Hahn (1973a; 1973b) called the "inessential" nature of money in Walrasian general equilibrium theory. Money is said to be an inessential addition to a model if money is incorporated without disturbing the real equilibrium solution. All contemporary monetary models based on Walrasian general equilibrium microfoundations have this property. See Rogers (2006).

(15.) Patinkin's (1965, chap. 13) analysis of Keynesian "involuntary unemployment" represented another failed attempt to square this aspect of the circle by introducing a Keynesian concept into a model where it is not defined.

(16.) The relationship between price-setting agents (firms) and the auctioneer running the Walrasian auction is never explained. In the case where $\mu = 0$, there are no price setters, and the model reverts to a complete Walrasian auction. The case where $\theta > 0$ and $\mu = 0$ is reminiscent of the Walrasian fix-price models of the 1980s.

(17.) For the derivation see Galí (2008, sec. 3.3).

(18.) It is never explained how market power originates or how this power is reconciled with the rest of the model, which remains under a Walrasian auction.

(19.) Wallace (2001) has drawn attention to the "hidden inconsistencies" that lurk in wait for the unwary in these models.

(20.) To derive the DIS equation, subtract Galí's (2008, chap. 3) equation (20) from equation (19) and apply the definition of the natural rate.

(21.) This is another aspect of New Keynesian analysis that is reminiscent of the Walrasian fix-price models of the 1980s.

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Single-Period Analysis and Continuation Analysis of Endogenous Money: A Revisitation of the Debate between Horizontalists and Structuralists

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[–] Abstract and Keywords

One of the main tenets of post-Keynesian economics is that money is endogenous, meaning that the supply of money is determined by the demand for loans, and the latter originates within the economic system in order to finance the production and accumulation processes or the upsurge of speculative purchases. The main policy implication of this theory is that money and monetary policy are not neutral, neither in the short nor the long run. The debate between what are usually labeled horizontalists (or accommodationists) and structuralists is based around three arguments First, there is disagreement over the degree of accommodation by central banks to the demand for reserves of commercial banks. Second, there is a discussion about the meaning and relevance of the liquidity preference of commercial banks. Third, there is a controversy over the implication of the liquidity preference of the nonbank public sector. This chapter explores the controversial issues between horizontalists and structuralists in terms of graphical analyses of the reserve market, the credit market, and the financial markets.

Keywords: post-Keynesian economics, endogenous money, money supply, monetary policy, horizontalists, structuralists, liquidity preference, reserve market, credit market, financial markets

1. Introduction

One of the main tenets of post-Keynesian economics is that money is endogenous, meaning that the supply of money is determined by the demand for loans, and the latter originates within the economic system in order to finance the production and accumulation processes or the upsurge of speculative purchases. The main policy implication of this theory is that money and monetary policy is not neutral, neither in the short nor the long run: money is needed for, and has the purpose of, financing the core activities of capitalist economies.

While these propositions are now widely accepted by most, if not all, post-Keynesian economists, and more generally heterodox economists, there are several details in the theory of endogenous money that are still contentious.[1] The debate between what are usually labeled horizontalists (or accommodationists) and structuralists is based around the following three arguments. First, there is disagreement over the degree of accommodation by central banks to the demand for reserves of commercial banks. Are central banks always willing to supply the required reserves at the going short-run nominal interest rate? Or could they attempt resisting this demand by changing the interest rate? (p. 189) Second, there is a discussion about the meaning and relevance of the liquidity preference of commercial banks. Is the liquidity preference theory consistent with endogenous money? And, if so, does this mean that there is an upward-sloping supply curve for loans? Third, there is a controversy over the implication of the liquidity preference of the nonbank public sector. Are the preferences of the final recipients of bank deposits (e.g., wage-earners) necessarily consistent with the preferences of the first recipients of these deposits (e.g., firms)? And, if not, is there a mechanism that reconciles the different preferences?

The objectives of this chapter are twofold. The first objective is to review the controversial issues debated by horizontalists and structuralists with the help of an original four-panel diagram (Fontana 2003; see also Palley 1994). The horizontalist and structuralist analyses of endogenous money provide insightful perspectives on the way central banks, commercial banks, firms, financial intermediaries, and wage-earners enter into the money supply process. Unfortunately, these perspectives are still presented in a dualistic style, with readers asked to be supporters of either horizontalism or structuralism (e.g., Lavoie 2006). The simple graphical analysis proposed in this chapter moves beyond this dualistic view of endogenous money, by presenting in a simple and concise way the nature and origin of the differences between horizontalists and structuralists.

The second objective of this chapter is to encompass the horizontalist and structuralist analyses in a general theory of endogenous money (Fontana 2004a, 2009). Building on the work of Hicks (1956, 1982), the horizontalist and structuralist analyses are interpreted in the light of an original time framework grounded on the distinction between a single-period analysis and a continuation analysis. A single-period analysis aims to disclose simple and stable relationships that may be precluded or difficult to disentangle, once all the complexities of the money supply process are considered. For this reason, a single-period analysis is based on the tacit assumption that within the period considered, economic agents hold constant expectations. However, a limit of a single-period analysis is that it assumes the expectations of agents are given and then explains the sequential stages of the money supply process. But one of the features of the money supply process is the possibility of affecting the expectations of all agents involved in it. Therefore, the effects of changes in the state of expectations of central banks, commercial banks, firms, financial intermediaries, and wage-earners are the main concern of a continuation analysis.

The chapter is divided in three sections. Section 2 presents the controversial issues between horizontalists and structuralists. The discussion is presented in terms of graphical analyses of the reserve market, the credit market, and the financial markets, respectively. Section 3 takes these analyses forward by showing that once the single-period/continuation time framework is adopted, the controversial issues can be rigorously explained, and the horizontalist and structuralist analyses can be encompassed in a general theory of endogenous money. Section 4 concludes.

(p. 190) 2. Controversial Issues

The core argument of the endogenous money theory is that the supply of money is determined by the demand for loans, and the latter originates within the economic system in order to finance the production and accumulation processes or the upsurge of speculative purchases. This means that any representation of the endogenous money theory requires at the minimum three markets and four types of economic agents, namely, a central bank, commercial banks (banks for short), firms, and wage-earners. In the following the debate between horizontalists and structuralists is therefore presented in terms of the controversial arguments surrounding the behavior of these economic agents in the reserve market, the credit or loans market, and the financial markets, respectively.

The Reserve Market

The first controversy between horizontalists and structuralists is over the relationship between the central bank and banks. In the endogenous money theory central banks set the short-run nominal interest rate (e.g., the federal funds rate in the United States, and the official bank rate in the UK) and supply monetary reserves on demand. The short-run nominal interest rate is thus the control instrument used by central banks to affect the lending activity of banks, and in this way the entire economic process. For instance, changes in the short-run nominal interest rate prompt banks to modify base rates (e.g., personal loan rates and mortgage rates) at which they lend to their customers. These rates ceteris paribus have an important role in influencing the level of investment and consumption, and hence the level of aggregate demand, which in turn affects the volume of output and employment.

The differences between the two analyses of endogenous money can be introduced in terms of a short-run reaction function measuring the elasticity of the nominal interest rate with respect to changes in the demand for reserves. Horizontalists argue for an infinitely elastic reaction function in the time period between revisions of the short-run nominal interest rate (e.g., Moore 1991, 1995), whereas structuralists defend a less-than-perfectly elastic function (e.g., Pollin 1991).

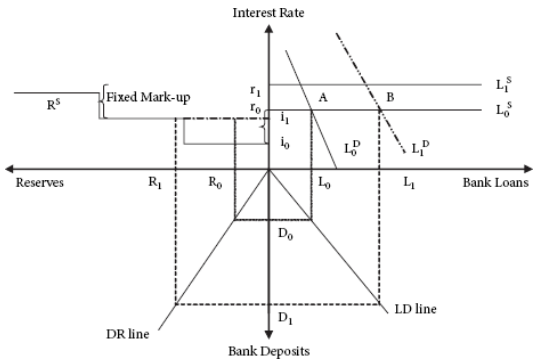

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figure 1.9.1 A general endogenous money analysis of the reserve market.

The four-panel diagram in figure 1.9.1 shows the contentious description of the reserves market.[2] The focus of the analysis is upon flows, namely changes in the supply of money, and how these changes arise from the flow of new bank loans to borrowers. The upper-left panel describes the reserves market. The supply of reserves is represented by a step function, with each horizontal segment representing a different interest rate policy (e.g., i_0, i_1). The horizontal parts of the schedule show the accommodative behavior on the part of the central bank, while the upward trend (from right to left in the diagram) reflects the structuralist view that central banks have a less-than-perfectly elastic reaction function. The upper-right panel shows the credit market, where banks and firms **(p. 191)** negotiate terms and conditions of the supply of new loans. Since the debate over the slope of the supply curve of loans is postponed to next section, the curve is represented by a perfectly elastic schedule at a base rate (e.g., r_0), determined as a fixed markup over the short-run nominal interest rate (e.g., i_0) set by the central bank. The demand for loans (e.g., L_0^D) is a decreasing function of the base rate (r), and together with the supply of loans (e.g., L_0^S), it determines the total volume of credit (e.g., L_0).

The lower panels are used to describe two main insights of the endogenous money theory, namely "loans create deposits" (*LD* line), and "deposits make reserves" (*DR* line), respectively. The equilibrium in the credit market determines via the *LD* line the supply of new deposits (e.g., D_0) in the lower-right panel. Note that the *LD* line represents the balance sheet constraint of banks and, for the sake of making the graphical exposition feasible, it is drawn on the assumption that banks hold their liabilities, like time or demand deposits, in a given proportion. The supply of reserves (e.g., R_0) associated with the supply of new bank deposits (e.g., D_0) is shown via the *DR* line in the lower-left panel. The *DR* line represents the total demand for reserves.

The four-panel diagram illustrates the underlying sequential analysis that characterizes the endogenous money theory, as well as the controversial issues related to the reaction function of the central bank. Expansionary shifts of the demand for bank loans (e.g., L_1^D) cause, via the *LD* line and the *DR* line, increases in the level of bank deposits (e.g., D_1), and of reserves (e.g., R_1), respectively. But, as a result of the new higher level of reserves, the central bank might, though it does not need to, decide to tighten conditions in the reserve market by moving to an (i_1) interest rate policy. This change in the policy stance of the central bank is then likely to affect the lending policy of banks in the credit market (e.g., L_1^S).

(p. 192) Note that this representation of the reserve supply curve is not inconsistent with the neo-Chartalist view that most of the central bank actions are defensive in nature, and are mainly undertaken in order to smooth out the imbalances in the pattern of money flows between the government's accounts on one hand, and banks on the other (Wray 1998, chap. 5; also Lavoie 2006). The central bank supplies the reserves that the banking system as a whole needs in order to achieve balance by the end of each settlement day. However, at any time the central bank chooses the price of these reserves, and hence it can change the price if it thinks it is appropriate or necessary to do so.

Furthermore, it is important to reiterate the importance for banks of the reserve market compared to the wholesale market (see, for a different view, Dow 2006, 46). It is only in the former that liquidity is created, whereas the role of the latter is to circulate existing liquidity between banks. The infamous run on Northern Rock, the fifth-biggest mortgage lender in Britain, in September 2007 is a case in point (Economist 2007). When on the back of problems in the subprime mortgage market in United States, British banks increased their liquidity preference and avoided lending to each other on the wholesale market, Northern Rock was unable to refinance its business (Chick 2008).

The Bank of England did not intervene by providing the much-needed new liquidity, and panic spread. Whatever the evaluation of the behavior of the Bank of England, it is clear that outside normal circumstances only the central bank could save a bank from insolvency. The central bank is the bank of banks, in the sense that it is the ultimate maker of liquidity for the economy. The reserve market is still relevant for the money supply process, though many countries, including Canada, Sweden, Australia, and New Zealand, have now no compulsory reserve requirements.

More generally, this simple example suggests that central banks have a very active role in the money supply process. By adjusting the short-run nominal interest rate, they are able to affect lending conditions in the credit market, and more generally to control the cost and availability of liquidity in the economy. This power of central banks is recognized by both horizontalists (e.g., Lavoie 1992, 186–89) and structuralists (e.g., Howells 1995, 12–17). Their main difference lies in the assumptions regarding the state of expectations of central banks during the money supply process. Horizontalists discuss the supply curve of reserves associated with a constant state of expectations, whereas structuralists allow for the effects of changes in the state of expectations. Therefore, while the former prefer to discriminate between different stances of monetary policy and focus only on the freely managed short-run nominal interest rate stance (Lavoie 1996, 279; Moore 1988, 265 n. 9), the latter are more inclined to consider complex reaction functions of central banks (Wray 1992, 307; Palley 1996, 592–93). In terms of figure 1.9.1, by the particular time nature of their models, structuralists are prone to consider the overall upward-sloping step function representing the supply of reserves (i.e., R^S), whereas horizontalists focus on each single horizontal part of it (i.e., either i_0 or i_1 policy line).

The Credit Market

A more controversial argument between horizontalists and structuralists is over the behavior of banks in the credit or loans market. Whether or not reserves are forthcoming (p. 193) at a constant short-run nominal interest rate, structuralists hold that, as a result of an increase in the lending activity, price and nonprice terms of credit will rise. Price terms are base interest rates like the standard mortgage rate, whereas nonprice terms mainly refer to the income and assets collateral requirements (Wolfson 1996, 456–57).

Drawing on Minsky's analysis of corporate financial behavior (Minsky 1975, chap. 5 and chap. 6), most structuralists argue that banks raise their base interest rates at the peak of the business cycle (e.g., Wray 1995, 278–80).[3] As lending grows, banks become increasingly concerned about their own portfolio balance (usually measured by the ratio of loans to equity, and the ratio of loans to safe assets), as well as the liquidity level of their customers (usually indicated by the ratio of debt to equity of firms). Similarly, structuralists maintain that in these circumstances banks often impose restrictions on their lending activity. They conclude that if price and nonprice terms are properly considered, the supply of loans is best represented by an upward-sloping curve (Dow 1996, 498–504; 2006, 43–49).

On their part, horizontalists argue for a horizontal supply curve in the interest-loans space. However, they acknowledge that banks may impose quantitative restrictions on their customers (Moore 1988, 24). Similarly, horizontalists accept that the liquidity ratios of banks and customers play a role in determining base rates over the trade cycle. However, they object to the contention that the supply of loans is necessarily upward sloping in the long run (Lavoie 1996, 286 and 289; 2006, 23). Horizontalists prefer to discuss the effects of changing liquidity ratios in terms of initial restrictions on the borrowing activity of customers. They argue that banks do not curtail credit by marginal variations of the markup, though they do change over time the requirements for the identification of sound customers (nonprice terms for new loans), and the base rate of their credit offer (price terms for new loans). Therefore, at all times banks only accommodate the so-called solvent or effective demand for loans. More importantly, the supply of loans is a truncated horizontal line: beyond some point, the supply curve simply vanishes (Lavoie 1996, 288). Changed conditions in the credit market are thus best represented by a shift in the demand curve, and a new horizontal supply curve.

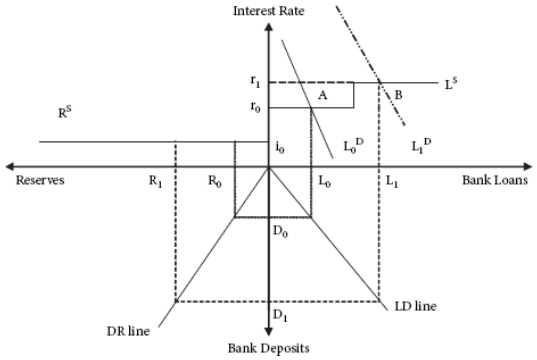

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figure 1.9.2 A general endogenous money analysis of the credit market.

Figure 1.9.2 shows the differences between the horizontalist and structuralist analyses of the credit or loans market. The significant difference from figure 1.9.1 is the assumption of a perfectly elastic schedule for the supply of reserves, meaning that only a single monetary policy stance is considered (e.g., an i_0 interest rate policy). More importantly, the loans supply schedule is now a function of the liquidity ratios of banks, and their customers. During an economic expansion banks are most likely going to experience a reduction in the level of liquidity. Illiquidity comes from increasingly risky new loans, and from outstanding loans being perceived as more risky. As the peak of the cycle is approached, some banks become aware of the objective fragility of the system and anxious about the illiquidity of their balance sheets. They are then likely to tighten the requirements for new credit and to raise their base rates (e.g., r_1). Similarly, as customers take on more debt, banks become concerned about the solvency of their borrowers. As in the previous case, it is likely that banks will revise their requirements upward and raise the base rates (e.g., r_1). Thus, in these circumstances the supply of loans (L^S) is better represented by a step function. Banks set their base rate, and this determines the height of the loans supply curve (i.e., the relevant horizontal line of the L^S). Their perception of the **(p. 194)** state of the economy explains the length of the horizontal parts of the curve, that is, how long banks hold constant the supply price of loans (Fontana 2003).

In short, the main difference between horizontalists and structuralist lies in the different assumptions about the behavior of banks in the credit market. Horizontalists look at the credit market under the assumption that during the money supply process banks are not affected by changes, if any, in their own liquidity ratios and the liquidity ratios of their customers. Structuralists allow for the possibility that over the business cycle banks revise price and nonprice terms of credit.

The Financial Market

Another controversy between horizontalists and structuralists is related to the relationship between the different recipients of deposits. In endogenous money theory, the demand for loans mainly originates with firms, while the deposits created by this lending are eventually held by wage-earners. Firms are deficit units involved in income-expenditure decisions. They negotiate with banks the amount of loans necessary for purchasing capital and labor services, and once collateral requirements are satisfied, they own the resulting deposits. These deposits are then exchanged with the owners of the inputs necessary for the production and accumulation processes, in return for their capital and labor services. If transactions between firms are ignored, that is, if the purchasing of capital services is considered an internal transaction of the firms sector, labor services are the only inputs to buy. The supply of new loans is therefore equal to the flow of new deposits transferred from firms to wage-earners.

(p. 195) Wage-earners use these bank deposits to buy commodities in the goods market and securities in the financial markets. In the simple case in which the public sector and the foreign sector are ignored, firms issue all securities available for purchase in the financial markets. Therefore, the amount of deposits that wage-earners spend in the goods market and in the financial markets is a measure of all new deposits returning to firms. Firms use these deposits to repay banks for their initial loans. This is what in the literature has been labeled the Kaldor-Trevithick reflux mechanism (Kaldor and Trevithick 1988). Horizontalists use this mechanism in order to explain how “excess” deposits for wage-earners are extinguished from the money supply process (Lavoie 1999, 105–8).

Structuralists usually acknowledge the importance of the Kaldor-Trevithick reflux mechanism (e.g., Arestis 1988,

65). However, they argue that the reflux mechanism does not automatically extinguish all newly created deposits (Chick [1986] 1992, 205; Cottrell 1986, 17; Dalziel 2001, 144 n. 2; Palley 1991, 397). Wage-earners spend part of these deposits in the goods market and save the remaining for precautionary or speculative purposes. The consequent allocation of deposits between securities and liquid balances is a portfolio choice, and for this reason it cannot be divorced from changes in interest rates differentials, which are bound to have important repercussions in the loans market (Arestis and Howells 1996, 540–44). Structuralists thus maintain that the portfolio choice of wage-earners between securities and liquid balances is an important component of the money supply process. It demonstrates the relevance of feedback effects between the credit market and the financial markets.

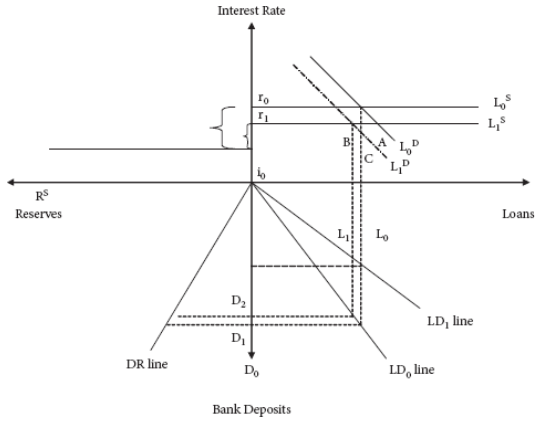

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figure 1.9.3 A general endogenous money analysis of the financial market.

Figure 1.9.3 shows the differences between the horizontalist and structuralist analyses of the financial markets.[4] The significant changes from previous figures are the different slopes of the *LD* line and their effects on the credit market. For the sake of simplicity, the supply of reserves (R^S) is assumed to be perfectly elastic, meaning that only a single monetary policy is considered. As in the previous figures, the demand for loans (L_0^D) together with the supply of loans (L_0^S) determines the flow of new loans (L_0) and, via the LD_0 line, the flow of new deposits (D_0). Importantly, the LD_0 line is drawn for a given portfolio choice of wage-earners between securities and liquid balances. Therefore, it cannot be excluded that the flow of new loans (L_0) creates an expansion of new deposits (D_0) that exceeds the willingness of wage-earners to hold them. Wage-earners will then modify their portfolios, attempting to hold fewer deposits (e.g., D_2) by exchanging some of the new deposits (D_0) with securities. The price of securities will rise and yields fall. The LD_0 line rotates counterclockwise (e.g., LD_1 line). This also means that firms are now able to recover on the financial markets a greater proportion of the initial flow of new deposits (D_0), which in turn reduces their outstanding debts toward banks. The demand for new loans will thus shift inward (e.g., L_1^D). At the same time, the fall in the yields on securities means that wage-earners are now willing to hold a greater proportion of new deposits (e.g., D_1 rather than D_2). Similarly, it is likely that the fall in the yields on securities will also have an effect on the supply of new loans. Banks will lower their base rate (e.g., r_1), and the supply of new loans shifts downward (e.g., L_1^S). To prevent cluttering figure 1.9.3, and on the assumption of a constant monetary policy, the effects of these changes in the reserve market are not explored here. **(p. 196)**

In short, horizontalists have examined the two-way relationship between the credit market and the financial markets under the assumption that the ultimate impact of an expansion in the supply of loans has no effects whatsoever on the portfolios of wage-earners. Structuralists have considered the possibility of portfolio choices changing as a result of the supply of new deposits. How portfolio adjustments in the financial markets affect future conditions in the credit market is of the utmost importance in their understanding of the money supply process (Arestis and Howells 1999, 118; also Cottrell 1988, 296; Goodhart 1989, 32–33; Wolfson 1996, 458–61).

3. A General Theory of Endogenous Money: A Single-Period/Continuation Time Framework

The foregoing account of the reserve market, the credit market, and the financial markets suggests that horizontalists and structuralists have in mind two distinct classes of models of the money supply process. These models share the same methodological and theoretical framework, but they differ in terms of the particular assumptions made about the state of expectations of central banks, banks, firms, and wage-earners. The **(p. 197)**

purpose of this section is to give precise meaning to this idea. The Hicksian distinction between a single-period and a continuation theory of money is used to explain rigorously the limits to the domains of relevance of the horizontalist and structuralist analyses of endogenous money (Fontana 2003). This argument is offered in a reconciliatory spirit. The final aim is to encompass these analyses into a more general theory of endogenous money.[5]

Horizontalists and structuralists concur that the general aim of the endogenous money theory is to explain the process of creation and circulation of money. They recognize that calendar time normally elapses between the moment in which central bankers, banks, firms, and wage-earners make decisions and the ultimate outcome of these decisions. During this time, disappointment or new opportunities play a central role in shaping and constraining the behavior of these agents. Accordingly, these agents continuously revise their plans for and expectations of the future course of events.

Having acknowledged the relevance of calendar time and expectations, horizontalist and structuralist analyses seem to differ in terms of alternative assumptions about the state of the expectations of agents involved in the money supply process and their influence on the working of the reserves market, the credit market, and the financial markets. From this perspective, horizontalists have proposed what along Hicksian lines could be labeled a single-period analysis of endogenous money, whereas structuralists have proposed a continuation analysis of endogenous money (Hicks 1982, 223).

A single period is the minimum effective unit of economic time for the analysis of agents involved in the money supply process. The length of this period is such that changes in expectations never occur within it, but rather at the junctions of one single period to the next. A single-period theory of endogenous money is thus built on the simple assumption that the state of expectations of central banks, banks, firms, and wage-earners is given. It is given in the sense not of being unique, but rather of being assumed constant. This assumption allows the specification of simple and stable functional relationships that continuously changing expectations would have made difficult or impossible to study. It is a realistic attempt to specify the fundamental relationships of the money supply process, without ignoring the possibility that changes in the state of expectations may affect the behavior of agents involved in this process.

Notwithstanding these positive features, the previous section has shown the limitations of a single period analysis of endogenous money. The possibility that central banks may adopt new monetary stances in response to conditions in the credit market, that over the trade cycle banks may revise price and nonprice terms of credit, or that the changes in the portfolios of wage-earners may affect the lending activity of banks has no place in a single period analysis. This should not come as a surprise. The formal features of a single period narrow the issues that can be investigated within such a time framework. In a single period expectations can be disappointed, but their effects are not allowed to alter the current course of events. The effects of changes in the state of expectations have to wait for next single period.

There are interesting things to be learned when expectations are allowed to affect the course of events. The actual path followed by the sequence of activities that describes the **(p. 198)** money supply process is in fact explained by the interactions between what agents plan to do and what they discover they ought to have planned to do. This is the primary purpose of the continuation analysis of money, which is concerned with the effects of the events of a period upon the expectations that determine the events of the following periods. A continuation analysis is thus the natural complement to a single-period analysis. It is the analysis of a dynamic sequence of single periods. It deals explicitly with linkages between successive periods, and these linkages are an essential step in moving beyond the boundaries of self-contained single periods.

The time framework of a continuation analysis explicitly allows for the fact that the general state of expectations may change in the light of realized results. Inconsistencies between plans of agents come to the front of the analysis, as do all sorts of mechanisms to reconcile them. For example, if central bankers realize that the actual outcome of monetary policy is not what they had expected, they attempt to do something before it is too late. As their expectations interact with the realized level of demand for monetary reserves, the short-run nominal interest rate is likely to change to reflect the new conditions in the economy. The base interest rates are then be affected, as are the demand for loans and the holding of deposits. Thus, the new aggregate supply of reserves will be responding to conditions in the credit market and the financial markets. Policy reactions from the reserve markets

would finally feed back to these markets, creating a complex network of interactions between all agents involved in the money supply process.

These interactions, policy reactions, and feedback effects are an important feature of a continuation analysis and a major difference from a single period analysis. Keeping with the same example, the latter would show that demand and supply conditions in the reserve market affect the credit market. A single period would then continue for a sufficient length of time such that the loans supply process works itself out completely. During this period, central banks may be disappointed by the results of their policy, banks may experience new opportunities and unexpected problems, or wage-earners may prefer to change their portfolios. Yet the formal features of the single period imply that disappointments and new opportunities or preferences have no effect on the state of expectations and hence on the behavior of agents operating in the reserve market, credit market, and financial markets. It is only in the next period that the reserve market, the credit market, and the financial markets will record new demand and supply conditions.

Before concluding, a word of caution is required. The Hicksian distinction between a single-period analysis and a continuation analysis does not imply that the former is necessarily less important or relevant than the latter. The advantage of the Hicksian distinction is that there is a rigorous criterion to discriminate between these two types of analysis, namely the state of expectations of agents. What type of analysis is more important or relevant depends on the purpose of the analysis, and which assumption about the state of expectations of agents is more realistic. For instance, figure 1.9.1 represents the supply of reserves as a step function, with each horizontal segment representing a different interest rate policy. The reason for a step function is that in a continuation **(p. 199)** analysis of the reserve market, central banks have the possibility of responding to conditions in the credit market, and hence of changing their monetary policy stance (e.g., i_0, i_1). However, this does not mean that the single-period representation of the supply of reserves as a horizontal line has little relevance in the analysis of the reserve market. The case could indeed be made that in normal circumstances the latter is the most appropriate representation of the supply of reserves. The actions of central banks in the reserve markets are normally defensive, that is, they intervene in the reserve market in order to achieve rather than change their single monetary policy stance. This means that in normal circumstances it is more appropriate to assume that the state of expectations of central banks is given. By the same token, outside normal circumstances a continuation analysis of the reserve market is likely to be more relevant. In other words, outside normal circumstances it is important to rely on a time that allows for all sorts of dynamic reactions between the reserve market, the credit market, and the financial markets.

4. Conclusions

The core of endogenous money theory is that the supply of money in modern economies is determined by the demand for loans, and that this in turn responds to the need for financing production or speculative purchases. Beyond a widespread agreement over the idea that “loans create deposits” and “deposits make reserves,” there is much controversy. Horizontalists and structuralists have now debated for long time the key issues related to endogenous money. Do central banks accommodate the demand for reserves at the going short-run nominal interest rate? Does the supply of loans slope upward? Do wage-earners make portfolio choices that affect the future availability of credit?

This chapter has proposed an original four-panel diagram to review the controversial issues between horizontalist and structuralist analyses of endogenous money, before showing that there is a time framework in which these analyses can be made compatible.[6] This time framework is general enough to be used for analyzing specific institutional settings or specific historical instances. The disagreement between horizontalists and structuralists arises from the particular assumptions made about the general state of expectations of economic agents. Horizontalists rely upon a single-period analysis that is built on the assumption that the state of expectations of all agents involved in the money supply process is given. This assumption allows the specification of stable functional relationships that continuously changing expectations would make very laborious to specify. In contrast, structuralists depend on a continuation framework that explicitly takes account of the fact that the state of expectations of agents may change in the light of realized results. In this way, structuralists are able to tackle controversial issues related to shifting monetary policies, the liquidity preference of banks, and the loans-deposits nexus that are overlooked by horizontalists. The conclusion of this chapter is that the horizontalist and structuralist

analyses together form a more general theory of endogenous money. (p. 200)

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Notes:

(*) This is a revised and update version of Fontana (2004b, 2009)

(1.) For critical surveys of the post-Keynesian theory of endogenous money, see Cottrell (1994); Dalziel (2001, chap. 3); Dow (2006); Fontana (2003); Fontana and Realfonzo (2005); Hewitson (1995); Howells (1995); Lavoie (2006); Rochon (1999); Rochon and Rossi (2003).

(2.) The author is indebted to Arestis and Sawyer (2006); Dow (1996, 1997); Howells (1995); Lavoie (1996); Palley (1994, 1996); Pollin (1996); and Sawyer (1996) for early representations of a similar diagram.

(3.) Recently, some structuralists have accepted that this need not necessarily be the case (e.g., Howells 1995, 20; Dow 2006, 46). For instance, they acknowledge the point made by Lavoie (1996, 285–90) to the effect that over the business cycle, loans are being taken out, profits earned, and loans repaid (out of profits, and out of borrowing), such that the ratio of loans to profits or to equity does not necessarily rise during the business upswing.

(4.) The author is indebted to Peter Howells for comments and suggestions on the graphical representation of the controversial issues surrounding the behavior of economic agents in the financial markets (see also Howells 2007).

(5.) For a discussion of the encompassing principle as an appropriate characterization of the post-Keynesian way of thought, see Fontana and Gerrard (2002). Recent examples of the encompassing principle in practice are Fontana and Palacio-Vera (2002, 2003).

(6.) Fontana and Setterfield (2009) use this time framework in order to explain the financial crisis in 2007 and the related recession and policy responses.

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[–] Abstract and Keywords

Endogenous money is a key feature of post-Keynesian monetary economics and of monetary circuit theory. This chapter highlights the contributions and the evolution of Wynne Godley's views on money, as they have evolved toward what Godley first called the real stock flow monetary model, which later became known as the stock-flow coherent model, showing that his views encompass post-Keynesian economics and monetary circuit theory. The chapter first recapitulates what it considers to be the main features of post-Keynesian monetary analysis. It then presents the work of Godley and his efforts to develop a systemic understanding of an economy and how money comes about. It also considers the role of banks and how they achieve their portfolio objectives. Finally, it explores how these stock-flow coherent principles fit in the context of an open economy and discusses some implications of the subprime financial crisis for monetary theory.

Keywords: endogenous money, monetary economics, commercial banking, Wynne Godley, real stock flow monetary model, stock-flow coherent model, monetary analysis, open economy, financial crisis, monetary theory

Endogenous money is, without any doubt, a key feature of post-Keynesian monetary economics. Nicholas Kaldor (1970, 1982) and Basil Moore (1988) were the most vocal advocates of a theory of endogenous money in the Anglo-Saxon world. In continental Europe, the closely related ideas of a monetary circuit, developed in particular by Alain Parguez (1980) and Augusto Graziani (1990), are also essential to the understanding of the post-Keynesian view of endogenous money. More recently, post-Keynesian authors such as Randall Wray (1998) and Scott Fullwiler (2006, 2009) have made substantial contributions to our understanding of the relationships between the commercial banking system, the central bank, and the Treasury, and hence the determination of overnight interest rates, by studying carefully the functioning of the clearing and settlement system. It has also been discovered over the years that the contributions to monetary analysis of some well-known post-Keynesian authors had been unfairly ignored or forgotten. For instance, Graziani (1989) and Rochon (2001) have recently uncovered the heterodox monetary analysis of Joan Robinson in the later chapters of her *Accumulation of Capital*, with her rejection of the quantity theory of money and the adoption of reversed causality, as well as the introduction of the concept of creditworthiness and the key role of the banking sector. Guttman (2010), Lavoie (2010a), and Rochon (2010) have also demonstrated that Alfred Eichner's contribution went much beyond the theory of the megacorp, as Eichner provided an original monetary analysis, with his focus on the determinants of the demand for and the supply of credit, the necessity of defensive operations by the central bank, and the usefulness of flow-of-funds analysis.

The main purpose of the present chapter is to highlight the contributions of Wynne Godley to monetary analysis. As was the case with Robinson and Eichner, I think one can say that these contributions have been mainly ignored by most post-Keynesian authors. For instance, in both his more recent book and his well-known classic book on post-Keynesian monetary theory, Basil Moore (1988, 2006) does mention the work of Godley, but only when discussing pricing or profit accounting; there is no reference to (p. 204) Godley's views on credit money and monetary

policy.[1] With the occurrence of the subprime financial crisis, the works of both Godley and Hyman Minsky have been brought back in the limelight, the latter because of his description of financial instability and the former because of his forecasts of impending and unsustainable financial imbalances, but it is probably not quite clear to everyone how the work of Wynne Godley is related to post-Keynesian economics in general and to post-Keynesian monetary theory. In the present text, I have given myself a limited task, that of analyzing the contribution and the evolution of Godley's views on money, as they have evolved toward what Godley (1993, 63) first called the real stock flow monetary model (RSFM), which later became known as the stock-flow coherent (SFC) approach.[2] This will be a pretext to summarize the main post-Keynesian views on monetary economics.

Thus, as a result, in the first section, I recapitulate what I consider to be the main features of post-Keynesian monetary analysis; in the second section I present the work of Wynne Godley and his efforts to develop a systemic understanding of an economy and how money comes about. In the third section, the role of banks and how they achieve their portfolio objectives is described in more detail. Finally, the fourth section discusses how these SFC principles fit in the context of an open economy, and it also discusses some implications of the subprime financial crisis for monetary theory.

Main Features of Post-Keynesian Monetary Analysis

Post-Keynesians in general—the heterodox dissenters—believe that the money supply is endogenous and demand-led. Post-Keynesians pay particular attention to the counterparties of the stock of money, in particular the loans or credits granted by the banking system. This explains in part why the main concern of post-Keynesians about the financial system resides in the availability of credit for productive activities and accumulation as well as the evolution of the stock of debts held by the various agents, as debt can generate financial instability, whereas mainstream authors focus on real balance effects, thinking that they will stabilize the economic system. For post-Keynesians, the main causality runs from credits to deposits, meaning that bank deposits are created the moment a new bank credit is granted. There is reversed causation. If credit rationing occurs, it is mainly because of a lack of confidence on the part of the banking or financial system, and not so much because of asymmetric information or because of a lack of financial resources (reserves, own capital, or the like). Furthermore, the causality associated with reserves is also reversed, with reserves being endogenous and demand-led, thus being a fraction of deposits, instead of deposits being a multiple of reserves. Indeed, central banks do their best to supply the amount of reserves that is being demanded by the banking system, but at a cost of their choice. This is true as well in an open economy, even with a fixed exchange rate regime: the fluctuations in foreign reserves will be compensated by (p. 205) changes in the other components of the balance sheet of the central bank, arising either from defensive actions taken by the central bank or from endogenous reactions of the private sector.

Post-Keynesians view interest rates as a distribution variable that, to a large extent, can be controlled by the monetary authorities. This is because the central bank is able to set the base rate at the level of its choice. The base rate is the target interest rate. This interest rate is usually a short-term interest rate. In the past it used to be the one-month or three-month yield on Treasury bills. Nowadays the target interest rate is the overnight rate—the federal funds rate in the United States, EONIA (Euro OverNight Index Average) in Europe. The target in many countries is in the middle of the band delineated by a ceiling and a floor, the rate of interest on advances from the central bank and the rate of interest on deposits at the central bank, so that, at least under normal circumstances, the overnight interest rate at which banks borrow from each other remains within the band. Indeed, the new operating procedures pursued by central banks have pierced through the veil of rhetoric and have vindicated the post-Keynesian view, most particularly the so-called horizontalist view, thanks also to the renewed study of the links between government expenditures and central bank money.

In normal times, all short-term interest rates (the T-bill rates) follow very closely the evolution of the overnight rate, and the latter is very close to the target rate set by the central bank. In unusual times, the evolution of short-term interest rates on private assets may diverge from that of the overnight rate and from the interest rates on government assets. The relationship between the target interest rate and long-term interest rates, especially rates on securities issued by the private sector, is looser. Liquidity preference is reflected in the differentials between all these other interest rates and the target interest rate set by the central bank. Liquidity preference does not affect the base rate, unless we extend the concept of liquidity preference to the behavior of the central bank, which does not seem appropriate since the target interest rate is a discretionary policy decision taken by the monetary

authorities.

Post-Keynesians, as it should now be obvious, are concerned with a monetized production economy, where money is neither neutral nor an inessential veil. As a result, post-Keynesians believe that a restrictive monetary policy will have negative consequences on an economy both in the short run and in the long run, meaning that it is likely to raise unemployment rates and reduce real growth rates. Similarly, financial disturbances are likely to have both short- and long-run effects. Post-Keynesians hold two claims of reversed causality. Observing the statistical relationship between money aggregates and price inflation, post-Keynesians attribute the growth in money aggregates to the growth in output and prices, thus objecting to the mainstream assertion that price inflation is a monetary phenomenon arising from an excessive growth of the money supply. Finally, post-Keynesians argue that investment is not constrained by current saving or loanable funds, but that instead investment determines saving—a claim that some consider as a key presupposition of post-Keynesianism. This reversed macroeconomic causality is evidently closely related to the monetized production economy, where banks can grant loans without disposing of previously acquired deposits.

(p. 206) It used to be simple to differentiate post-Keynesian monetary economics from orthodox economics since mainstream authors assumed the presence of an exogenous supply of money, with interest rates being said to be endogenous. It is not so simple now, since several orthodox authors, which in that sense are orthodox dissenters, now endorse the concept of endogenous money that is so dear to post-Keynesian theorists. Indeed, real-business-cycle theorists, New Consensus authors, and New Paradigm Keynesians all accept that the supply of money is *essentially* endogenous, as did the French overdraft economists of Hayekian background in the 1980s (see Lavoie 1985). In the case of New Consensus authors, close to central bankers through their design of the famous dynamic stochastic general equilibrium (DSGE) models, it has been argued by critics that there is neither room nor need for the presence of money and credit in these models (Dullien 2011; Rogers 2009). Another important feature of the orthodox dissenters is their belief in the existence and uniqueness of a Wicksellian natural rate of interest, toward which the actual rate of interest set by central banks must converge. The belief or disbelief in such a rate is perhaps the critical distinguishing feature between orthodox economists and post-Keynesian economists—a point made earlier in Lavoie (1985). This distinguishing feature may be linked to the overall distinction between a *real analysis* that dominates mainstream theory and a *monetary* analysis, advocated by Minsky and the post-Keynesians, not to mention Keynes himself.

A Systemic View of Monetary Economics

When I reflect on the works of Wynne Godley, I realize that while he was concerned with highly technical issues, such as the proper accounting definition of profits or the role of inventory interest costs in setting prices, Godley was most preoccupied with understanding the functioning of the economy as a whole. On a number of occasions (Godley 1993, 63; 1996, 3), he expresses his annoyance at Nicholas Kaldor for not having tried to put his ideas and those of Keynes in a coherent mold that would have made life easier for all his followers. Godley's last book, *Monetary Economics* (2007), which he wrote with me, was the arrival point of a long voyage, because for a long time Godley (1996, 14) had been groping "to show how the whole system fits together and cast banks in a realistic role."

How the whole system did fit together had to rely first and foremost on accounting identities. Already, from this angle, Godley's work comes close to that of the circuitists, who also rely on national accounting identities with a minimum of behavioral equations, a feature that can also be associated with Kalecki (1971). Kalecki had drawn from these ideas and the assumption that workers did not save the conclusion that profits in a closed economy were equal to investment expenditures minus the saving of capitalists plus the government deficit, while circuitists like Parguez (1980) inferred from the identities that the retained profits of firms would equal investment expenditures minus the saving of households plus the government deficit. As is now well known, in the 1970s, (p. 207) in his efforts to make better conditional forecasts in the context of what became known as his New Cambridge model, which incorporates the role of the foreign sector, Godley put forward what is now known as the fundamental identity: $(S - I) = (G - T) + CAB$. In words, it must be that the financial saving of the domestic private sector, that is, the saving of the private sector minus its investment, must be equal to the amounts lent to finance the deficit of the public sector (its expenditures minus its net tax revenues) plus the amount lent to the foreign sector, that is, the current account balance surplus (CAB).

Still, these were flow identities. How did these flows relate to stocks? And how did real flows tied to economic activity relate to financial stocks of assets and liabilities? My view of Wynne's theoretical work is that his work is a quest for the Holy Grail of Keynesianism. Keynesians have for a long time mentioned the need to integrate the real and the monetary sides of economics. Integration was all the talk, but for a long time little seemed to be achieved. Stinted by the rise of monetarism in the 1970s, with the monetarists claiming that the Keynesians had no clue about the role played by financial aggregates, Kaldor (1970, 1982) was forced to sharpen his views of endogenous money while his friend Godley wanted to discover how money got into the economy. As Godley said at the Keynes centennial conference in Cambridge in 1983, he wished "to outline a theory of the determination of real expenditure and real output in a monetary economy" (Worswick and Trevithick 1983, 170). His first attempt is the book that he wrote with Francis Cripps, his colleague at the Department of Applied Economics. I understand the Godley and Cripps (1983) book as an exercise in finding some way to amalgamate the real and the financial sides. This is clearly stated in the introduction to their book, where Godley and Cripps (1983, 17) claim that "our present synthesis may be broadly characterized by saying that we make a 'monetarist' financial system (based on the behaviour of stocks of money, financial assets and debts) drive a 'Keynesian' flow system based on the response of expenditure to income," and it is reiterated in the epilogue, when they claim "to have provided a framework for an orderly analysis of whole economic systems evolving through time" (305). Indeed, in the very first sentence of the book, they point out that "macroeconomics is the study of how whole economic systems function" (13).

Godley believed that Keynesian orthodoxy "did not properly incorporate money and other financial variables" (Godley and Cripps 1983, 15), a regret that was also expressed at the time by other frustrated Keynesians such as Jean Denizet (1969) in France. In their attempt to integrate the real and the monetary sides, Godley and Cripps and their colleagues "found quite early on that there was indeed something deficient in most macroeconomic models of the time," including their own, "in that they tended to ignore constraints which adjustments of money and other financial assets impose on the economic system as a whole" (Godley and Cripps 1983, 16). Interestingly, Godley was aware of the work being carried out at about the same time by Tobin and his Yale colleagues, as well as that of others such as Buiter, Christ, Ott and Ott, Turnovsky, and Blinder and Solow, who emphasized, as Godley and Cripps (1983, 18) did, that "money stocks and flows must satisfy accounting identities in individual budgets and in an economy as a whole." Still, Godley thought that their analysis was overly complicated, in particular because **(p. 208)** they assumed some given stock or growth rate of money, "leaving an endogenous rate of interest to reconcile" this stock of money with the fiscal stance. I also suspect that Godley and Cripps (1983, 15) were annoyed by several of the behavioral hypotheses found in the work of these more orthodox Keynesians, as they "could only give vague and complicated answers to simple questions like how money is created and what functions it fulfils." The Cambridge authors thus wanted to start from scratch, with their own way of integrating the real and the financial sides, thus avoiding these "tormented replies."

In line with the New Cambridge approach that Godley and his collaborators developed in the 1970s at the Department of Applied Economics, Godley and Cripps (1983, 43) contend that stock-flow norms "are crucial to determining how actual economic systems work" and that they "exhibit a fair degree of stability." They focus their attention on two stock-flow norms that will determine the behavior of financial stocks: the desired inventory-to-sales ratio and the desired wealth-to-disposable-income ratio. The stability of the latter has often been questioned in the past. However, it seems that it has not been realized that this wealth-to-income ratio target is constant as long as we assume a constant propensity to consume out of disposable income and a constant propensity to consume out of wealth, as most Keynesians would when constructing a model. The link between this stable stock-flow ratio and the stable propensities to consume is first made, as far as I know, in Godley (1996) and then reappears in subsequent work.

Money and Banking

The big difference in the theoretical work on money conducted by Wynne Godley in the early 1980s and the mid-1990s is the explicit introduction of asset choices in his later work. In the Godley and Cripps book, portfolio choice is discussed, but it is not modeled. We are told that there must exist a hierarchy of interest rates: "bank lending rates must be higher than bond yields (otherwise banks would not want to lend to the private sector) and rates on interest-bearing bank deposits must be lower than bond yields (otherwise neither the public nor banks would want to hold bonds)" (Godley and Cripps 1983, 160). This hierarchy in interest rates will remain embedded in the explicit models to be built later (as in Godley 1993, 73).

Godley (1996) is the paper that truly launched the SFC approach in post-Keynesian economics. What struck me most when I first read it was that Godley was putting together a monetary flow analysis, linking monetary income and expenditure with a flow demand for credit, and a portfolio analysis, which together explained the various demand functions for financial assets, including the demand for a stock of money. Brought up in the tradition of the monetary circuit theory, where monetary flows and the flow demand for credit are most important and where stocks of financial assets were a side issue, I always had some difficulty in seeing how the monetary circuit approach could be reconciled with the more traditional Keynesian portfolio approach based on stocks of financial assets. But Godley's 1996 paper integrated the two views, showing (p. 209) formally, with a fully-integrated model that could be simulated, how flows and stocks would gradually change in line with each other through time. Godley's models could simultaneously determine the stocks of money or securities held by households and the flows of credit, investment, and income, as well as the stocks of private and public debts. The same integration had already been achieved in the Godley and Cripps (1983) book, but the integration was only partial, the difference being that most of the book assumed that all financial assets held by households were retained in the form of bank deposits. When adding the public sector, Godley and Cripps (1983) assumed that the nonbank private sector chose between government securities and bank deposits, but this choice was only described in words and not explicitly modeled.

In the French and Italian monetary circuit theory, as described earlier by Parguez (1980) and Graziani (1990), the production process starts with banks granting advances to production firms to pay for wages and intermediary products. This is initial finance. Firms are then able to pay back this initial finance as long as households don't accumulate new money balances in banks. Godley and Cripps (1983) have a similar view. For them, production takes time, and firms must borrow from banks to finance their new production. In both monetary circuit theory and the Godley and Cripps representation of the simplified circuit, the outstanding debt of firms toward banks will be equivalent to the money balances held by households. There are two innovations from Godley and Cripps (1983), compared to the monetary circuitists. The first one is that Godley shows that the outstanding debt of firms will be equal to the end-period inventories valued at cost. The second innovation is that he has an explanation of the size of the money balances. As recalled earlier, they were some stable proportion of disposable income. In his 1990s work, the proportion of money balances as a share of financial wealth was given an additional Tobinesque explanation.

As Godley points out on a number of occasions, he himself owed his formalization of portfolio choice and of the fully-consistent transactions-flow matrices to James Tobin. Godley was most particularly influenced and stimulated by his reading of the paper by Backus et al. (1980), as he writes in Godley (1996, 5) and as he told me verbally several times. The discovery of the Backus et al. paper, with its large flow-of-funds matrix, was a revelation to Godley and allowed him to move forward, by providing both a role for the banking sector and getting into sectoral flow-of-funds analysis. But as explained in Godley and Lavoie (2007, 493), despite their important similarities, there is a crucial difference in the works of Tobin and Godley devoted to the integration of the real and monetary sides. In Tobin, the focus is on one-period models, or on the dynamics of adjustment from an arbitrary distribution of assets to the desired portfolio composition, for a given income level. As Randall Wray (1992, 86) points out, in Tobin's approach "flow variables are exogenous, so that the model focus is solely on portfolio decisions." By contrast, in Godley and Cripps and in further works, Godley is preoccupied in describing a fully explicit traverse that has all the main stock and flow variables as endogenous variables. As he himself says, "the present paper claims to have made … a rigorous synthesis of the theory of credit and money creation with that of income determination in the (Cambridge) Keynesian tradition" (Godley 1997, 48). Tobin never quite succeeds in (p. 210) doing so, thus not truly introducing (historical) time in his analysis, in contrast to the objective of the Godley and Cripps book, as already mentioned earlier. Indeed, when he heard that Tobin had produced a new book (Tobin and Golub 1998), Godley was quite anxious for a while, as he feared that Tobin would have improved upon his approach, but these fears were alleviated when he read the book and realized that there was no traverse analysis there either.

Another major difference between Tobin and Godley is their views about the role of banks. Again this is discussed in detail in Godley and Lavoie (2007, 497–99). Banks in most of Tobin's writings are veils that provide households with a greater variety of asset choices: "the raison d'être of Tobin's banks, so far as I can see, is to enlarge the asset choice of households and facilitate the agility with which it can be made" (Godley 1997, 49). By contrast, in Godley's view, banks play a distinct and essential role, since "bank loans are required to enable industry to function at all" (1997, 49). Godley's banks are Kaldorian, responding to the financial needs of their creditworthy

clients. As pointed out earlier, this is linked to his view of the production process, which as we said, is similar to that of the French and Italian monetary circuitists. Within this framework, bank loans act as a necessary buffer for the fluctuations in inventories. The link between inventories and bank loans is preserved all the way from Godley and Cripps (1983) to Godley and Lavoie (2007).

There is another feature of banking behavior that survived the twenty-five-year transition. Godley and Cripps (1983, 160) describe the mechanism through which deposit and lending rates will remain around bill rates. If the Treasury bill rate goes up, this will induce households to acquire bills from the banks and get rid of their money deposits. But if this is the case, the deposit-to-loans ratio will drop down, and banks will feel that they are less liquid, holding relatively fewer of their assets in the form of safe bills. Banks will thus be induced to raise their deposit rate, so as to preserve their liquidity ratio norm, and consequently they will also raise their lending rates to maintain their profit margins. The mechanism is first formalized in Godley (1996, 21), and it can be found in a similar form in later works, including Godley and Lavoie (2007). It is interesting to note that Alfred Eichner (1986) had identified a very similar mechanism through his empirical work, arguing that interest rates tended to be higher when the deposit-to-loan ratio was high relative to its trend level, thus also arguing along the lines of some sort of bank liquidity mechanism. It is not clear that such a mechanism still exists in the real world, as banks tend to use securitization or liability management, marking up the overnight rate target of the central bank to set the prime lending rate. Unless banks desire to achieve a target deposit-to-loan ratio, a sudden increase in the amount of required loans will have no impact whatsoever on interest rates or interest rate differentials, a point that was made to me by John Smithin when we were together riding a cab in Berlin in 2001.

Godley was always puzzled by the standard neoclassical assumption, found in both the IS/LM model and among monetarists, of an exogenous or fixed stock of money, the worst example of which is Friedman's money helicopter drop. As Godley (1997, 4) says, "governments can no more control stocks of either bank money or cash than a gardener can control the direction of a hosepipe by grabbing at the water jet." In Godley and Cripps (1983) (p. 211) , the essentials of a monetary economy are described in any case without a government or a central bank, so that we have a pure credit economy, where private agents can only hold their wealth in the form of bank deposits. Thus, "in such a world there is only one way in which the stock of money can be changed—namely by banks increasing or decreasing the total value of their loans" (Godley and Cripps 1983, 76–77). Godley shows clearly that loans make deposits, but he also shows that changes in the desire to hold deposits have a feedback effect on outstanding loans. Thus, in that simple world, there can be no discrepancy between the stock of money and outstanding credit, just as there can be no discrepancy between saving and investment in the national accounts.

Also, "there cannot be any problem about equating what is usually called the 'supply' of money with the 'demand' for it. Money is created when banks make loans" (Godley and Cripps, 82). Thus, as the circuitists would put it, "the act of money creation is also an act of expenditure and (therefore) of income creation" (83). This is reiterated later in the book, even with a government sector, as Godley and Cripps (1983, 126) claim that there cannot be "any discrepancy between the amount of money created and the amount of money which people in some sense want to hold." Bank loans will need to increase either because firms desire to hold more inventories relative to sales and because firms expect more sales, or because households desire to increase their wealth-to-disposable-income ratio, thus desiring larger bank deposits. But this desire to save more and hence to acquire more bank deposits will generate a reduction in the sales of production firms, and hence an increase in their inventories and the amount of loans required to finance unsold stocks. Thus an exogenous increase in the demand for money will generate a concomitant increase in the supply of loans and hence in the supply of money. This thus vindicates Kaldor's (1982) position that there can never be an excess supply of money. All these ideas are found again in chapters 7 and 9 of Godley and Lavoie (2007), where the interdependence between loans and deposits and their necessary equality is explored in a similar simplified model. In the more sophisticated model of Godley (1999a), where banks hold several assets and liabilities, the necessary equality between bank deposits and bank loans vanishes, although their interdependence does not.

Endogenous Money in an Open Economy and the Financial Crisis

So far, we have said little about money in an open economy. In their chapter devoted to the open economy, Godley and Cripps (1983, chap. 14) describe the New Cambridge view, in particular the claim that either the fiscal

stance or foreign trade performance has to get adjusted for all the constraints on an economy to be fulfilled in an adequate way. There is, however, no discussion about the implications of such a view for the balance sheet of the central bank or for money balances that would go beyond the effects (p. 212) on asset holdings arising from the fundamental identity that we mentioned earlier. For this to occur, we must wait until Godley (1999b), where within his stock-flow consistent approach he sets up a two-country model that makes up the whole world. In doing so, Godley is again inspired by the previous work of Tobin and also that of Branson and Henderson (1985). But while these authors propose a formal determination of exchange rates with several financial assets and portfolio choice in a two-country model with imperfect asset substitution, they take budget deficits, aggregate income, and production to be exogenous, as do Blanchard et al. (2005) in their recent resurrection of models with imperfect asset substitution. These assumptions look totally unrealistic after the occurrence of the subprime financial crisis, which led to huge changes in economic activity, government deficits, and trade flows, with little changes in prices.

Godley (1999b) by contrast has asset prices feeding back on production, income, and public and foreign sector flow balances, with these in turn feeding back on asset prices. Godley thus tracks the evolution of money balances and the foreign reserves of both countries. The implications of the model in a flexible exchange rate regime are well explained there but only with Godley and Lavoie (2005–6) do we get a full look at the implications in a fixed exchange rate regime. As is well known, the standard Mundell-Fleming model, as well as the monetary approach to the balance of payments, claims that monetary policy is impotent in a fixed exchange rate regime, because the money supply is endogenous, its changes being determined by the changes in foreign reserves. The money supply increases endogenously, but independently of the demand for money arising from economic agents, leaving interest rates to become the adjustment variable, and hence with interest rates being endogenous. This is totally at odds with the post-Keynesian view, which ascertains that "so long as it is recognized that money supply is credit-driven and demand-determined, the exchange rate regime is of absolutely no consequence in the determination of money and credit" (Arestis and Eichner 1988, 1015).

The post-Keynesian view is vindicated in this open-economy context in the Godley and Lavoie (2005–6) model. As long as there are foreign reserves, in a world of imperfect asset substitution, central banks have the ability to keep interest rates, nominal or real, at the level of their choice, even in a fixed exchange rate regime. A fortiori, when countries are running balance-of-payments surpluses, central banks are under no pressure to lower interest rates, and no extraneous monetary inflation will be generated by the rise in foreign exchange reserves. This increase on the asset side of the balance sheet of the central bank will be compensated by a change in some component of this balance sheet other than bank reserves at the central bank, which are determined by the demand for such reserves. Looking at table 10.1, we see that the increase in foreign reserves held by the central bank is likely to be compensated by a decrease in credits to the domestic economy, either in the form of reduced central bank holdings of government securities, as is assumed through the conventional sterilization mechanism associated with the Federal Reserve and the Bank of England, or in the form of reduced advances to commercial banks, as is usually the case in Continental Europe. Otherwise, the compensation mechanism may operate through the liability side, with an increase (p. 213)

Table 10.1 The balance sheet of central banks

Assets	**Liabilities**
Foreign exchange reserves	Cash and bank reserves
Government securities	Government deposits
Advances to commercial banks and the financial system	Central bank bills and bonds

in government deposits at the central bank, which is the main mechanism in countries such as Canada, or through an increase in the outstanding size of central bank bills or bonds, as is the case in China or in several less-developed countries such as the Dominican Republic.

Table 10.1 also helps us to understand how central banks, in particular the Federal Reserve, handled themselves during the subprime financial crisis. When it became evident that the prices of private assets, in particular

mortgage-based securities, were in an unstable tailspin, central banks responded by providing advances to banks to help them sustain these prices or by buying these assets themselves. These purchases were initially sterilized by sales of government securities on the open market, but after a while central banks started to run out of T-bills. Governments then issued new securities, selling those to their central bank, allowing the latter to replenish their holdings of government securities, while governments in counterpart acquired deposits at the central bank. As the crisis worsened, with the bankruptcy of the Lehman Brothers investment bank in September 2008, many central banks gave up any pretence at controlling the size of bank reserves, purchasing private assets or providing advances to the financial system in nearly unlimited amounts without conducting compensating operations. This was made possible by changes in monetary policy implementation, with several central banks setting the target overnight interest rate equal to the floor of the band, at the level of the interest rate on bank reserves, thus managing to keep control of overnight interest rates despite the accumulation of huge amounts of excess reserves (Lavoie 2010b).

Thus, while mainstream economists dubbed these operations under the name of "quantitative easing," or QE, post-Keynesians would instead talk of "credit-easing operations," as the main purpose of these changes in the balance sheet of the central bank was to relieve downward pressures on the prices of private financial assets and hence relieve upward pressures on interest rates of private liabilities. What was then called QE2 was similarly an attempt by the Federal Reserve to lower long-term interest rates, by pursuing open market operations through the purchase of long-term government assets (instead of short-term T-bills). The objective of these operations was not to increase bank reserves in the hope of inducing banks to make more loans, since banks don't need reserves to make loans and since, as pointed out in the first section, bank reserves are supplied on demand at the target rate of interest. The increase in bank reserves was rather the (nearly) unintended result of these credit-easing operations. Also, the fact that, especially in the United States, commercial banks held large excess reserves did not (p. 214) imply in any way that banks declined to provide loans and were exercising credit rationing. As long as the target overnight rate is the floor rate on reserves at the central bank, the monetary authorities have the ability to set any amount of excess reserves, and there is nothing that the commercial banks can do to reduce this excess amount (Fullwiler and Wray 2010).

Unfortunately, it is rather difficult to introduce these institutional features within a SFC model of the Godley variety. In his review of Godley and Lavoie (2007), Lance Taylor (2008, 644) regrets that their more complicated models did not include a mortgage market, securitization, and a shadow banking system so as to properly represent and assess the subprime financial crisis. Gennaro Zezza (2008) has, however, constructed an SFC model with housing investment and mortgages, and many more researchers are currently working on similar SFC models. It would not be overly difficult to include a shadow banking system, thus extending previous efforts by Tom Palley (1996) to take into account both the banking sector and a nonbanking financial sector.

Conclusion

Post-Keynesians have kept alive the tradition that focuses on credit relationships and that associates monetary policy to interest rate targeting and to financial stability, a tradition that goes back to the Banking School, with Tooke and Fullarton. The changes in monetary policy implementation that have occurred in central banks over the last twenty years, by making more transparent what was previously hidden in a maze of procedures and official statements, have vindicated post-Keynesian monetary theory. Similarly, the special steps and the additional changes in central bank operating procedures that were adopted during the global financial crisis that started in 2007 have reinforced the claims of the explanatory power of post-Keynesian monetary theory, as many of the stylized facts observed during the financial crisis, such as low inflation and no change in the money supply despite huge increases in high-powered money, are consistent with post-Keynesian theory while contradicting mainstream monetary theory and its money multiplier hypothesis.

In the past, the development of post-Keynesian monetary theory and macroeconomic analysis was hampered by the absence of a model that could simultaneously take into account the portfolio and liquidity preference decisions of households and the credit relationships between banks and production firms, while keeping tabs on real flows of output, income, and expenditures as well as the variations in public deficits and public debt. The stock-flow consistent approach proposed by Wynne Godley provides a boost to post-Keynesian analysis, by providing a method to those who wish to examine in a systematic manner intertwined real and financial issues, dealing both

with immediate short-run effects and the possible traverse toward longer-run consequences.

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Notes:

(1.) Although Hamouda and Harcourt (1988) must be credited with devoting a full page to Godley and his associates in their well-known survey of post-Keynesianism.

(2.) There is now a website devoted to the stock-flow coherent approach, created by Gennaro Zezza. See http://sfc-models.net/.

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Hyman Minsky and the Financial Instability Hypothesis

John King

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[–] Abstract and Keywords

During the global financial crisis of 2008–9, the name of Hyman Minsky (1919–1996) was frequently cited in the media. Minsky devoted his entire career to the problem of financial fragility, which he always regarded as the principal threat to US capitalism. His financial instability hypothesis summarized the reasons that the system is vulnerable to financial crises, why nevertheless a catastrophe like the Great Depression had not happened again, and what must be done in order to prevent a recurrence. Minsky always placed financial markets at the center of his analysis. In his "Wall Street vision," the crucial economic relationship is that between investment banker and client, not factory-owner and worker. Although money is central to his vision, it operates in a rather unusual way. Minsky died in 1996, before the "new consensus" (or New Neoclassical Synthesis) in macroeconomics had firmly established itself, but he would certainly have been a severe critic of its treatment of money and its neglect of finance.

Keywords: Hyman Minsky, macroeconomics, financial instability hypothesis, financial crisis, capitalism, financial markets, Wall Street vision, money

> Only an economics that is critical of capitalism can be a guide to successful policy for capitalism.
>
> (Minsky [1986] 2008, 332)
>
> Minsky was the most significant economist of the last forty years—perhaps as significant in our time as Keynes was in his.
>
> (Keen 2001, 106)

1. Introduction

During the global financial crisis of 2008–9 the name of Hyman P. Minsky (1919–1996) was frequently cited in the media, and with good reason. The crisis itself was sometimes described as a "Minsky moment," though "Minsky half-century" would have been a more accurate phrase (Wray 2008). Minsky devoted his entire career to the problem of financial fragility, which he always regarded as the principal threat to US capitalism. His *financial instability hypothesis* summarized the reasons that the system is vulnerable to financial crises, why nevertheless a catastrophe like the Great Depression had not happened again, and what must be done in order to prevent a recurrence.

Born to working-class parents in Chicago, Hyman Minsky grew up in a city with a powerful labor movement. As a young man he benefited greatly from his contacts with Marxist intellectuals like Oscar Lange and socialist activists such as David Saposs (Minsky 1992; Papadimitriou 1992). He studied economics at the University of Chicago, (p.

(p. 219) where he was taught by the rather quirky liberal economist Henry Simons and learned a great deal by reading Irving Fisher and John Maynard Keynes. From Fisher, whose debt-deflation interpretation of the Great Depression was very influential at the time, Minsky discovered the importance of changes in asset prices as a fundamental cause of macroeconomic instability. From Keynes he took the principle of effective demand, the nonneutrality of money, and the central role of business investment expenditure as the cause of cyclical fluctuations.

His PhD thesis, written at Harvard under the supervision of Wassily Leontief, was an attempt to integrate money and finance into contemporary Keynesian models of the business cycle; it was published fifty years later (Minsky 2004; Toporowski 2008). He taught at Brown University (1949–57), the University of California at Berkeley (1957–65), and at Washington University in St. Louis (1965–90). Minsky was not, however, an armchair critic of the US financial system. For almost twenty years he was associated with the Mark Twain Banks in St. Louis, which he described as "his laboratory" (Arestis and Sawyer 2000, 414). Two brief statements of the financial instability hypothesis can be found in Minsky (1977a) and (1988), while Minsky ([1975] 2008) is a book-length exposition set out as a rational (and critical) reconstruction of Keynes. A Festschrift was published shortly before his death (Fazzari and Papadimitriou 1992), and another (in two volumes) appeared posthumously (Bellofiore and Ferri 2001). After his retirement Minsky continued his research at the Levy Economics Institute of Bard College, in Annandale-on-Hudson, New York, which has organized an annual Hyman Minsky Conference since 1991 (details can be obtained from www.levy.org).

Minsky's underlying vision of American capitalism was there from the beginning. He always placed financial markets at the center of his analysis; labor, industry, and production did not interest him very much. In Minsky's "Wall Street vision," the crucial economic relationship is that between investment banker and client, not factory-owner and worker. His "representative agent" is neither a classless consumer (as in mainstream economic theory) nor an industrial capitalist (as in Marxian political economy), but a financial capitalist. Borrowing and lending are the crucial transactions, not buying consumer goods or selling labor power. Minsky's agents are "representative," or herdlike, only at certain stages of the business cycle. They emulate each other in the upswing, when they are all equally exuberant, and also in the downswing, when they are cautious or distinctly pessimistic. But the behavior of atypical or *nonrepresentative* agents is important at the critical turning points. At the start of a boom, someone has to have the confidence to borrow, and to lend, on a greatly increased scale. At the beginning of a financial crisis, someone has to lose faith in clients' creditworthiness and call in their loans. The expectations that are formed by Minsky's agents are certainly forward-looking. Indeed, it could be said they are excessively forward-looking, since at some stages of the cycle economic agents begin to suffer from total amnesia, losing all memories of the past. But these are not *rational* expectations in the conventional sense of the term, and Minsky's financial markets are certainly not *efficient* markets—not, at least, in the way in which that term is used by mainstream economists.

(p. 220) Money is central to his vision, but again it operates in a rather unusual way. There is no suggestion that the stock of money is exogenously determined by the decisions of the monetary authorities, still less that fluctuations in output and employment are caused by the policy mistakes of these authorities. For Minsky the business cycle is the result of endogenous financial instability, which is caused by the behavior of private sector financial agents. Government policy is not part of the problem but instead the most important part of the solution (not that any solution will ever be complete or permanent). Unlike many Marxists (and not a few Keynesians), Minsky is emphatically not a stagnationist. He sees capitalism as essentially dynamic, not least in its capacity for financial innovation, and also (and in consequence) as inherently unstable. But capitalism cannot be understood, or successfully modeled, in "real" terms, neglecting the central role of money and finance as the supposedly "Keynesian" growth and trade cycle models of the 1940s and 1950s had attempted to do (Minsky 1957). Minsky was thus a consistent critic of the old "neoclassical-Keynesian synthesis," which he believed to have seriously neglected the role of money and finance. He died in 1996, before the "new consensus" (or New Neoclassical Synthesis) in macroeconomics had firmly established itself, but he would certainly have been a severe critic of its treatment of money and its neglect of finance.

2. The Financial Instability Hypothesis

It is no accident, as the Marxists used to say, that Minsky grew up during the Great Depression. For him the Wall Street crash was the defining moment in US economic history. His whole career was devoted to understanding it,

explaining why it had not been repeated, and advocating policies that would prevent it from recurring. Almost everything that Minsky wrote had 1929 explicitly or implicitly in view, and his collected essays (Minsky 1982) appeared under the title *Can "It" Happen Again?* (in North America, at least; his British publisher preferred the anodyne *Inflation Recession and Economic Policy*).

He was a late developer, publishing nothing until he was almost forty and taking another two decades to produce a complete and fully articulated theoretical framework of his own (King 1996). Thereafter he summarized the argument over and over again, embellishing and refining it without seriously altering the fundamental message. For Minsky, financial markets are not only crucial to the operation of capitalism, but also inherently unstable. In a world characterized by fundamental uncertainty concerning future prospects, rather than by quantifiable risk, the expectations of lenders and borrowers fluctuate (often dramatically) in a regularly repeated cyclical process. Depression gives way to confidence, which grows into exuberance and excitement before collapsing into despair. These mood swings are reflected in financial transactions, as caution is replaced first by optimism and then by euphoria. In the early stages of an upswing, *hedge finance* is the general rule: borrowers are able to make both scheduled interest payments **(p. 221)** and the necessary repayments of principal from the cash flows generated by their activities. Eventually *speculative finance* becomes more typical, and profit flows are sufficient only to meet interest bills and at best a proportion of principal commitments. (Note that Minsky's terminology was developed well before the emergence of modern "hedge funds," whose activities are, in anyone's language, highly speculative). As the boom nears its end, *Ponzi finance* appears, with borrowers unable even to pay interest without incurring further debts in order to do so. *Financial fragility* now increases rapidly, and soon the cycle turns down in a spiral of bankruptcies, "fire sales" of assets at greatly reduced prices, falling profit expectations, and declining profit flows, before confidence recovers and the entire process begins all over again.

How, precisely, does a financial crisis affect the "real economy"? In mainstream macroeconomics there are two ways in which "money" may influence the "real world." For monetarists, an exogenous increase in the stock of money gives rise to excess money balances, which economic agents eliminate by increasing their spending on consumer goods. In the New Neoclassical Synthesis, the stock of money is endogenously determined and the monetarist story is therefore implausible. Instead, interest rates set by the monetary authorities play the central role, strongly influencing consumption (and perhaps also investment) expenditure.

For Minsky, these channels are not significant. Finance is what matters, not money; neither consumption nor investment is particularly interest-elastic; and the effects of interest changes are in any case often swamped by other factors. He distinguishes three ways in which financial events have important effects on the real economy. First and foremost, changes in asset prices lead to changes in both consumption and investment spending. Two different mechanisms operate here. Consumption depends on wealth as well as income, so that increases in the price of land and financial securities induce agents to increase their consumption expenditure, and vice versa. Investment depends (inter alia) on the relative price of existing assets and newly produced capital goods. When asset prices collapse, due to the "fire sales" required to meet financial commitments, the incentive to buy new capital goods falls; the reverse is true (more weakly, perhaps) when asset prices are rising.

Minsky's theory of investment hinges on the relationship between the price of existing capital assets and the supply price of new equipment:Our economy is capitalist. It is characterized by private ownership of the means of production, sophisticated finance, and the buying and selling of capital assets and financial instruments. Capital assets, both individually and as collected into plants and firms, have prices. Thus a capitalist economy has two sets of prices: one of current output and the second of capital assets and associated financial instruments.

These two sets of prices are formed in different markets and on the basis of different "parameters." The supply prices for current output mainly depend upon money wages and profit margins as determined by demand. The prices of capital assets are determined by the gross profits they are expected to earn, risk premiums, and capitalization rates. Capitalization rates depend on the relative supply of those assets that protect the holders against uncertainty (i.e., money), the subjective value placed upon the **(p. 222)** insurance that such assets yield, and the extent of financial commitments that lead to a demand for the monetary assets in which financial commitments are denominated.

As the two sets of prices are determined in different markets and depend upon different variables, their ratios are free to vary. The cyclical behavior of the economy is largely determined by the alignment of the two sets of prices.

Whenever the prices of capital assets rise relative to the prices of current output, investment increases. A fall in these price ratios leads to a decrease in investment. Through the multiplier, changes in investment become changes in aggregate demand (Minsky 1977b, 17; cf. Minsky [1975] 2008, chap. 5).

This theory of investment is in some ways similar to James Tobin's "*q*-theory," but differs from it in placing much more importance on financial considerations, and in particular on fundamental (Keynesian) uncertainty as a factor influencing the decisions of both lenders and borrowers (Pollin 1997, 78–80). Late in life Minsky criticized the "asymmentric information boomlet," and Ben Bernanke in particular, for failing to deal adequately with "the two-price-level characterization of a capitalist economy" (Minsky 1992–3, 82).

The second way in which financial conditions affect aggregate expenditure, and therefore influence output and employment, is through changes in expectations. Minsky was evidently not a believer in rational expectations. Indeed, the financial instability hypothesis can be summarized as a theory of cyclically *irrational* expectations, as speculative finance gives way to Ponzi finance and then, after the credit crunch, to hedge finance once more. Minsky would, however, have insisted on the importance of the fallacy of composition in this context: what is rational for any individual financial agent (that is, lender or borrower) is often irrational from the point of view of the financial system as a whole. This turns out not to be a good thing, either for individual agents or for the economy as a whole. Note that it is expectations concerning *asset* prices that really matter; "inflationary expectations," as conventionally understood, which concern the future rate of increase of *output* prices, are not particularly important.

The third channel through which finance affects output and employment is critical in the crisis and depression phases of the cycle. This is credit rationing. Whereas in the upswing and (especially) the euphoric phases almost everyone capable of asking for a loan is granted one, when the bubble bursts even solid, creditworthy borrowers will be denied finance and will be forced to reduce their expenditure accordingly. Minsky himself emphasized the power of credit rationing in reducing business investment in the depression phase of the cycle, but he would not have been greatly surprised to discover its adverse effect on consumer expenditure, including but not confined to housing. This has little or nothing to do with interest rates. In a credit crunch, almost by definition, it is impossible to obtain finance at any price. Thus, in Minsky's vision of financial capitalism, a crisis that begins in the financial sector has pervasive effects on output and employment in all other sectors. Unemployment rises, not because workers choose leisure instead of consumer goods, as in the New Neoclassical Synthesis, but because capitalists no longer find it profitable to employ so many of them.

The financial instability hypothesis began life as a theory of financial *commitments*. To complete his analysis Minsky needed a theory of financial *resources*, which (p. 223) he found—eventually—in Michał Kalecki's model of aggregate profits. A company is in financial stress, to use a favorite term of Minsky's, only if its contractual obligations exceed its ability to meet them. In macroeconomic terms, taking all companies together, this ability depends on total profits, and here Kalecki's analysis is crucial (Kalecki 1942). Minsky was slow to make use of it—the first acknowledgment comes in Minsky (1977b)—but it became central to his own thinking (Minsky [1986] 2008, 36–43). In a closed economy with no government, the familiar income-expenditure equation can be written as (1.11.1)

$$\begin{aligned}\text{Profits} + \text{Wages} = \ & \text{Capitalists' Consumption} \\ & + \text{Workers' Consumption} + \text{Investment}.\end{aligned}$$

$$\begin{aligned}\text{Profits} + \text{Wages} = \ & \text{Capitalists' Consumption} \\ & + \text{Workers' Consumption} + \text{Investment}.\end{aligned}$$

Causation runs from right to left; expenditure determines income (and full employment is neither assumed nor ensured). If workers do not save, so that wages are equal to workers' consumption spending, this simplifies to (1.11.2)

$$\text{Profits} = \text{Capitalists'Consumption} + \text{Investment}.$$

$$\text{Profits} = \text{Capitalists' Consumption} + \text{Investment}.$$

Again causation runs from right to left. Equation (1.11.2) shows that, in aggregate, capitalists' expenditure determines capitalists' incomes, and therefore also determines their ability to meet their financial commitments.

Minsky's theoretical analysis distinguishes him very clearly from monetarists and New Classical macroeconomists, for whom the private sector is fundamentally stable, and from the Austrians, for whom state intervention is seen as part of the problem and not (as with Minsky) as an important part of the solution. It also put him at odds with many post-Keynesians, who seemed to focus on growth and/or stagnation at the expense of cyclical instability. Minsky was severely critical of Paul Davidson's *Money and the Real World* for precisely this reason (Minsky 1974). Nonetheless, he has much in common with post-Keynesianism, and also with those New Keynesians who analyze the working of imperfect capital markets (Fazzari 1992).

Minsky was an endogenous money man, though not always consistently so (Wray 1992; King 1996). In post-Keynesian terms, he had one foot in each of the "structuralist" and "accommodationist" camps (Pollin 1991; Fontana 2009, chap. 7). The money supply was not a control variable, he argued, due both to the unremitting pressure of financial innovation, which enabled any restrictive monetary policy to be evaded, and to the potentially disastrous consequences of a central bank failure to accommodate the market demand for credit in periods of financial crisis. This was a less serious problem than the monetarists would maintain, since inflation, for Minsky, was caused not by monetary expansion but rather by cost increases that originated in noncompetitive labor and other input markets. It could almost be said that he reversed the classical dichotomy, so that "monetary" factors determined the level of output and "real" factors were responsible for the price level.

(p. 224) **3. Policy Implications**

In his later years Minsky used to emphasize the strong socialist influences on his early life and thought (Minsky 1992; Papadimitriou 1992). His position was always, however, reformist rather than revolutionary. While he believed that capitalism could and must be reformed, he was under no illusion that the business cycle could be abolished or economic instability eliminated. Entrepreneurial ingenuity, which was repeatedly demonstrated by financial innovation, rendered necessary both eternal vigilance and constant attention to institutional reform: "A fundamental flaw exists in an economy with capitalist financial institutions, for no matter how ingenious and perceptive Central Bankers may be, the speculative and innovative elements of capitalism will eventually lead to financial usages and relations that are conducive to instability" (Minsky 1977b, 22; cf. Minsky [1986] 2008, 287, 333).

Minsky was an early and outspoken critic of monetarism, on at least four counts (Minsky 1963, 1972). He denied that central banks were able to control the money supply; proposed a largely nonmonetary theory of inflation; had no patience with the concepts of a "natural" or "nonaccelerating inflation" rate of unemployment; and urged an active or discretionary monetary policy far removed from the simple rules that were advocated by the monetarists. Minsky argued that the monetary authorities had two vitally important tasks, both aimed at reducing financial instability. The first involved detailed supervision and regulation of financial institutions to restrain market exuberance and prevent the worst excesses of speculative (and still worse, Ponzi) finance. The second required the Federal Reserve to intervene as lender of last resort in moments of actual or potential financial crisis, in order to prevent the failure of financial institutions and the consequent collapse of asset values and investment expenditures. Minsky was well aware of the "moral hazard" dangers of lender-of-last-resort interventions, but he was convinced by the lessons of 1929 that nonintervention posed a much greater threat. The Fed had learned the lessons of the Great Depression, Minsky believed, and this had contributed greatly to the increased stability of the US economy after 1945. Although financial instability could never be prevented, it could be managed, as indeed it had been in a number of postwar crises, like those of 1966 and 1987 (on which see Minsky 1988).

Minsky has been criticized for exaggerating the purely financial causes of economic crises and neglecting other factors (Rousseas 1998, 135–36; Pollin 1997, 93; Palley 2010). He did, however, acknowledge that the task of the Federal Reserve in crisis management had been made very much easier by important changes in fiscal policy in the wake of the Great Depression. Extending the Kaleckian profit equation to a closed economy with a government, equation (1.11.2) becomes (1.11.3)

$$\begin{aligned}\text{Profits} + \text{Taxes} = \ & \text{Capitalists' Consumption} + \text{Investment} \\ & + \text{Government Expenditure}.\end{aligned}$$

$$\begin{aligned}\text{Profits} + \text{Taxes} = \ & \text{Capitalists' Consumption} + \text{Investment} \\ & + \text{Government Expenditure}.\end{aligned}$$

(p. 225) It follows that aggregate profits equal capitalist expenditures plus the budget deficit: (1.11.4)

$$\begin{aligned}\text{Profits} = \quad & \text{Capitalists' Consumption} + \text{Investment} \\ & + (\text{Government Expenditure} - \text{Taxation}).\end{aligned}$$

Profits = Capitalists' Consumption + Investment
+ (Government Expenditure –Taxation).

Thus budget deficits increase aggregate profits and significantly reduce financial fragility (Minsky 1982, xix–xx).

There were three respects, he argued, in which the post-1945 economy was "qualitatively different from the economy which collapsed after 1929." One was the acceptance by the Fed of its role as lender of last resort. The other two related to fiscal policy, and in particular to the much greater size of the federal government after 1939. There was a flow aspect to this, and a stock aspect:

1. The relative size of the government is immensely larger. This implies a much greater deficit once a downturn occurs.
2. There is a large outstanding government debt which increases rapidly when there are deficits. This both sets a floor to liquidity and weakens the link between the money supply and business borrowing (Minsky 1982, xvi).

The second (stock) aspect is often neglected by commentators on Minsky, but it was probably the more significant. For Minsky the importance of vast quantities of risk-free government paper in the portfolios of private financial institutions could never be exaggerated. Accordingly he was, as we have seen, a supporter of "Big Government." In political terms he was a "tax-and-spend" Democrat, with the emphasis on the "spend." He would certainly have been strongly opposed to the deflationary "fiscal consolidation" measures that were implemented in many European economies in 2009–10 and were also advocated (for example, by the International Monetary Fund) for the United States.

For a brief period, between 1965 and 1973, Minsky wrote prolifically on the issues of employment, unemployment, poverty, and inequality, and he returned to these questions in his last major work (Minsky [1986] 2008, chaps. 12–13). His arguments can be summarized in a single phrase: "tight full employment" (Minsky 1965). He claimed that the unemployment rate could and should be reduced to no more than 2.5–3 percent. This was possible without weakening the capitalist institutions of the US economy, and at no serious additional inflationary cost. It was an essential element in the "war against poverty," which could itself be seen as "a conservative rebuttal to an ancient challenge of the radicals, that capitalism necessarily generates 'poverty in the midst of plenty'" (Minsky 1965, 175). To bring unemployment down to 2.5–3 percent, a big increase in public expenditure was necessary: "the emphasis should be on the spending side of fiscal policy, and an object of the spending should be to have the largest primary and secondary impact upon the present poor. Thus, spending should be directed at the communities with low incomes, and the spending programs should directly employ the low-income worker" (1965, 190).

(p. 226) In addition Minsky called for acceptance of the principle that the state should act as *employer of last resort*, offering a job at a low but socially acceptable wage to all those unable to find better-paid employment in the private sector, as with the Works Progress Administration (WPA) during the New Deal. This would not compete with private enterprise to any appreciable degree, since public sector jobs would be concentrated on labor-intensive activities like park patrolmen, hospital orderlies, and environmental conservation that were intrinsically unattractive to private capital. The proposal would permit the repeal of minimum wage legislation and the abolition of unemployment benefits, neither of which would be needed once public sector jobs were available, at a living wage, to almost all who wanted to work. The net effect on government expenditure would be small. In 1986 Minsky estimated the cost of public employment for two million workers at an annual wage of $7,000, with an extra $3,000 in overhead and material costs, at $20 billion, or 0.55 percent of GNP; the more ambitious proposals that he had advanced in the 1960s were significantly more expensive (Minsky 1965, 195–99; [1986] 2008, 310–11).

A further advantage of the scheme, Minsky claimed, was its contribution to the control of inflation, since excessive wage demands would be constrained by the fear that well-paid jobs in the private sector would be replaced by minimum-wage employment in the public sphere (Minsky [1986] 2008, 313). By the late 1990s Minsky's ideas had won the support of some institutionalists (Gordon 1997) and post-Keynesians (Wray 1998, chap. 6; cf.

Aspromourgos 2000). The employer-of-last-resort proposal was intended to "provide jobs in lieu of adult welfare and extended unemployment insurance" (Minsky [1986] 2008, 311) and has obvious similarities with the "workfare," "welfare into work," and "work for the dole" schemes introduced in the 1990s in the United States, UK, and Australia. The language of "mutual obligation" is implicit in all this. A further advantage that Minsky claimed for his proposal was its ability to restrain union power in the private sector (Minsky [1986] 2008, 313); he had already pointed approvingly to the way in which textile union power in the northern states had been eroded by competition from new (and largely nonunion) producers in the South (Minsky 1959, 2234).

The conventional post-Keynesian remedy for inflation is an incomes policy, either by formal tripartite agreement or through market incentives (Harcourt 2001, part 5; Wallich and Weintraub 1971). Papadimitriou reports that Minsky had lost faith, at least by the 1970s, in the willingness of American trade unions to cooperate with employers and the state in the control of inflation (Papadimitriou 1992, 19). He seems never to have considered the feasibility of a tax-based incomes policy, which was advocated by the prominent post-Keynesian Sidney Weintraub, and his support for the centralization of wage negotiations along corporatist lines was no more than lukewarm. In the 1980s, indeed, he dismissed incomes policy as impossible to administer, except perhaps in the public sector (Minsky [1986] 2008, 332). Price and wage increases might be restrained through competition policy, and there was no harm in aiming for complete price stability, but a modest rate of inflation was an apparently inevitable feature of any capitalist economy, except in conditions of deep depression.

(p. 227) **4. Extensions of the Financial Instability Hypothesis**

Minsky's ideas were formed in a period when the United States was, to all intents and purposes, a closed economy, and he formulated the financial instability hypothesis accordingly. One of the few references to the external sector comes in *Stabilizing an Unstable Economy*, where he extended his Kaleckian model of aggregate profits to an open economy without a government, so that equation (1.11.4) becomes (1.11.5)

$$\text{Profits} + \text{Imports} = \text{Capitalists' Consumption} + \text{Investment} + \text{Exports},$$

Profits + Imports = Capitalists' Consumption + Investment + Exports,

and it follows that (1.11.6)

$$\text{Profits} = \text{Capitalists' Consumption} + \text{Investment} + \text{Net Exports}.$$

Profits = Capitalists' Consumption + Investment + Net Exports.

Minsky pointed to Japan (but, significantly, not the United States) as a country where (in the mid-1980s) profitability was vulnerable to any loss of international competitiveness (Minsky [1986] 2008, 43).

In fact the Minsky model can very easily be extended to the international economy. First, exchange rate risk must be recognized as an additional source of financial fragility in an open economy with a floating exchange rate: commitments denominated in a foreign currency are liable to rise or fall, sharply and unpredictably, due to fluctuations in the value of the currency. This danger is intensified when financial institutions take part in the "carry trade," borrowing at low interest rates in one foreign country and lending at higher interest rates in other countries. In an increasingly globalized financial market, a crisis in one region can spread very rapidly to other parts of the world. Although in any one nation such financial contagion can be mitigated by the intervention of the central bank, there is no international lender of last resort, given the limited resources (and punitively deflationary stance) of the International Monetary Fund.

In sum, Minsky's theory can be modified so that, in a global context, financial fragility is increased by the ability of funds to cross national borders and invest in domestic markets; an increase in exchange-rate exposure; and global interest-rate speculation, such as the "carry trade." The movement to the brink of financial crisis can come about from increases in foreign interest rates and decreases in exchange rates. The "not unusual" event can be contagion, and debt deflation can take the form of a debt-exchange rate interaction. The debt deflation can be worsened by the absence of a global central bank, the absence of coordinated macroeconomic policy, and intervention that reduces aggregate demand (Wolfson 2002, 397; original stress deleted).

The Asian financial crisis of 1996–97 provided a very clear example of all this, and the fate of smaller European

countries like Greece, Hungary, Iceland, Ireland, and Latvia in 2010 offers another.

(p. 228) The global financial crisis of 2008–9, however, was very definitely "born in the USA," whence it spread rapidly to the rest of the world. And it began in the US housing market, involving low-income households in addition to the Wall Street capitalists and their corporate customers who dominate the financial instability hypothesis. But it is possible to analyze household behavior, and especially housing debt, in a Minsky framework, and thereby to use his underlying theoretical framework to shed light on the global financial crisis. This requires some significant modification of the hypothesis, which in its original form hinged on relations between capitalist borrowers and capitalist lenders; there are no manual workers on Wall Street. Once NINJA (No Income, No Job or Assets) mortgages are readily available, so that substantial borrowing by low-income households becomes possible, a wedge is driven between workers' incomes and their expenditure (casting doubt on the wisdom of using equation (1.11.2) instead of equation (1.11.1) above). Rising household debt now emerges as a potentially significant source of financial fragility. Although the subprime borrowers in the United States who became the first victims of the global financial crisis were not in fact "Ponzi units," in Minsky's terms (Davidson 2008), they were wiped out exactly as if they had been. The fall in asset prices that began in early 2008 originated in the market for real estate, not capital equipment, and the initial wealth effects were felt on consumption expenditure, not business investment. *Mutatis mutandis*, however, the ensuing credit crunch unfolded more or less as Minsky himself would have expected, with a collapse in business confidence closely following on the collapse in consumer confidence, leading to a sharp drop in investment spending that was made even more serious as a result of severe credit rationing.

Toward the end of his life Minsky was reflecting on the emergence of a new stage of financial capitalism, which he termed "money manager capitalism" (Wray 2009). It was based on the new phenomenon of securitization. This was the latest phase of financial innovation and had led to "the creation of financial paper that is eminently suitable for a global financial structure. There is a symbiotic relation between the globalization of the world's financial structure and the securitization of financial instruments" (Minsky 2008, 2–3). Once again, financial entrepreneurs had succeeded in escaping from what remained of US financial regulation by creating new products and new markets, which lay outside its reach. "Securitization implies that there is no limit to bank initiatives in *creating* credits for there is no recourse to bank capital, and because the credits do not absorb high-powered money…. Securitization lowers the weight of that part of the financing structure that the central bank (Federal Reserve in the United States) is committed to protect" (2008, 3; original stress). It therefore threatens to increase the fragility of the financial system as a whole.

As the global financial crisis unfolded and gave rise to an increasing deep recession in the real-world economy, Minsky's analysis was increasingly invoked, both by post-Keynesians who had always endorsed it (Kregel 2008; Palley 2009; Wray 2008, 2009) and by more orthodox economists, some of whom appeared not to understand it very well (Akerlof and Shiller 2009, 177 n. 2). At the time of writing (January 2013), it seems most unlikely that the New Neoclassical Synthesis will be abandoned by mainstream macroeconomists, despite its evident irrelevance to the global financial (p. 229) crisis. It is "business as usual" in academia, and also in the International Monetary Fund (Blanchard, Dall'Arica, and Mauro 2010). Any shift to a genuinely Keynesian macroeconomics, however, will have to take very serious note of Hyman Minsky and the financial instability hypothesis.

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[–] Abstract and Keywords

This chapter explores the Kaldorian approach to endogenous growth theory. The central principles of this approach are explored, including the claims that growth is (*a*) demand led, with trade playing a central role in aggregate demand formation; and (*b*) path dependent. It is shown that both the actual and natural rates of growth are path dependent in the Kaldorian tradition. The implications of inequality between the actual and natural rates of growth are investigated, and it is shown that mechanisms exist within the Kaldorian tradition that are capable of reconciling these growth rates. This results in the sustainability (in principle) of any particular equilibrium value of the actual rate of growth.

Keywords: endogenous growth, Kaldor, path dependence, demand-led growth, technical change, institutions, natural rate of growth

1. Introduction

The ambition of this chapter is to develop a model of endogenous growth that provides a unified and coherent account of capitalist macrodynamics along Kaldorian lines. According to this model, there are two fundamental properties of growth: it is both demand led (with international trade playing a particularly important role in generating the growth of autonomous demand) and path dependent. Path dependence is found in both the actual and the (Harrodian) natural rates of growth and ultimately involves the economy evolving through an historically specific series of technologically and/or institutionally specific regimes or episodes of growth.

The Kaldorian approach is by no means the only post-Keynesian (much less the only nonneoclassical) perspective on growth from which the central themes addressed in this chapter arise.[1] Moreover, there is no unique "Kaldorian approach" to growth. Instead, three distinct strands of contemporary Kaldorian growth theory can be identified: models of balance-of-payments-constrained growth; models of cumulative causation; and two-sector "North-South" models.[2] The themes explored in these strands overlap considerably, but the strands themselves are nevertheless distinct. The approach adopted in this chapter draws on the first two—and, in particular, the second—of the three strands of Kaldorian growth theory identified above.[3]

The chapter is organized as follows. Section 2 outlines elements of the basic vision of growth developed by Nicholas Kaldor following his inaugural lecture at Cambridge University (Kaldor 1966). In section 3, the canonical formal model of Kaldor's growth schema—based on Dixon and Thirlwall (1975)—is presented, and its properties are highlighted. Section 4 then discusses path dependence in the actual rate of growth. The potential importance of initial conditions is discussed first. Richer conceptions of path dependence are then introduced, drawing on Cornwall and Cornwall's (2001) (p. 232) conception of "evolutionary Keynesian" macrodynamics. Particular importance is attached in this discussion to the recursive interaction of institutions, demand conditions, and growth outcomes. It is shown that a variant of the Kaldorian model that emphasizes this recursive interaction can help

illuminate the rise and decline (or at least, contemporary crisis) of the recent "financialized" growth process centered in the United States. Section 5 then discusses path dependence in the natural rate of growth. This draws attention back to the response of supply conditions to demand conditions that is a basic feature of the Kaldorian vision of growth. It also results in investigation of the ways in which supply and demand conditions may interact in the course of growth so as to reconcile the rates of growth of actual and potential output—an important theme in some branches of post-Keynesian growth theory since Cornwall (1972).[4] Finally, section 6 offers some conclusions.

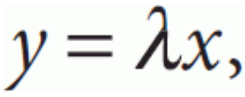
2. The Kaldorian Vision of Growth

Modern Kaldorian growth theory builds on the growth schema found in Nicholas Kaldor's writings on cumulative causation (see, for example, Kaldor 1970; 1985; 1996). Kaldor's basic vision of growth is, in turn, based on the two-way interaction between the division of labor and the extent of the market first discussed by Adam Smith. Hence for Kaldor—as for Smith—"the division of labour depends on the extent of the market." In other words, the expansion of demand induces changes in the potential supply of goods, by affecting the efficiency with which goods are produced. Kaldor appealed to Verdoorn's law, according to which the rate of growth of productivity depends on the rate of growth of output, to represent this dynamic. Verdoorn's law is commonly understood as a dynamic analog of Smith's original dictum, capturing the influence of output growth on not just the extent of specialization in the production process, but also on learning by doing, the propensity to engage in research and development, and firms' willingness to invest in "lumpy" physical capital that embodies technological improvements (see, for example, Setterfield 1997a, chap. 3 for further discussion).

For Smith, it was also true that the extent of the market depended on the division of labor—that is, supply created demand, as in Say's Law. Kaldor, however, regarded demand as being relatively autonomous of supply conditions —*influenced* but not *determined by* supply conditions, as in Keynes's principle of effective demand.[5] This Keynesian conception of demand formation privileges the causal role of demand in the two-way interaction between demand and supply originally envisaged by Smith. In other words, demand formation becomes the focus of growth analysis, and growth is conceived as an essentially demand-led process.

In his writings on cumulative causation, Kaldor placed particular emphasis on external demand (i.e., exports) as the key source of the expansion of aggregate demand. (p. 233) Indeed, for Kaldor, the expansion of exports is the proximate source of growth, so that the basic "equation of motion" in growth theory is (1.12.1)

$$y = \lambda x,$$



where y is the rate of growth of real output, x is the rate of growth of real exports, and λ is the dynamic foreign trade multiplier. Note that if equation (1.12.1) were to imply that growing economies must run balance-of-trade surpluses, it would suffer a simple fallacy of composition. It would lack generality as a description of capitalist growth, because not all economies can simultaneously accumulate trade surpluses. However, equation (1.12.1) does *not* necessarily have this implication. To see this, consider the foundations of equation (1.12.1) based on the following simple static model of output determination: (1.12.2)

$$Y = C + I + (X - M)$$

$Y = C + I + (X - M)$

(1.12.3)

$$C = cY$$

$C = cY$

(1.12.4)

$$I = v\Delta Y = vyY$$

$I = v\Delta Y = vyY$

(1.12.5)

$$M = mY$$

$M = mY$

where Y is real output, C, I, X, and M are (respectively) consumption, investment, exports, and imports (all in real terms), and c, v, and m are (respectively) the propensity to consume, the (fixed) full capacity capital-output ratio and the propensity to import. The structure of this model is consistent with Kaldor's (1970) insistence that, ultimately, exports are the only truly autonomous source of demand: both consumption and investment are wholly endogenous to income.[6]

Solution of (1.12.2)–(1.12.5) yields

$$Y = \frac{1}{1-(c+vy)+m} X.$$

$Y = \frac{1}{1-(c+vy)+m} X.$

Suppose we now assume that $c + vy = 1$. This implies (from equations (1.12.3) and (1.12.4)) that the savings-income and investment-income ratios are always equal, and is again consistent with Kaldor's thinking.[7] Under these conditions, the solution to (1.12.2)–(1.12.5) reduces to (1.12.6)

$$Y = \frac{1}{m} X,$$

$Y = \frac{1}{m} X,$

(p. 234) where $1/m$ is the Harrod foreign trade multiplier. Finally, it follows from (1.12.5) and (1.12.6) that[8] (1.12.7)

$$\dot{M} = m\dot{Y}$$

$\dot{M} = m\dot{Y}$

(1.12.8)

$$\dot{Y} = \frac{1}{m} \dot{X}$$

$\dot{Y} = \frac{1}{m} \dot{X}$

and from combination of (1.12.7) and (1.12.8) that

$$\dot{M} = m \frac{1}{m} \dot{X} = \dot{X}.$$

$\dot{M} = m \frac{1}{m} \dot{X} = \dot{X}.$

In other words, starting from a position of external balance ($X = M$), any expansion of output due to an expansion of exports $(\dot{X} > 0)$ will automatically be consistent with the *maintenance of external balance*, since $\dot{M} = \dot{X}$. In short, the notion that export-led growth (as in equation (1.12.1)) necessarily suffers a fallacy of composition—in the sense that not all countries can pursue export-led growth simultaneously—is false. This result is, of course, intuitive. It holds for the same reason that an increase in the size of Firm A does not necessarily come at the expense of Firm B: both firms can expand simultaneously as a result of a *general expansion of trade*.[9]

For Kaldor, the two-way interaction between demand and supply conditions that has been discussed above is properly interpreted as a process of cumulative causation—that is, a self-reinforcing, causal-recursive process, as a result of which initially rapid growth induces dynamic increasing returns (via Verdoorn's law), which enhances export competitiveness and hence export growth, which results in further rapid growth (via equation (1.12.1)), and so on. In this schema, growth is certainly endogenous in the "narrow" sense identified by Roberts and Setterfield

(2007). First, technical change is explicitly modeled (in the form of Verdoorn's law). Second, instead of their being imposed upon the system from without, actual growth outcomes arise from causal interactions within the schema itself. But Kaldor's growth schema is also consistent with Roberts and Setterfield's "deeper" conception of endogenous growth, in which the growth rate today is sensitive to the pace of growth in the past. In other words, growth is *endogenous to its own past history*, or is path dependent. The importance of this theme to Kaldor is evident in the following quotation:

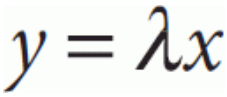
> it is impossible to assume the constancy of anything *over* time, such as the supply of labour or capital, the psychological preferences for commodities, the nature and number of commodities, or technical knowledge. All these things are in a continuous process of change but the forces that make for change are endogenous not exogenous to the system. The only truly exogenous factor is *whatever exists at a given moment of time*, as a heritage of the past.
>
> (Kaldor 1985, 61; emphasis in original)

(p. 235) Along with the importance of trade for aggregate demand formation, the notion of growth as a historical or path-dependent process has also informed much of the literature that has built on Kaldor's growth schema. This will become clear in the development and discussion of the Kaldorian growth model that follows.

3. A Model of Cumulative Causation

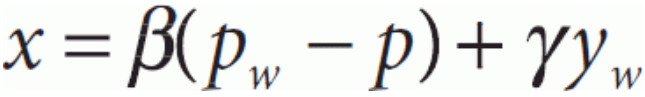
The canonical formal model of Kaldor's growth schema for a "representative" capitalist economy, originally developed by Dixon and Thirlwall (1975), can be stated as follows:[10] (1.12.1)

$$y = \lambda x$$



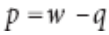
(1.12.9)

$$x = \beta(p_w - p) + \gamma y_w$$



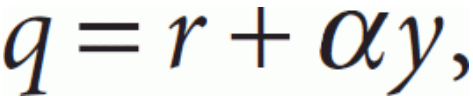
(1.12.10)

$$p = w - q$$



(1.12.11)

$$q = r + \alpha y,$$



where p is the rate of inflation, w is the rate of growth of nominal wages, q is the rate of productivity growth, the subscript w denotes the value of a variable in the "rest of the world," and all other variables are as previously defined. Equation (1.12.1) is already familiar. Equation (1.12.9) describes the rate of growth of exports in terms of the inflation differential ($p_w - p$), which measures the rate of change of the relative prices of tradable goods, and the rate of growth of income in the rest of the world. It can be derived from a Cobb-Douglas export demand function of the form

$$X = \left(\frac{P_w E}{P}\right)^{\beta} Y_w^{\gamma},$$

$$X = \left(\frac{P_w E}{P} \right)^{\beta} Y_w^{\gamma},$$

where P denotes the price level, E is the nominal exchange rate (assumed fixed for simplicity), β is the price elasticity of exports, γ is the income elasticity of exports, and other variables are as previously defined. Equation (1.12.10) describes the rate of inflation and follows from a pricing equation in which prices are set as a (fixed) markup over unit labor costs. Finally, equation (1.12.11) represents Verdoorn's law, as discussed earlier. The parameter r captures exogenous influences on productivity, while α—the "Verdoorn coefficient"—measures the elasticity of productivity with respect to real output.

Combining equations (1.12.1), (1.12.9), and (1.12.10) yields (1.12.12)

$$y = \lambda([p_w - w + q] + \gamma y_w).$$

$$y = \lambda(\beta\,[p_w - w + q] + \gamma y_w).$$

(p. 236) If we now assume that

$$p_w = w_w - q_w$$

$$p_w = w_w - q_w$$

$$q_w = r + \alpha_w y_w$$

$$q_w = r + \alpha_w y_w$$

(in other words, that inflation and productivity growth in the rest of the world are determined in the same fashion as they are in our representative economy), and that

$$w = w_w$$

$$w = w_w$$

(the Kaldorian stylized fact of constant wage relativities), then equation (1.12.12) can be rewritten as (1.12.13)

$$y = \Omega + \lambda\beta q,$$

$$y = \Omega + \lambda\beta q,$$

where $\Omega = \lambda([\gamma - \alpha_w\beta]y_w - \beta r)$. Following Cornwall and Setterfield (2002), we can identify Verdoorn's law in equation (1.12.11) as the *productivity regime* (PR) of the model, describing how productivity growth is determined through (inter alia) growth-induced technical progress, and equation (1.12.13) as the *demand regime* (DR), which describes the dynamics of demand formation. Equation (1.12.13) summarizes a process of demand formation that includes the influence of productivity growth on domestic inflation (in equation (1.12.10)) and hence export growth (in equation (1.12.9)) and hence output growth (in equation (1.12.1))—thus establishing the influence of supply conditions on aggregate demand presupposed by Smith.[11] But the dynamics of demand formation are not *limited* to this influence of supply on demand (thanks to the role of Ω), thus establishing the relative autonomy of aggregate demand from aggregate supply presupposed by Kaldor (following Keynes's principle of effective demand).

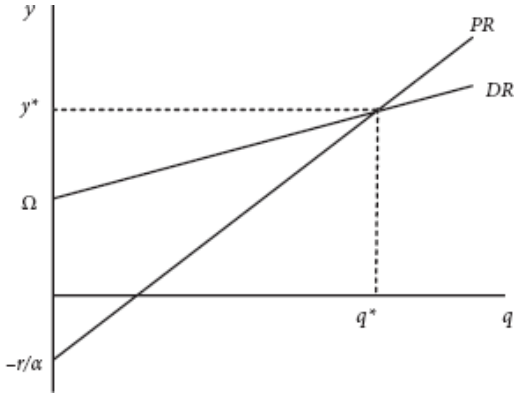


Figure 1.12.1 The canonical Kaldorian growth model.

Together, the productivity and demand regimes outlined above describe the recursive interaction of aggregate demand and aggregate supply in the determination of the growth rate, as envisaged by Kaldor in his discussions of the process of cumulative causation. This is illustrated in figure 1.12.1, in which y^* and q^* denote the equilibrium rates of growth of output and productivity, respectively, and where it is assumed that $\Omega > 0 > -r/\alpha$ and $1/\alpha > \lambda\beta \Rightarrow \lambda\alpha\beta < 1$. The significance of the first of these conditions is clear by inspection of figure 1.12.1; the second implies that, as they are presented in the figure, PR is steeper than DR. Together, these conditions are sufficient to ensure the stability of the growth equilibrium depicted in figure 1.12.1 at economically meaningful (i.e., positive) values of y and q. This is captured in the figure by the values of y^*, $q^* > 0$, coupled with the observation that if we begin in figure 1.12.1 with any value of q that is lower (higher) than q^*, the resulting rate of growth (read off DR) will cause a subsequent increase (decrease) in q due to movement along PR, which will induce a rise (fall) in y due to movement along DR and so on, until the point (q^*, y^*) is reached. **(p. 237)**

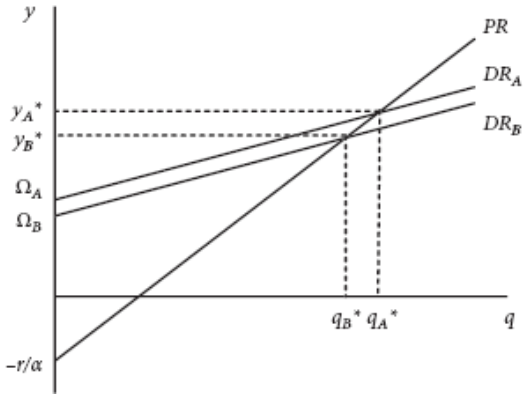


Figure 1.12.2 Growth outcomes in two different economies.

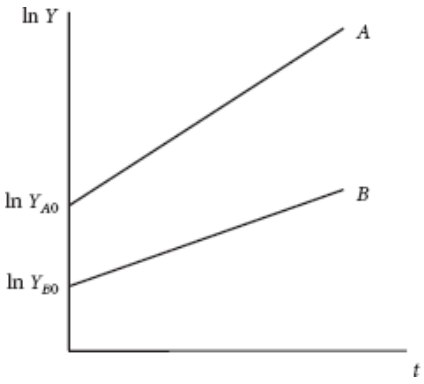


Figure 1.12.3 Income divergence in the canonical Kaldorian model.

The model developed so far serves to illustrate an important theme in Kaldorian growth theory: the possibility of income divergence, and hence growing inequality, between economies in the course of growth. To see this, consider two economies, *A* and *B*, that differ only with respect to their income elasticities of demand for exports, γ, such that

$$\gamma_A > \gamma_B.$$

$\gamma_A > \gamma_B.$

Then in terms of their respective DRs (and as is revealed by inspection of equation (1.12.13) and the definition of Ω) we have

$$\Omega_A > \Omega_B$$

$\Omega_A > \Omega_B$

and hence, as is illustrated in figure 1.12.2,

$$y_A^\star > y_B^\star.$$

$y_A^* > y_B^*.$

Now assume that $Y_A > Y_B$ initially. The consequences of this assumption, when coupled with the growth outcomes depicted in figure 1.12.2,[12] are illustrated in figure 1.12.3. Figure 1.12.3 makes clear that, thanks to its initial advantage in the level of *Y* and (from figure 1.12.2) its self-perpetuating advantage in growth, economy *A* will grow ever richer than economy *B* over time in both absolute and relative terms.[13] In other words, the inequality of income as between economies *A* and *B* will steadily increase, in both absolute and relative terms, in the course of growth. This pattern of divergence between "rich" and "poor" economies is consistent with the observed experience of advanced capitalist economies vis-à-vis the rest of the world (see, for example, Maddison 1991, table 1.5). (p. 238)

Even as the model illustrates the potential for divergence between rich and poor economies, however, it is important to note that it is also consistent with empirical findings of "conditional convergence"—the tendency of poorer countries to grow faster than richer ones once a variety of influences on growth *other than the initial level of development* has been controlled for (see, for example, Mankiw et al. 1992). These findings are usually interpreted in terms of a neoclassical growth framework, from which the result of conditional convergence was first derived. But as shown by Roberts (2007), the same result can be derived from the canonical Kaldorian model outlined above. Essentially, this is because the transitional dynamics of the model above are qualitatively identical to those of the neoclassical growth model: the growth rate will tend to rise (fall) over time in any economy that initially grows slower (faster) than its equilibrium growth rate, as was illustrated in figure 1.12.1 (see Roberts 2007, 624–26). Conditional convergence results that are usually interpreted in terms of neoclassical growth theory are therefore compatible with the canonical formal model of Kaldor's growth schema that has been outlined in this section.

(p. 239) **4. Path Dependence in the Actual Rate of Growth**

The model developed in the previous section is certainly faithful to the circular interaction between actual and potential output emphasized by Kaldor. Nevertheless, it seems to lack the requisite emphasis on history and path dependence in the growth process: it is, to all appearances, an ahistorical, traditional equilibrium model.[14] But contrary to appearances, the model in fact provides a good vehicle for exploring path dependence in the growth process, as will be demonstrated in this and the following section.

4.1. A Disequilibrium Approach to Historical Contingency

It was noted in the previous section that, providing certain existence and stability conditions are observed, the rates of growth of output and productivity will automatically gravitate toward their equilibrium values even if they are above or below these equilibrium values initially. In other words, equilibrium outcomes such as (q^*, y^*) in figure 1.12.1 act as *point attractors*. Of course, if the rates of growth of output and productivity *are* different from their equilibrium values initially, then throughout the process of adjustment toward equilibrium, their values will depend on the rates of growth established initially.[15] Moreover, it may not be possible to "get into" equilibrium if the speed of adjustment toward equilibrium is slow relative to the rate at which the data defining the equilibrium are changing over time (Harcourt 1982, 218; Fisher 1983, 3; Cornwall 1991, 107; Halevi and Kriesler 1992, 229).[16] The upshot of

these considerations is the following: the existence of a point attractor such as (q^*, y^*) in figure 1.12.1 notwithstanding, the rates of growth of output and productivity actually observed in the economy may always be a product of their initial rates in a system characterized by perpetual disequilibrium adjustment. We thus have a model of "weak" path-dependent growth "in which initial conditions, but no other feature of the economy's growth trajectory, influence subsequent growth outcomes in a purely self-reinforcing manner" (Setterfield 2002, 220).[17] This is in keeping with Kaldor's emphasis on the lasting influence of initial conditions on growth outcomes in a system that never "settles down" into a steady (equilibrium) rate of growth (see, for example, Kaldor 1985, 61–63).

4.2. A Unit Root in the Growth Process

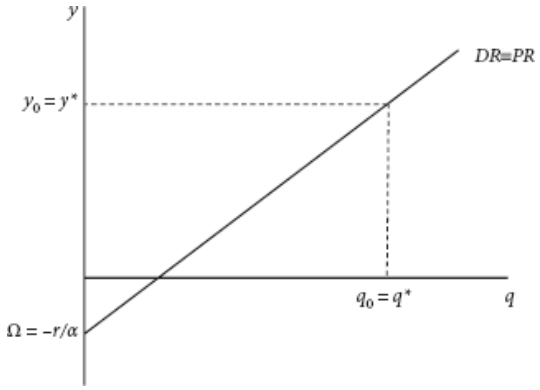


Figure 1.12.4 The Influence of initial conditions due to a unit root in the growth process.

An alternative to the disequilibrium approach is to postulate the existence of a unit root in the growth process—specifically, to assume that

$$\lambda\alpha\beta = 1.$$

$\lambda\alpha\beta = 1.$

(p. 240) It will immediately be recognized that in so doing, we have changed one of the two conditions identified earlier as sufficient for the existence and stability of the equilibrium identified in figure 1.12.1. The consequence of this unit root assumption is easiest to demonstrate if we also assume that[18]

$$\Omega = -r/\alpha.$$

$\Omega = -r / \alpha.$

Now note that $\lambda\alpha\beta = 1 \Rightarrow \alpha = 1/\lambda\beta$ and $\Omega = -r/\alpha \Rightarrow r = -\alpha\Omega$. If we substitute these last two expressions into PR in equation (1.12.11), we get

$$q = -\alpha\Omega + \frac{1}{\lambda\beta}y,$$

$q = -\alpha\Omega + \frac{1}{\lambda\beta}y,$

from which it follows that

$$y = \Omega + \lambda\beta q$$

$$y = \Omega + \lambda\beta q$$

(recalling that λαβ=1). This is, of course, exactly the same as the expression for DR in equation (1.12.13). In other words, DR and PR are now identical, as depicted in figure 1.12.4. And as is also illustrated in figure 1.12.4, *any* initial choice of productivity growth rate (such as q_0) will generate a rate of growth of output (y_0), read off PR, that will, in turn, generate a rate of growth of productivity (read off DR) that is exactly equal to q_0. In other words, ceteris paribus, whatever growth rate is established initially will be indefinitely self-perpetuating. Put differently, all points along the DR ≡ PR schedule depicted in figure 1.12.4 are steady-state growth equilibria, so that $q_0 = q^*, y_0 = y^*$ for all q_0, y_0. The substance of this result is that, once again, the decisive influence of initial conditions on subsequent growth outcomes (à la Kaldor)—that is, the "weak" path dependence of growth—is established.

(p. 241) **4.3. Strong Path Dependence I: Technological Lock-in and Growth**

The "weak" path dependence inherent in both the disequilibrium and unit root variants of the canonical Kaldorian model means that initial conditions affect long-run growth outcomes. But in these models, in the absence of unexplained, exogenous shocks, initial conditions are the *only* feature of the economy's prior growth trajectory that influences subsequent growth outcomes. However, a richer sense of historical contingency exists, which can be identified with "strong" path dependence. Strong path dependence involves *structural change* within an economy in response to its prior trajectory, where the latter may involve either a sequence of disequilibrium adjustments (as discussed in section 4.1 above), or cumulative experience of the same (equilibrium) outcome (such as that depicted in figure 1.12.1). Specifically, strong path dependence exists when either the path toward or the cumulative experience of a particular equilibrium outcome affects the conditions of equilibrium (the data defining the equilibrium, such as the values of Ω and α in DR and PR depicted in figure 1.12.1) and hence the position of equilibrium (i.e., the precise equilibrium outcomes, such as q^* and y^* in figure 1.12.1).[19] From this point of view, *all* positions of equilibrium (such as that depicted in figure 1.12.1) are "provisional" or "conditional" (Chick and Caserta 1997; Setterfield 1997b). They exist only as long as the "data" defining them remain constant, and await subsequent redefinition resulting from discontinuous change in the structure of the economy that is induced by prior (equilibrium or disequilibrium) outcomes themselves. Hence, in the context of the model developed here, figure 1.12.1 depicts no more than a transitory growth "regime"—a provisional or conditional characterization of the system that is adequate for the description of a particular "episode" of growth that may last for several consecutive business cycles, but which is ultimately susceptible to reconfiguration induced by the very outcomes that constitute the episode.[20]

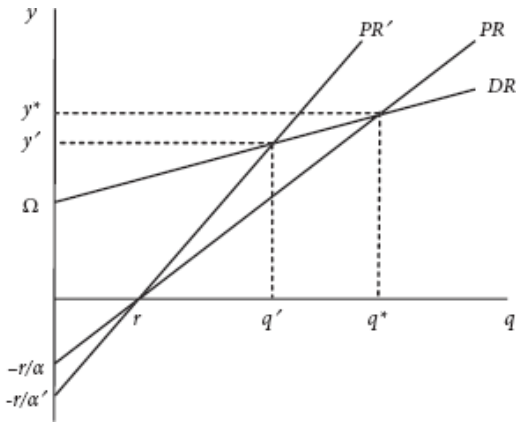


Figure 1.12.5 The consequences of technological interrelatedness and lock-in.

There are various ways in which the structural change associated with strong path dependence may assert itself in the Kaldorian growth model. One of these concerns the pace of induced technological progress, as captured by PR in equation (1.12.11). Recall that α, the Verdoorn coefficient, captures the elasticity of productivity with respect to output—that is, the capacity of the economy to realize productivity gains on the basis of any given rate of growth of output. The value of this elasticity may be subject to discrete, growth-induced structural change due, for example, to technological interrelatedness and lock in (Setterfield 1997a, 1997c, 2002). Suppose, for instance, that

rapid growth in the past causes an economy to get "stuck" with certain industries and/or technologies inherited from the past. This might occur if rapid growth promotes specialization in production (as per Verdoorn's law), but if at the same time, different components of the increasingly specialized production process (including plant, equipment, and human capital both within and between firms, industries, and the public sector) are *interrelated*—that is, subject to common technical standards that create (p. 242) interconnections between them. For example, certain types of computer software will work only on specific computer hardware, and require a specific skill set in order to be operated. Such interrelatedness makes it difficult to change one component of the production process without changing others. For example, an accounting firm may not be able to improve its software without simultaneously changing its computer hardware and retraining its employees. The upshot is that technical change may become prohibitively costly and/or (in an environment of private ownership and decentralized decision making) difficult to coordinate in an economy that has grown extensively (i.e., rapidly and/or over a protracted period of time) by accumulating certain interrelated types of human and physical capital, and in which the degree of interrelatedness between components of the production process has, as a result, surpassed a critical threshold level. Such an economy can be said to have become "locked in" to a particular technological base, inherited as a legacy of its past, from which it subsequently becomes difficult to deviate. And this, in turn, may impair the ability of the economy to realize induced technological progress in the future. Hence if a technological improvement is incompatible with existing components of the production process, it may be foregone. The result is that the economy will experience a discrete drop in the size of its Verdoorn coefficient, α, which measures the ability of the economy to capture induced technological progress, as the threshold level of interrelatedness is surpassed and the economy experiences lock in. The consequences of this are illustrated in figure 1.12.5. Beginning with the same conditional growth equilibrium (at q^*, y^*) depicted in figure 1.12.1, assume that cumulative experience of these growth outcomes creates lock-in to a particular technological base, as described above. This, in turn, will transform the economy's PR from (1.12.11)

$$q = r + \alpha y$$

$q = r + \alpha y$

(p. 243) to (1.12.11a)

$$q = r + \alpha' y,$$

$q = r + \alpha' y,$

where $\alpha' < \alpha$. The upshot of this development is a reduction in the conditional equilibrium rates of output and productivity growth to y' and q' respectively, as illustrated in figure 1.12.5. Clearly, figure 1.12.5 exemplifies strong path dependence as defined earlier. In this case, the cumulative experience of a particular (conditional) equilibrium outcome affects the conditions of equilibrium (the Verdoorn coefficient, α) and hence the position of equilibrium itself.

4.4. Strong Path Dependence II: Institutional Change and Growth

Technology is not the only source of discontinuous structural change that can be associated with strong path dependence. Another source is institutions, defined broadly to include conventions and norms as well as formal (e.g., legal) rules. According to Cornwall and Setterfield (2002), institutions create a framework akin to a computer's operating system,[21] within which the income-generating process summarized in equations (1.12.1) and (1.12.9)–(1.12.11) is embedded. Hence the parameters (and even the precise functional forms) of DR and PR in equations (1.12.11) and (1.12.13) reflect the structure of the economy's institutional framework. For example, a "value sharing" norm that ensures that both workers and firms benefit from productivity gains may reduce conflict over technological change at the point of production and thus increase the responsiveness of productivity growth to output growth (as captured by the Verdoorn coefficient, α). This, in turn, will affect the position of the PR schedule in figure 1.12.1 and hence the economy's rates of growth of output and productivity.

According to Cornwall and Setterfield (2002), the economy's institutional framework is relatively inert and hence enduring—sufficiently so to give rise to precisely the sort of discrete episodes of growth, lasting for several consecutive business cycles, alluded to in the previous subsection. And as was suggested earlier, these growth

episodes can be characterized by equilibrium growth outcomes of the sort depicted in figure 1.12.1, as long as such equilibria are understood to be strictly conditional—in this case, conditional on the reproduction over time of the specific constellation of institutions within which DR and PR are embedded. This conditionality of equilibrium draws our attention to the fact that, while relatively enduring, the institutional framework is not immutable. It can and does change over time, not least in response to the cumulative effects of the growth outcomes to which it gives rise.[22] For example, if sustained economic growth creates "aspiration inflation" resulting in the breakdown of the value-sharing norm described earlier, then heightened distributional conflict at the point of production may impair the capacity of the economy to realize induced technological change, reducing the size of the Verdoorn coefficient, shifting PR, and thus reducing (p. 244) the rates of growth of output and productivity in a manner similar to that depicted in figure 1.12.5. In other words, the institutional framework shapes DR and PR in equations (1.12.11) and (1.12.13), thus creating a discrete episode of growth characterized by a conditional growth equilibrium (such as that depicted in figure 1.12.1). But growth outcomes then have feedback effects on institutions that eventually become manifest as institutional change. The upshot will be a new DR and/or PR, and hence a new episode of growth, and so on. Once again, we are describing a process whereby the cumulative experience of a particular (conditional) equilibrium outcome affects the conditions and hence the position of equilibrium—in other words, a system that displays strong path dependence.

Cornwall and Setterfield (2002) use the model described above to chart the rise and decline of the postwar golden age (1945–73) of macroeconomic performance in terms of discrete institutional changes interacting with the Kaldorian income-generating process summarized in equations (1.12.11) and (1.12.13). As a further example of their approach, consider the international transmission of the rise and decline of the financialized US growth process over the past twenty years. It is widely accepted that growth in the US economy over the last twenty years was consumption-led and financed by unprecedented household debt accumulation (Palley 2002b; Cynamon and Fazzari 2008). According to Cynamon and Fazzari (2008), this financialized growth episode in the United States was brought about by significant changes in the borrowing and lending norms of households and creditors, respectively. Moreover, the institutional change that Cynamon and Fazzari identify can be thought of as having been (in part) induced by the macroeconomic performance experienced in the United States during what Cornwall and Setterfield (2002) identify as the low-growth "Age of Decline" (1973–89).[23] Hence one important macroeconomic outcome that was established during this low-growth episode was the tendency for real wages to grow slower than productivity for the majority of workers, thus depressing the wage share of income (see, for example, Palley 2002b). This outcome can be traced directly to an important institutional feature of modern American capitalism that emerged during the Age of Decline—its "incomes policy based on fear," associated with changes in corporate organization, labor law, and macroeconomic policy designed to increase worker insecurity and reduce the relative power of workers in the wage bargain (Harcourt 2007, 63–64; Setterfield 2006b; 2007). And as Cynamon and Fazzari (2008) argue, stagnant real wage growth has contributed to an increased acceptance among American households of debt accumulation as a mechanism for pursuing the "American dream" of rising living standards. At the same time, the incomes policy based on fear alluded to above was designed to subdue inflationary pressures in the US economy—something it was successful in doing (Setterfield 2006b; 2007). The resulting low (and stable) inflation environment that began to materialize toward the end of the Age of Decline helped to induce changes in creditors' lending norms, by reducing their macroeconomic risk and hence creating an incentive for them to pursue greater microeconomic risk, such as accepting greater household leverage and lending to subprime households (see, for example, Goodhart 2005, 300). (p. 245)

The upshot of these developments was a debt-financed, consumption-led growth episode in the United States after 1990, which has had beneficial effects for countries exporting to the United States as a "consumer of last resort." The international transmission of this financialized US growth episode (and its recent demise) is captured in figure 1.12.6.[24] Suppose, then, that we begin at the equilibrium denoted by q^*, y^* as originally depicted in figure 1.12.1. The emergence of the financialized growth process in the United States can be reckoned to have had two effects on the DR of countries exporting to the United States. The first, direct effect is an increase in $y_w = y_{US}$ and hence $\Omega = \lambda([\gamma - \alpha_w\beta]y_w - \beta r)$ where y_{US} denotes the rate of growth of the US economy, which is treated as a proxy for y_w in economies exporting to the United States as a "consumer of last resort." The second, indirect effect operates via the income elasticity of demand for exports, γ. The increased leverage of US households over the past two decades suggests that, for any given proportional increase in real income, the proportional increase in expenditures by US consumers on all goods and services (including imports) has increased (ceteris paribus), as income growth (which funds additional consumption) has been accompanied by debt accumulation (which

finances additional consumption over and above what would be possible out of additional income). This will manifest itself as an increase in γ and hence (again) $\Omega = \lambda([\gamma - \alpha_w\beta]y_w - \beta r)$. In other words, both the direct and indirect consequences for countries exporting to the United States of the financialized US growth process involve an increase in Ω (to Ω′ in figure 1.12.6), which will shift DR upwards (to DR′ in figure 1.12.6) thus raising the equilibrium rates of output and productivity growth (to *y*′ and *q*′, respectively, in figure 1.12.6).

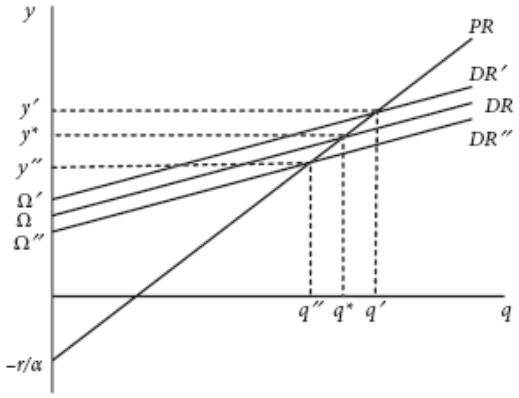


Figure 1.12.6 International transmission of the rise and demise of the financialized US growth regime.

As the events of 2007–9 demonstrated, however, the financialized US growth regime was unsustainable.[25] And as the United States entered the Great Recession and accompanying financial crisis, this had both direct and indirect effects on countries exporting to the United States as the "consumer of last resort" that are again captured in figure 1.12.6. First, the direct effect of the Great Recession was to reduce $y_W = y_{US}$ and hence $\Omega = \lambda([g - \alpha_w\beta]y_w - \beta r)$. Second, the combination of the Great Recession and (p. 246) the financial crisis has changed the proclivity of households and creditors to borrow and lend respectively, with the result that the proportional expansion of expenditures accompanying any given proportional expansion of income—and hence the value of γ—has dropped, again lowering $\Omega = \lambda([\gamma - \alpha_w\beta]y_w - \beta r)$. These developments are captured by the decrease in Ω (to Ω″ in figure 1.12.6), the resulting downward shift in DR (to DR″ in figure 1.12.6), and the accompanying fall in the equilibrium rates of output and productivity growth (to *y*″ and *q*″, respectively, in figure 1.12.6). The remaining question, of course, is whether these events prove to be temporary, or whether the financialized growth regime in the United States is truly exhausted—in which case, ceteris paribus, lower growth outcomes similar to *y*″ and *q*″ in figure 1.12.6 will persist as a new growth episode as the United States leads the world into a period of secular stagnation.

5. Reconciling the Actual and Potential Rates of Growth

In the Kaldorian model outlined in section 3, not only is the actual (equilibrium) rate of growth path-dependent but so, too, is the Harrodian *natural* rate of growth—the maximum rate of growth that the economy can achieve in the long run. This is because the natural rate is sensitive to the actual rate of growth that the economy achieves, thanks to the operation of Verdoorn's law. This is illustrated in figure 1.12.7. The figure shows how the equilibrium rate of productivity growth, q^*, established by the intersection of DR and PR in the northeast quadrant of the diagram, determines the equilibrium natural rate of growth, y_n^*, in the southeast quadrant, given the rate of growth of the labor force, *l*.[26]

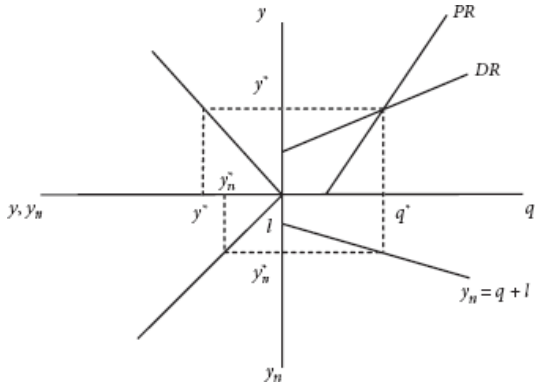


Figure 1.12.7 The endogeneity of the natural rate of growth.

It is also evident from figure 1.12.7 that, even though the natural rate of growth is endogenous, the first Harrod problem—inequality of the equilibrium and natural rates of growth—may persist (Cornwall 1972). In fact, as in Harrod, $y^* = y_n^*$ will emerge only as a special case in the model developed thus far. The reasons for this can be made clear as follows. First, note that from the solution to equations (1.12.11) and (1.12.13), it follows that (1.12.14)

$$y^\star = \frac{\lambda(\gamma - \alpha_w \beta) y_w}{1 - \lambda\alpha\beta}.$$

$$y^* = \frac{\lambda(\gamma - \alpha_w \beta) y_w}{1 - \lambda\alpha\beta}.$$

Meanwhile, since

$$y_n \equiv q + l,$$

$y_n \equiv q + l,$

(p. 247) it follows from appeal to Verdoorn's law that (1.12.15)

$$y_n^\star = r + l + \alpha y^\star.$$

$$y_n^* = r + l + \alpha y^*.$$

Finally, solving equations (1.12.14) and (1.12.15) under the condition $y^* = y_n^*$ yields (1.12.16)

$$\frac{r + l}{1 - \alpha} = \frac{\lambda(\gamma - \alpha_w \beta) y_w}{1 - \lambda\alpha\beta}.$$

$$\frac{r + l}{1 - \alpha} = \frac{\lambda(\gamma - \alpha_w \beta) y_w}{1 - \lambda\alpha\beta}.$$

It is clear by inspection that the equality in (1.12.16) is possible but not likely: it involves a constellation of independently determined parameters, and there is no obvious mechanism that will ensure these parameters take on values that exactly satisfy (1.12.16).

The result derived above raises an important question about the *sustainability* of the equilibrium rate of growth depicted in figure 1.12.7. Hence note that since

$$y \equiv q + n,$$

where n denotes the rate of growth of employment, it follows from this definition and that of the natural rate of growth stated earlier that, if $y^* > y_n^*$ as in figure 1.12.7, we will observe

$$q^\star + n^\star > q^\star + l$$

$$\Rightarrow n^\star > l,$$

(p. 248) where n^* is the equilibrium rate of growth of employment derived from the equilibrium rates of output and productivity growth determined in figure 1.12.7, and the definition of the actual rate of growth stated above. Now note that

$$E = \frac{N}{L}$$

(1.12.17)

$$\Rightarrow \dot{E} = E(n^\star - l)$$

where E denotes the employment rate. Equation (1.12.17) tells us that, given the rate of growth of the labor force, the employment rate E will keep increasing if $n^* > l$. But since the employment rate is bounded above (it cannot exceed 1), this is impossible.[27] The condition $y^* = y_n^*$ therefore constitutes a "golden rule" for sustainable, long-run equilibrium growth. Only if we are analyzing a "dual" economy—that is, one with an abundant "latent reserve army" of labor in a subsistence or informal sector that can be drawn (on demand) into the modern sector whose growth is described by the model we have developed so far—can the "golden rule" be satisfactorily ignored. But advanced capitalist economies are not dual economies, and it is clear from their postwar experience that they are capable of operating near to full employment—in which case any growth outcome similar to that depicted in figure 1.12.7 must be regarded as ultimately unsustainable. Of course, it must be remembered that we are treating growth equilibria such as that depicted in figure 1.12.7 as "conditional." Because of this, a growth regime or episode such as that in figure 1.12.7 may come to an end before the logical bounds of the employment rate have been tested. Nevertheless, the possibility that a growth episode may become labor constrained (i.e., unsustainable because $n^* \neq l$) should alert us to the potential importance of the "golden rule" $y^* = y_n^*$, and hence to the importance of studying processes through which the equilibrium actual and natural rates of growth (and hence n and l) might be brought into alignment, so that growth episodes can be made consistent with a constant employment rate and thus become (in principle) sustainable in the long run.

One such process, proposed by Setterfield (2006a), involves changes to the Verdoorn coefficient brought about by changes in the employment rate.[28] Specifically, Setterfield postulates that (1.12.18)

$$\alpha = \alpha(E),\ \alpha' > 0.$$

In other words, the Verdoorn coefficient is increasing in the rate of employment. The rationale for this relationship is that it is not just the *rate of growth* but also the *level* of economic activity that influences induced technological progress. Specifically, a tighter goods market, from which the tighter labor market associated with a high value of E is understood to derive, will encourage firms to engage in more innovation, changes in technique, and so on, at any given rate of growth.

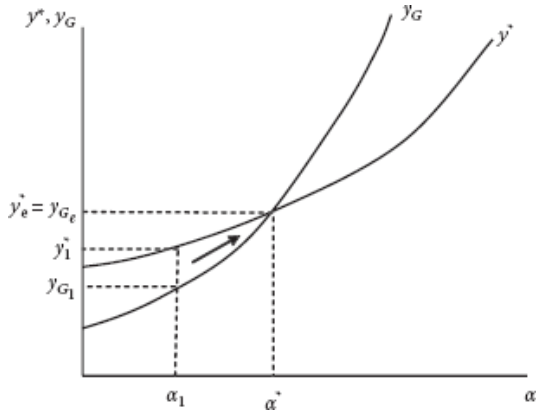


Figure 1.12.8 Adjustment toward a sustainable equilibrium growth rate.

The consequences of equation (1.12.18) are illustrated in figure 1.12.8. The figure depicts, as a function of α, both the equilibrium actual rate of growth in equation (1.12.14) (the schedule denoted y^*), and the rate of growth necessary to satisfy the (p. 249) "golden rule" $y^* = y_n^*$ (the schedule denoted y_G) which, by referring to the left-hand side of equation (1.12.16), can be stated as[29] (1.12.19)

$$y_G = \frac{r+l}{1-\alpha}.$$

$$y_G = \frac{r+l}{1-\alpha}.$$

Figure 1.12.8 depicts a situation where, with $\alpha = \alpha_1$, $y_1^* > y_{G_1}$, and hence, as demonstrated earlier, $n^* > l$. This will result in $\dot{E} > 0$ in equation (1.12.17), as a result of which α will rise in equation (1.12.18), increasing the values of both y^* and y_G in figure 1.12.8. These adjustments will continue until $\alpha = \alpha^*$ in figure 1.12.8, at which point $y_e^* = y_{G_e}$. At this point, the economy will have achieved a conditional equilibrium rate of growth that satisfies the "golden rule" and is therefore sustainable in the long run.

6. Conclusion

This chapter has explored the Kaldorian approach to endogenous growth. The central principles of this approach are that growth is (*a*) demand led, with exports playing a crucial role in aggregate demand formation; and (*b*) path dependent. In Kaldor's original vision, path dependence is associated specifically with the process of cumulative causation, in which initial conditions are self-reinforcing. In modern Kaldorian growth theory, the actual rate of growth may display either "weak" path dependence (sensitivity to initial conditions) or "strong" path dependence. When growth is subject to strong path dependence, the experience of a particular (equilibrium or disequilibrium) growth trajectory can induce discrete structural change associated with the economy's technology and/or institutions, as a result of which the economy will evolve through a series of discrete "regimes" or "episodes" of growth. The natural rate of growth is also path dependent in Kaldorian growth theory, although in and of itself this does not resolve (p. 250) important questions about the *sustainability* of any growth regime characterized by inequality of the actual and natural rates of growth. As has been shown, however, it is possibility to identify solutions to this sustainability issue. These solutions reconcile the basic Kaldorian vision of growth with precisely the type of balance in the growth process necessary to render growth outcomes sustainable in the long run.

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Notes:

(1.) Hence see, for example, Harcourt (2006, chap. 7) for a more comprehensive overview of post-Keynesian growth theory, and Setterfield (2010) for surveys of the literatures that have grown out of these contributions.

(2.) See King (2010) for further discussion of these strands and their antecedents in Kaldor’s own work.

(3.) On the third strand, see Harcourt ([1997] 2001, 247–51) and Skott (1999).

(4.) See, for example, Palley (2002a); Setterfield (2006a); and Dutt (2006, 2010) for more recent discussion and development of this theme in post-Keynesian macrodynamics.

(5.) See, for example, Toner (1999, chap. 6) on the importance of the principle of effective demand in Kaldor’s growth schema.

(6.) See Palumbo (2009) for further discussion of Kaldor’s treatment of consumption, investment, and exports.

(7.) Again, see Palumbo (2009) for further discussion.

(8.) Note that it follows from (1.12.8) that, in this case, $\lambda = 1$ in equation (1.12.1).

(9.) The view that trade (specifically exports) can drive long-run growth *without* creating external imbalances is properly formalized in the balance-of-payments-constrained growth (BPCG) theory originally developed by Thirlwall (1979). See also Blecker (in this volume) for discussion of BPCG theory and a formal reconciliation of this theory with the export-led model of cumulative causation developed in this chapter.

(10.) The Dixon-Thirlwall model is actually a traditional equilibrium model, in which the equilibrium rate of growth is defined and reached independently of the adjustment path taken toward it. It may thus appear to be at odds with the importance placed on path dependence in Kaldorian growth theory. But in fact, suitably extended, the model

provides a good vehicle for discussing growth as a path-dependent process, as will be demonstrated in sections 4 and 5 of this chapter.

(11.) Note, then, that the influence of supply on demand in the Dixon-Thirlwall model assumes that some importance attaches to cost competition in international trade. This is not a necessary feature of the model. Its essential structure—the two-way interaction of supply and demand conditions—would remain unchanged if we were to assume constant relative prices (i.e. $p_w = p$,) and that productivity growth enhances the quality of goods, and hence their non-price competitiveness, and hence the income elasticity of demand for exports (γ). See, however, Carlin et al. (2001) for evidence of the influence of unit labor costs on export competitiveness.

(12.) Note that in figure 1.12.3, $d(\ln Y_A)/dt = y_A^\star > y_B^\star = d(\ln Y_B)/dt$, which is consistent with the results in figure 1.12.2.

(13.) Harcourt's (1995, 12–13) "wolf-pack analogy" provides a useful metaphor for the tendency for income divergence that results from cumulative causation. As wolves break away from the pack, so forces are set in motion that allow them to get further and further ahead. This contrasts with a situation in which breakaway wolves are subject to forces that swiftly return them to the pack.

That the difference between Y_A and Y_B grows in *absolute* terms becomes clear if we define the difference between these income levels at any point in time as

$$G_a = Y_A - Y_B = Y_{A0}e^{y_A^\star t} - Y_{B0}e^{y_B^\star t},$$

$G_a = Y_A - Y_B = Y_{A0}e^{y_A^* t} - Y_{B0}e^{y_B^* t},$

from which it follows that

$$dG_a/dt = Y_{A0}e^{y_A^\star t}y_A^\star - Y_{B0}e^{y_B^\star t}y_B^\star > 0$$

$dG_a/dt = Y_{A0}e^{y_A^* t}y_A^* - Y_{B0}e^{y_B^* t}y_B^* > 0$

since both $Y_{A0} > Y_{B0}$ and $y_A^* > y_B^*$ by hypothesis. That economy *A* also becomes richer in *relative* terms can be demonstrated by defining the difference between the log levels of Y_A and Y_B as

$$G_r = \ln Y_A - \ln Y_B - \ln(Y_A/Y_B)$$

$G_r = \ln Y_A - \ln Y_B = \ln(Y_A/Y_B)$

and noting, by inspection of figure 1.12.3, that G_r—and hence the (log) level of income in economy *A* relative to that in economy *B*—is increasing over time.

(14.) Setterfield (1997a, 6) defines the traditional equilibrium approach to economic analysis "as one in which the long-run or final outcomes of economic systems…are both defined and reached without reference to the (historical) adjustment path taken towards them."

(15.) The choice of any arbitrary initial rate of growth in figure 1.12.1 will result in a sequence of subsequent rates of growth (produced by the process of disequilibrium adjustment) that is uniquely determined by the choice of initial growth rate. Formally, if we rewrite PR from section 3 as

$$q = r + \alpha y_{-1}$$

$q = r + \alpha y_{-1}$

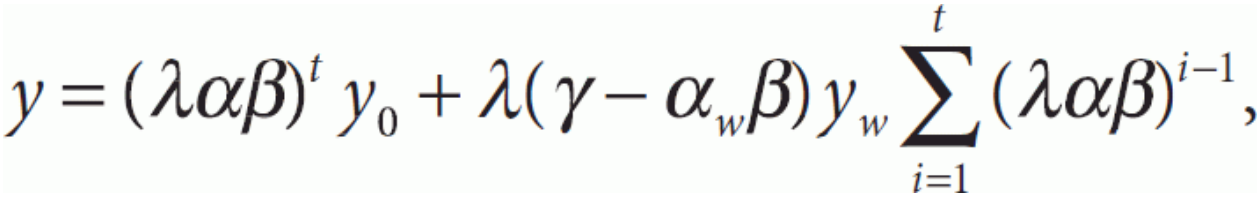
and combine this expression with DR in equation (1.12.13), we get (recalling the definition of Ω):

$$y = \lambda(\gamma - \alpha_w\beta)y_w + \lambda\alpha\beta y_{-1}.$$

$y = \lambda(\gamma - \alpha_w\beta)y_w + \lambda\alpha\beta y_{-1}.$

This expression can, in turn, be rewritten as

$$y = (\lambda\alpha\beta)^t y_0 + \lambda(\gamma - \alpha_w\beta)y_w \sum_{i=1}^{t} (\lambda\alpha\beta)^{i-1},$$

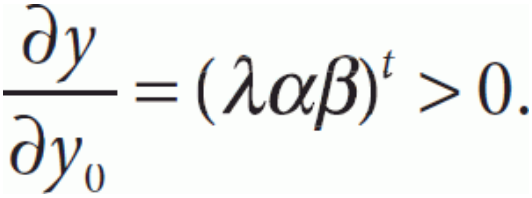


where y_0 denotes the initial rate of growth of output and t is the number of periods that has elapsed since these initial conditions were established. Clearly, ceteris paribus, the choice of y_0 determines the value of y in all subsequent periods.

(16.) The significance of this possibility is reinforced if the "data" defining the equilibrium are understood to derive from relatively enduring but ultimately transmutable institutions, as in the model developed by Cornwall and Setterfield (2002). See section 4.4 below for further discussion.

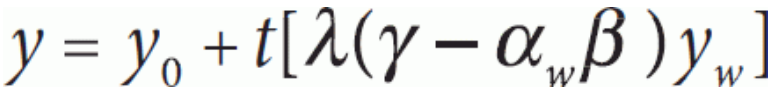
(17.) That the influence of initial conditions is strictly self-reinforcing can be demonstrated by differentiating the expression for y in the previous note with respect to y_0, from which we obtain

$$\frac{\partial y}{\partial y_0} = (l\alpha\beta)^t > 0.$$



(18.) The qualitative result reported below—that the existence of a unit root ensures that initial conditions always matter in the growth process—is unaffected by this second assumption, which is introduced only for purposes of simplicity. To see this, note that the assumption of a unit root transforms the final expression derived in note 12 into

$$y = y_0 + t[\lambda(\gamma - \alpha_w\beta)y_w]$$



from which it is evident by inspection that initial conditions *always* affect subsequent growth outcomes, regardless of the values of other parameters.

(19.) Setterfield (2002, 227) identifies strong path dependence with hysteresis, on the basis that structural change is the sine qua non of hysteresis. The term hysteresis is, however, used in various different ways in economics—including that of a label for the unit root processes discussed earlier—and as such, is avoided altogether here. See Setterfield (2009) for fuller discussion of hysteresis.

(20.) Figure 1.12.1 is thus analogous to what Robinson (1956, 59, 66–67) describes as a "state of tranquility"—a special case where an innately historical process generates outcomes akin to those of a mechanical equilibrium process. See also Harris (1991, 2005).

(21.) See Colander (1999) for the origins of this metaphor.

(22.) In keeping with the durability of institutions (and hence the episodic nature of growth), such change will be discrete and discontinuous.

(23.) The analysis that follows was inspired by, and is in part based upon, a conversation with Wendy Cornwall that took place in August 2008.

(24.) The domestic impact on the US economy itself can also be captured by the variant of the model developed in this chapter that is used by Cornwall and Setterfield (2002). For the sake of simplicity, this exercise is not pursued here.

(25.) See, for example, Palley (2002b) and Godley and Izurieta (2002) for anticipations of this unsustainability that, in tandem with the discussion above, focus on the likely consequences for the aggregate-demand-generating process.

Note that in what follows, the shift in DR to DR″ in figure 1.12.6 is hypothesized to have resulted from the *exhaustion* and subsequent collapse of a growth episode, rather than from institutional change induced by cumulative experience of the growth outcomes associated with the episode (and hence strong path dependence). In this sense, there is an important qualitative difference between the account provided above of the *rise* of the financialized US growth regime (which *does* involve appeal to strong path dependence based on institutional change induced by macroeconomic performance during the previous growth episode), and the account of the regime's subsequent *decline*.

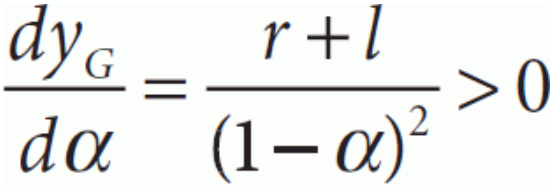
(26.) The rate of growth of the labor force can also be made endogenous to the actual rate of growth (see, for example, Cornwall 1972; 1977), but this possibility is overlooked here for the sake of simplicity. See also León-Ledesma and Thirlwall (2000; 2002) and León-Ledesma and Lanzafame (2010) for evidence of the endogeneity of the natural rate.

(27.) Note that the employment rate is also bounded below—it cannot be less than zero—so an equilibrium growth outcome that involves $n^* < l$ will also raise a problem of unsustainability similar to that identified above.

(28.) See Palley (2002a) for discussion of alternative processes.

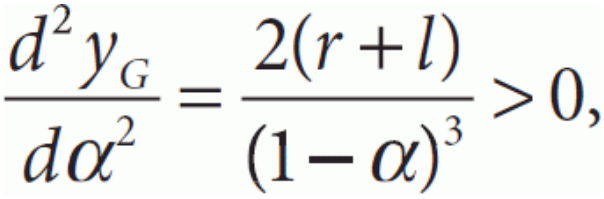
(29.) The schedules depicted in figure 1.12.8 are based on the facts that, from equation (1.12.19)

$$\frac{dy_G}{d\alpha} = \frac{r+l}{(1-\alpha)^2} > 0$$



and

$$\frac{d^2 y_G}{d\alpha^2} = \frac{2(r+l)}{(1-\alpha)^3} > 0,$$



while, from (1.12.14)

$$\frac{dy^\star}{d\alpha} = \frac{\beta\lambda^2(\gamma - \alpha_w\beta)y_w}{(1-\lambda\alpha\beta)^2} > 0$$

$$\frac{dy^{\star}}{d\alpha} = \frac{\beta\lambda^{2}(\gamma - \alpha_{w}\beta)y_{w}}{(1-\lambda\alpha\beta)^{2}} > 0$$

and

$$\frac{d^{2}y^{\star}}{d\alpha^{2}} = \frac{2\beta^{2}\lambda^{3}(\gamma - \alpha_{w}\beta)y_{w}}{(1-\lambda\alpha\beta)^{3}} > 0.$$

Note also that $\lim_{\beta \to 0} (dy^{\star}/d\alpha) = 0$—so a small enough value of β (the price elasticity of demand for exports) is sufficient to ensure that (as depicted in figure (1.12.8), thus ensuring the stability of the system as a whole. See, for example, McCombie and Thirlwall (1994) for discussion of the inelasticity of trade to price competition in the context of Kaldorian growth theory.

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Prue Kerr and Robert Scazzieri

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[–] Abstract and Keywords

The beginnings of Keynesian economics were grounded in the need to grasp fundamental relationships in economic reality, but did not explicitly recognize the crucial roles of the underlying long-term structures and their dynamics. This means there was not an explicit discussion of the nature of the relatively persistent constraints circumscribing the course of economic events over time, nor was there any attempt at investigating the pattern of change of those very constraints as we move from shorter to longer time horizons. The conceptual difficulty of the early Cambridge Keynesians with structural dynamics continued even after R. F. Harrod's dynamic turn. Both Joan Robinson and Nicholas Kaldor addressed the economics of the long run through long-period theory but did not consider a truly structural analysis. The task of explicitly addressing structural economic dynamics from within the Cambridge post-Keynesian economics was taken up by Richard Goodwin and Luigi Pasinetti.

Keywords: post-Keynesian economics, Joan Robinson, Nicholas Kaldor, Richard Goodwin, Luigi Pasinetti, structural dynamics, R. F. Harrod, Cambridge Keynesians, structural economic dynamics

1. A Premise: Cambridge Thinking on Structures and Dynamics

The beginnings of Keynesian economics were grounded in the need to grasp fundamental relationships in economic reality, but did not explicitly recognize the crucial roles of the underlying long-term structures and their dynamics. This means there was not an explicit discussion of the nature of the relatively persistent constraints circumscribing the course of economic events over time, nor was there any attempt at investigating the pattern of change of those very constraints as we move from shorter to longer time horizons. For instance, early Keynesian economics was neither interested in the nature of relatively persistent production structures nor in discussing what would be the most suitable conceptual representations of those structures given the objective in view.

The realist slant of early Keynesian theory was essentially pragmatic and had no inclination to detect long-term structural features of the economic system, which could in turn guide economic actions and policy. Indeed, Keynes's emphasis on fundamental uncertainty makes it difficult to think of analytical structures that could at the same time represent *real structures* in the sense of directly expressing the fundamental characteristics of the economic system under consideration. From this point of view, there is a divide in early Keynesian thinking between the purpose of economic theory and the analytical tools supposed to fulfill that purpose.

The conceptual difficulty of the early Cambridge Keynesians with structural dynamics continued even after Harrod's dynamic turn (Harrod 1939, 1948). For Harrod's dynamics acknowledges dynamic factors and their interdependence but is essentially concerned with virtual processes and conditions (knife-edge, natural, and warranted (p. 258) growth). This is also true of the two most important attempts, coming from the generation of Keynes's pupils, at addressing the real systems dynamics of economic systems in the long run. Both Joan Robinson

and Nicholas Kaldor addressed the economics of the long run through long-period theory but did not consider a truly structural analysis. For Joan Robinson, in truly Keynesian spirit, found the long period analytically intractable due to pervasive uncertainty. She introduced categories of movement or change in "historical time" as opposed to logical time, which culminates in "equilibrium", an approach adopted by some post-Keynesians. Nicholas Kaldor outlined an empirical investigation of the long run in terms of historical generalizations (stylized facts) developing analytical principles that acknowledged increasing returns and cumulative causation in the manufacturing sector. In other words, a generalization was attempted, but the resulting analytical framework did not become the basis of further theoretical exploration of structural change. These two economists differed from later Keynesians discussed in this chapter, by the nature and extent of their disaggregation. Around the same time, and starting from different premises, James Meade and Richard Stone (1948) had constructed a disaggregated model of the British economy as an empirical basis for policy, but again did not make an attempt to build on its basis a theoretical understanding of the patterns of interdependence they were detecting.

The task of explicitly addressing structural economic dynamics from within the Cambridge post-Keynesian tradition was taken up by two economists of the younger generation (although of different age), Richard Goodwin and Luigi Pasinetti. Both had come to Cambridge from abroad (Goodwin was previously a Rhodes Scholar at Oxford, where he was supervised by Harrod, and then at Harvard, while Pasinetti had recently graduated from the Catholic University of Milan), and they were both open to external intellectual influences and traditions. Goodwin had been a pupil of Schumpeter and Leontief at Harvard; Pasinetti was coming from an academic background in which the combined influence of Schumpeter and Sraffa was already at work (primarily through the work of a generation of economists slightly older than Pasinetti, which included Siro Lombardini and Paolo Sylos Labini). It is through the work of Goodwin and Pasinetti that a strong intellectual tradition of structural economic dynamics was born at the University of Cambridge. Other economists directly or indirectly associated with the Cambridge blend of structural analysis and dynamic theory contributed to the further development of that tradition, such as Paolo Leon (1967), Terenzio Cozzi (1969), Alberto Quadrio Curzio (1975; see also Quadrio Curzio and Pellizzari, 1999), and Adolph Lowe (1976). It may be interesting to note that Goodwin's and Pasinetti's research programs have both points in common and points of divergence. Common to both is the analytical representation of the economic system in terms of a multisectoral model and the interest in the patterns of structural change a multisectoral economy undergoes over time. Points of difference are the specific representation of the multisectoral economy and the way in which dynamic factors are addressed (see also Landesmann and Scazzieri, 1993). In particular, a Goodwin-type economy (in its conclusive and most elaborated formulation) consists of a set of "dynamically conjoined" sectors such that processes showing similar dynamic characteristics (similar rates of actual or potential growth over time) would be part of the same aggregate sectors.

(p. 259) Differently from Goodwin, Pasinetti adopts a representation of the multisectoral economy whereby productive sectors are identified not by their dynamic features but by their respective final outputs—both in the case of processes leading to consumption goods in a pure labor economy and in the case of vertically integrated sectors leading to consumption or capital goods in a production economy in which commodities are made by labor and produced means of production. The difference between Goodwin's and Pasinetti's analytical representation of a multisectoral production economy are rooted in their respective approach to the study of economic dynamics. For in Goodwin the central dynamic problem is how to assess the instability of the economic system under the specific institutional setup of a capitalist economy. This shows an attitude to economic dynamics that is at the same time reminiscent of Schumpeter's interest in the instability of capitalism (Schumpeter 1928) and of the skepticism expressed by both Karl Marx and Michał Kalecki, and later by Joan Robinson, toward a theoretical investigation of the economics of the long run. Pasinetti's view is different insofar as he is concerned with the identification of permanent and 'natural' features that are in principle independent of specific institutional assumptions. As the most recent formulation of his ideas makes clear (Pasinetti 2007), Pasinetti takes for granted that economic dynamics are constrained by a "deep" structural framework, that this framework is preinstitutional (largely technological), and that the economics of the long run should be conceived first as the study of an abstract (and fundamental) economy and then grounded in concrete historical reality. In spite of their similar points of departure, Goodwin and Pasinetti advocate radically different approaches to the study of structural dynamics. In a way, they take to ultimate consequences Joan Robinson's later view that the long run derives from a sequence of short-period situations. But the consequences they draw are not the same. Goodwin goes for a sophisticated mathematical analysis of instability and fluctuations due to the behavior of social classes in a capitalist economy under the influence of technical change. In this case, Keynesian features (such as effective demand-induced booms and

depressions) are associated with a fundamentally Schumpeterian attitude to the instability associated with innovative waves under capitalist conditions.

Pasinetti, though, does not associate technical progress with a particular institutional setup and wants to identify a theoretical benchmark that draws from reality its essential features and yet can be used as a normative standard in order to evaluate specific historical and institutional setups. In short, a fundamentally skeptical attitude to the possibility of positive dynamic theory for the long run takes Goodwin and Pasinetti along two divergent paths. Goodwin concentrates on short- to medium-run fluctuations and stability problems along a von Neumann path; Pasinetti drops the direct theoretical investigation of institutional issues and concentrates on a normative theory of the long run, in which basic assumptions (stylized facts) about the composition of consumers' demand and technical progress are explored for their consequences on the multisectoral structure of the economic system as long as the economy maintains macroeconomic equilibrium and full employment.[1] In a sense, the contributions by Goodwin and Pasinetti highlight the different implications of addressing structural dynamics by respectively looking at the Marx-Keynes-Schumpeter or at the Keynes-Sraffa relationship. In the (p. 260) former case (Goodwin) the emphasis is on short- to medium-term shocks and response, both of the disequilibrium and "re-equilibration" type. In the latter case (Pasinetti) the emphasis is on the normative implications of structural constraints and on the search for policy tools instrumental for given objectives in view of those constraints.

2. Joan Robinson on Structural Change

The meaning of Joan Robinson's approach to structural analysis can be approached by way of her complex relationship to Piero Sraffa. Although they discussed contemporary theoretical issues, she once remarked that Sraffa would not engage in examining her own analytical developments. So it is not clear to what extent Robinson recognized her own doubts and hesitations with economic theory in Sraffa's methodological concerns. In 1932 she published a booklet on issues arising from different ways of "doing economics," in which she selects to examine, among several others, Sraffa's approach to economics (Robinson 1932). She saw him as unusually serious (see Harcourt [1990] 2002) but as suggestive of a particular methodology. One way she developed of approaching the particular difficulty of constructing theory, of bringing together the real and the abstract, was by distinguishing between the roles of historical and logical time in economics. The passage of time could not be accounted for in a static system, but its implications could be introduced into a dynamic system, in particular by taking into account the effects of uncertainty and expectations, which become apparent in the long run. Hence she introduced a dual temporality: logical versus historical time (also depicted in terms of "history versus equilibrium"), a distinction that she continued to use to represent and qualify different analyses.[2] This dual was also seen to overlap with the analytical purposes of the distinctions of inductive versus deductive argument or realist versus analytic methods. At the same time it involved moving from short-period theory (of Keynes) to (classical) long-period theory. These conceptions involved a strategy of argument that much simplified the methodological debates that underlay them.

For Sraffa, the methodology requires that the "logical" dimension is an outcome of abstracting from the real and is thereby related to the real. For Robinson the representations of the two, logical and historical, for example, although possibly loosely related, can exist independently; Robinson does not see a necessary interdependence. Within the "historical" domain were the "rules of the game." These included all the social and political properties particular to the economy under study that it was hypothesized could influence or account for its behavior. The implications of time were drawn upon: the relationship between the micro and the macro, for example. These may be represented by abstractions that would closely invoke the "real." In 1956 she noted of her own procedure that "it is of no use framing definitions more precise than the subject matter to which they apply" (Robinson 1956, vii). She continues on to say: "These simple categories, however, are useful, provided that we remember innumerable complications that have to be reintroduced before abstract analysis can be confronted with reality" (1956, 5). Robinson undertakes an examination of the representation of the "real" in a number (p. 261) of conceptual and abstract categories and considers the variety of ways the abstraction can change (see Robinson 1956, book 1 in particular; see also pp. 63–64, in which she spells out her rationale). By drawing on classical theory and the theory of effective demand she can replace "equilibrium" with "tranquillity," referring to a state where expectations are fulfilled, concerning prices, quantities of output sold, "costs, profits and all relevant characteristics of the situation" (1956, 59). Implicated in her methodological observations was a critique of neoclassical economics and in particular of its use of "equilibrium," not only as a concept but also on the grounds of the theoretical structure it entailed. It led, among other things, to a neoclassical confusion of differences in positions of equilibrium with

movement or changes between positions (1956, 71), interpreting the static as the dynamic.

Her explanation of growth and accumulation was based on the Marxian schema of reproduction (informed also by Rosa Luxemburg), which she interpreted as an abstraction from her conception of the properties of capitalism. She set out in this (1956) book outcomes that were consistent under different sets of conditions. These outcomes had nothing to say about movement from one state of tranquillity to another but revealed on what such states of tranquillity were contingent.[3] This was essentially a static system.

Robinson's emphasis on the need for theory to be based on "historical time" if it is to address dynamic issues is evident in her (1962) explanation in *The Accumulation of Capital* (1956). Her awareness of the two problems—creating abstract concepts that truly reflect the "real" in all its implications for the subsequent theory and finding the relationship between these concepts that is the outcome of the variables interacting and not the adaptation to the requirements of the theory—began to inform her writing more pervasively as her writing became more political and more provocative. There was a language that belonged to each category of the duals reflecting their different bases: long-period equilibrium was a concept that had no "real" counterpart. She insisted that economic problems tend to raise political tensions: they are historically contingent. (See, for instance, Robinson 1973; [1974] 1979, 48–58).

Perhaps the more immediate interpretation that Robinson gave to Sraffa's deliberations about causation was an outcome of her more philosophically limited (Anglo-Saxon) intellectual background as compared with Sraffa. She conceptualized certain methodological problems that she saw in economic analysis, but she presented the problem of representing and theorizing a dynamic and structured economy with demands that became widely acknowledged among theorists. In 1942, she argued on the basis of her (as yet nonslogan) "history versus equilibrium" (see also Robinson [1953–54] 1960):

> Historically, it is natural to suppose that different industries are developed with widely varying rates of exploitation, varying rates of profit, and varying ratios of capital to labour. The push and pull of competition then tends to establish a common rate of profit.…The movement from an equal rate of exploitation towards an equal rate of profit is not a process in the development of capitalism but a process in the development of economic analysis, from the primitive labour theory of value towards a theory of the interaction between relative demands and relative costs.
>
> (Robinson 1942, 19–20)

(p. 262) In *Exercises in Economic Analysis* (Robinson 1960), she described three types of economy—a peasant economy, a socialist economy, and a competitive capitalist economy. The latter has a consumption goods sector and an investment goods sector and three classes—wage-earners, rentiers, and entrepreneurs. The outcomes for the economy will depend on the saving behavior of each class and the inspiration and activity of the entrepreneurs: these will impact on the level of activity and the distribution of income. She constructed historically and socially different economies featuring different relationships between, for example, distribution and investment, real wage behavior, and the availability of labor. Different outcomes will generate different expectations, so that different values will follow for the key variables. These, she emphasizes, represent differences, not changes. The actual relationships themselves may, in the long run, change, so demanding new basic propositions and representations. She applied this form of analysis particularly when discussing choice of technique. She concludes, after a considered study of various conditions, that there is a long-period trend upward in the accumulation of capital in a capitalist economy. It is the outcome of "the drop in each slump [being] checked at a higher level of demand for consumption goods" and with additional rentier wealth retained, each turn "starts from a higher level of output than the last" (1956, 269).[4] And so there was a long-period dynamic: the sectoral breakdown did not play an integral part. In fact her method was not successfully dynamic; it could specify the differences between respective outcomes but not the process of moving between them.[5]

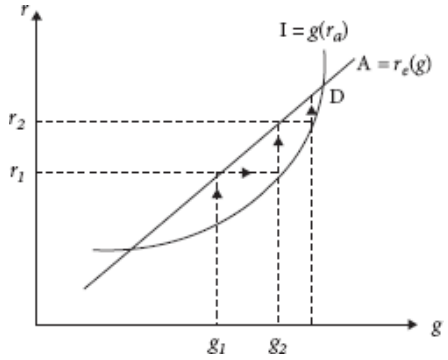

Figure 1.13.1 Rate of profit and rate of growth: Robinson's "banana diagram".

Robinson was aiming to build situations where what happened at the individual level was also true for the aggregate. "The *ceteris paribus* assumption made it analytically feasible to conceive of the economic system in aggregate terms, since compositional issues could be disregarded precisely under the same set of conditions that make the analysis of co-ordination among agents or sectors redundant in the short period" (Scazzieri 2009a, 534). The historical, sociological and institutional features of the economy in Keynes's short period do change, in form and composition and function, over the long period. Keynes's was a short-run theory and could ignore these movements, but a modern growth theory is about change and evolution over the long period, where structure of the economy is crucial. Coordination between sectors cannot be subsumed in a macroeconomic framework of the long period and the resolution of structural issues assigned to exogenous institutional factors. In 1962, Robinson noted that "In concrete reality (as opposed to imaginary equilibrium conditions) the entities described as the amount of employment, the available labour force, the level of prices, the quantity of money, and so forth, are not sharply demarcated at the edges and are immensely complex in their internal structure.… In a causal model the entities are of this vague and complex nature; when simple measures are used, their conventional basis is frankly exposed" (28). She refers here to Keynes's *Treatise on Money*, chapter 8 on index number problems, revealing her concern for the representation of basic concepts and the complexity of converting them to measurables (see also Robinson 1956, 65, where she considers some of the complications of devising index numbers when acknowledging technical progress).[6] **(p. 263)**

Robinson's subsequent approach to explaining the dynamics of a capitalist system, reflecting some of its influences and some of its potential developments, can be represented in several simple diagrams. In her 1962 book she begins by proposing a set of conditions and relationships for the short period. There is spare capacity and unemployment, and the production of commodities is limited by the available plant. Expenditure on the flow of produced commodities equals the flow of outlay on wages plus a part of net profits. The price level of commodities is this total flow of expenditure divided by the rate of output. This price, with the ruling money wage rate, determines the real wage in terms of the consumption good and the total amount of gross profit from sales. And so Robinson creates a classical context within which firms create their expectations and make their plans: she follows Keynes and assumes that expectations of the future are based on the projection of the present, of its wages and prices and so its expected rate of profit on investment.

The dynamic of her model at this stage comes from the drive of firms to accumulate, which itself depends upon the expected rate of profit on investment. Valuing the existing stock of capital on the basis of the existing rate of profit, she can then express their plans in terms of a rate of accumulation. This is the double-sided relationship between the rate of profit and the rate of accumulation to which Kalecki drew attention: accumulation determines the level of profits obtainable and so, depending on the nature of the prevailing expectations, the rate of profit expected on subsequent investment. This rate of profit, in turn, influences the rate of accumulation. The potential endogeneity of this dynamic is revealed in the relationship between the rate of profit caused by the rate of accumulation and the rate of accumulation that that rate of profit will induce.

The arguments are set out in figure 1.13.1 (Robinson 1962, 48–49: her so-called banana diagram).

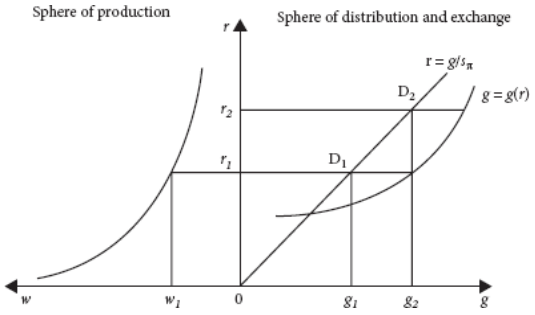

Figure 1.13.2 Distribution and accumulation: Harris's development

On the vertical axis are the actual and expected rates of profit for the economy as a whole. On the horizontal axis are the rates of accumulation. As Joan Robinson writes: "The *A* curve represents the expected rate of profit on investment as a function of the rate of accumulation that generates it. The investment curve represents the rate of **(p. 264)** accumulation as a function of the rate of profit that induces it" (1962, 48–49).The position and slope of the curve showing the relationship between the actual accumulation and the realized profitability reflect the thriftiness out of profits and (possibly) wages and the nature of the financial conditions that determine what profitability a given rate of accumulation may establish. These are conditions of the short period.

At point *D*, the rate of accumulation is generating just the expectation of profit that is required to maintain it. It is a version of Harrod's warranted rate of growth. If actual accumulation is g_1, the corresponding actual (and so, expected) rate of profit is r_1; this rate of profit will support actual accumulation at rate g2 which will generate actual profitability r_2. Robinson is thinking in terms of a consumption goods sector and an investment goods sector in which "the structure of the stock of productive capital has become more or less completely adjusted to requirements" (1962, 50). Robinson acknowledges that this is a simplification and that many factors will interfere to affect the slopes and shapes and positions of the curves, and to influence the possibility and likelihood of the paths being taken between the positions. The iterative process leads the economy to a position of balance that embodies past history; a "desired" rate of accumulation, albeit one that coincides with unemployment, on the basis of a long-run context.[7]

Some of these features have been adapted to Robinson's "banana" diagram to introduce the implications of the distribution of income between wages and profits; her ideas on differing distributions and growth paths are incorporated diagrammatically by Harris 1975 (see figure 1.13.2).[8]

Harris added a wage rate–rate of profit trade-off that reflected, as well as the state of class relations, the current technical conditions and nature of work. His addition illustrated the need for accommodating the interdependency between the realization of the surplus and the need for exploitation of labor to produce it. It reflects a particular balance of power. D_1 represents the position at which the established real wage (on the left, w_1) enables a maximum rate of profit (r_1) that is consistent with a rate of accumulation g_1. OD is, therefore, the profit realization curve. But on the basis that this rate of profit **(p. 265)** will become the next expected rate of profit, entrepreneurs undertake a further level of investment, lifting the rate of accumulation to g_2. On the basis of static assumptions, wherein the underlying relationships themselves do not change, the process moves up to what can be an explosive acceleration. There is also scope for feedback between the two sides of the diagram. The curve g(r) might also move reflecting different sets of investment plans for different sets of historical conditions. Actual accumulation can change the real wage rate and also embody technical progress, and this will impact on the position and shape of the *w-r* relationship. Similarly, events will affect the relationships of accumulation and distribution.[9] Robinson's diagrams allow the path between successive positions to be traced: she can separate the "historical" influences from the short-period influences and so separate out the "trend" from the "cycle." She can allow structural change between periods in response to change in the distribution of income and the composition of effective demand. She defines a long-period position as representing the position toward which the successive adjustments tend to move. This is determined by the coincidence of congruent values of the short-period variables as manifest within their institutional context, this latter itself having the potential to be changed by changes of events that may also affect the short-period variables. Here, therefore, she takes into account a series of factors that, it can be assumed for simplification, remain in a constant relation with each other and with the variable factors over the short period, but whose interdependencies might shift and change the position and shape of the longer-run relationships. Robinson's representation at this stage allows crises to be identified (at the lower intersection of

the curves and the higher nonintersection) and their possible impacts on the structure of the economic system represented and followed through. In this later formulation Robinson also changed her view about the long-run trend: "the ossifying effects of success … [by which] the urge to accumulate and reduce costs is weakened" (1962, 77). These effects "operate also through the supply of finance" (77).

Within her category of "history," she was alert to the problem of behavior and outcomes being different as the economic theory moved its focus from the individual to the aggregate, and she tried to avoid the unsustainable division between microeconomic situations and analysis and macroeconomic situations and analysis: "regardless of the objectives of the firm, its chances of achieving them depends upon systemic behavior. This is because, ultimately, profit creation, and therefore the establishment of expectations of profitability relevant to the investment decision, depend upon the overall rate of accumulation, regardless of the market structures and decision rules ruling in various firms and industries" (Harcourt and Kerr 2009, 140; see Robinson 1962, appendix A, 78–87).

In her later writings Robinson became closer to Kalecki's approach to dynamics, which was similarly associated with the distribution of income and investment decisions. Kalecki became insistent that long-period (and long-run) growth was a series of short periods; there was no self-generating trend, only a succession of cycles, driven by investment decisions that were themselves driven by technical progress and innovations and expected profits. In this view, expanded reproduction over the long run was not a "natural" process; at best some dynamic emerging from technological change might (p. 266) maintain the growth process, any deficiency of effective demand being met by a net surplus on external markets or by public expenditure, probably on armaments, the latter providing an outlet for the surplus that does not create further capacity (this point of view had also been expressed by Rosa Luxemburg [1913] 1951; introduction by Joan Robinson). Kalecki bases his argument on the disaggregation of Marx's reproduction schema for capitalism, itself constructed on the basis of ascertainable properties of capitalist economies. Kalecki's analysis represents three classes each with its own source of income, and three production sectors each of which generates wages and profits, out of which some is consumed, some saved, and some invested, and he proposes that "the institutional framework of a social system is a basic element of its economic dynamics and thus of the theory of growth relevant to that system" (Kalecki 1970, 311). Attention is focused on sources of uneven short-run change rather than on determinants of long-run transformation. Robinson's analysis adopted Kalecki's classical framework and the dynamic of his two-sided relationship between the rate of profit and the rate of accumulation. She also came to accept his view that there was no long-period trend that could be theorized separately from short-period cycles.

3. Long-Run Dynamics and Stylized Empirics

Kaldor was another eminent economic theorist in Cambridge interested in dynamic theory that addressed real problems. His approach to the economics of growth and to economic dynamics is of special interest for the dual route he chose to follow. For he investigated the dynamic properties of economic systems both by means of historically based explorations into long-run dynamics and by analytical models of economic growth. Kaldor's theoretical models of economic growth are fully within the growth equilibrium tradition, as is shown by Kaldor's selection of "stylised facts" to be used as a "starting-point for the construction of theoretical models" (Kaldor [1961] 1978, 2). In Kaldor's words, these stylized facts are "(1) [t]he continued growth in the aggregate volume of production and in the productivity of labour at a steady trend rate;…(2) A continued increase in the amount of capital per worker,…(3) A steady rate of profit on capital, at least in the 'developed' capitalist society;…(4) Steady capital-output ratios over long periods;…(5) A high correlation between the share of profits in income and the share of investment in output; a steady share of profits (and of wages) in societies and/or in periods in which the investment coefficient (the share of investment in output) is constant…(6) appreciable differences in the rate of growth of labour productivity and of total output in different societies" (Kaldor [1961] 1978, 2–3). This point of view goes hand in hand with a strong emphasis on capital accumulation and its association with technical improvement (Kaldor's "technical progress function") (Kaldor [1961] 1978, 31–39). There is thus the accelerator-type idea that technical progress is (p. 267) endogenously generated by accumulation behavior and that investment itself is reacting to investors' propensity "to increase their productive capacity in line with the growth of their sales" (Kaldor [1961] 1978, 41). A subsequent version, written in collaboration with James Mirrlees, assumed that "the level of investment is based on the volume of investment decisions made by entrepreneurs, and is independent of the propensities to save" (Kaldor and Mirrlees [1962] 1978, 55). It also assumed "an isolated economy with continuous technical progress and with a steady rate of increase in the working population" as well as a level of

investment "primarily *induced* by the growth in production itself" (Kaldor and Mirrlees [1962] 1978, 55–56). Again the center stage was occupied by a "technological 'investment function', i.e. a functional relationship (shifting in time) between investment per worker and output per worker" (Kaldor and Mirrlees [1962] 1978, 75). The main lesson to be drawn from the analytical exercise was an emphasis on technical progress "as the main engine of economic growth" (Kaldor and Mirrlees [1962] 1978, 74), and the idea that "stimulating the technical dynamism of the economy (*raising* the technical progress function) is the most effective tool of growth policy" (Kaldor and Mirrlees [1962] 1978, 78). All in all, Kaldor's theoretical models of growth look at the economy from a macroeconomic point of view and suggest reasons for an endogenously generated full-employment dynamics consistent with the post–World War II experience. At the core of the model is the idea that "investment is the independent variable and savings are the dependent variable" (Kaldor [1962] 1978, 22). However, adjustment follows basically classical principles and it is maintained that "an underemployment equilibrium is only *stable* under slump conditions when induced investment is zero" (Kaldor [1961] 1978, 22). It is also argued that "it is impossible to conceive of a *moving* equilibrium of growth being an under-employment equilibrium" (Kaldor [1961] 1978, 28). At this stage, Kaldor was thus thinking in terms of full-employment growth equilibrium. Indeed, it is revealing that, according to Kaldor, "Keynes, in the *General Theory*, writing in the middle of the big slump of the 1930s, concentrated on the under case, and conceived of the mechanism which equates savings with investment as one which operates through variations in the general level of employment. But in his previous book, the *Treatise on Money* (written in the late 1920s), he described essentially the same mechanism as determining the relationship of prices to costs, with output and employment as given" (Kaldor [1961] 1978, 24).[10] This is a notable difference from Joan Robinson's (and Michał Kalecki's) models of the dynamics of a capitalist economy. But Kaldor never convincingly established why there would be a trend to full employment. Kaldor's subsequent explorations take a strikingly distinct approach and immediately address the relationship between economic growth and structural change as a type of compositional dynamics.[11] Kaldor's Inaugural Lecture at the University of Cambridge drew attention to the central role of the manufacturing sector in a growth process, and to increasing returns in that sector as the central engine of modern economic growth (Kaldor [1966] 1978). Kaldor's attention to the relationship between increasing returns and manufacturing development reflects his involvement "with practical problems of economic policy" as he "constantly addressed the major domestic and international issues of the day" (Wood [1987] 2008, 668). His **(p. 268)** structural breakdown of the economy was based upon three sectors: agriculture and mining, industrial sector, and service sector. On that basis, he pursued the implications of their various responses to technical progress. He derived from Allyn Young, his onetime teacher at the London School of Economics (Young 1928), the theoretical relationship of cumulative causation to explain differential rates of growth, both between sectors within an economy and internationally. In particular, he differentiated less-developed economies with an agricultural wage goods sector and a small, industrialized, modern investment goods sector from modern developed economies with a large manufacturing sector and services sector, the latter carrying surplus labor. As a country develops and industrializes, a service sector emerges, but this in itself is not a sufficient vehicle for growth. Cumulative causation was the outcome of increasing returns in the manufacturing sector and of human learning that occurs with experience and specialisation in that sector. As a result, Kaldor thought that "the forces making for continuous changes are *endogenous …* and the actual state of the economy during any one 'period' cannot be predicted except as a result of the sequence of events in previous periods which led up to it" (Kaldor [1972] 1978, 186; author's emphasis).[12] Kaldor's later (post-1970s) explanation for the growth of a nation, or internationally for the relative growth of a group of nations, brought together several propositions. First, a country's growth depended on the growth of productivity of its sectors, which depends on the growth of the manufacturing sector, this latter being the source of new inventions. The second reason for focusing on manufacturing is that it is subject to increasing returns to scale (Young 1928). Further, this resultant cumulative growth in the manufacturing sector increases the productivity of the system as a whole, as workers from the primary (lower productivity and surplus labor) sector move there. The factors that would generate the growth process were endogenous demand (in particular for investment in new techniques) from the primary sector, other sources of internal demand, or demand from the public sector in a closed economy (e.g., undergoing rearmament), and export demand in an open economy (he also introduced an active foreign trade sector). Kaldor's "stylized facts" now reflected the interdependencies within and between sectors.[13] However, Kaldor's theoretical explorations in his later, more policy-oriented phase were primarily based on the simplified picture of two main sectors—agriculture and manufacturing. These were characterized by their own production behavior and pricing behavior. Increasing returns were considered both an intrinsically dynamic process and a "macro phenomenon" since each industry benefited from the expansion not just of its own output but of output as a whole (Kaldor [1972]

1978). In Kaldor's view, constraints on accumulation were supply rather than demand in origin, and the presence of surplus labor in the agricultural and service sectors enabled the increasingly high rate of growth in industry.

At the same time, the dynamics of increasing returns are closely associated with the changing composition of consumer demand: "it is well known that a *high* income elasticity for manufactured goods … is a characteristic of an intermediate zone in the levels of real income per head. At low levels of income a high proportion of both average and marginal incomes is spent on food. At very high levels of real income, the income (p. 269) elasticity of demand for manufactured goods falls off both absolutely and relatively to that of services: but for the continued appearance of new commodities, like washing machines and television sets, it would fall off more rapidly. In the middle zone in which this proportion is both large and growing, there is a double interaction making for faster economic growth: the expansion of the industrial sector enhances the rate of growth of real incomes; the rise in real incomes steps up the rate of growth of demand for industrial products" (Kaldor [1972] 1978, 113).

An additional important feature that came to characterize Kaldor's late thinking on long-term structural dynamics was the relationship between diminishing and increasing returns both within individual economic systems and at the level of the world economy. In this connection Kaldor called attention both to the unavoidable long-term dependence of manufacturing activities upon nonproduced resources subject to global scarcity bottlenecks, and to the inherent asymmetries (between sectors as well as between areas) associated with the cumulative causation pattern of increasing returns. An important consequence that Kaldor emphasized was the interdependence of structural and institutional factors in shaping the emergence of asymmetries in the world economy. In particular, increasing returns were seen as the source of "the concentration of production in certain areas … a '*polarisation process*' which inhibits the growth of such activities in some areas and concentrates them in others" (Kaldor [1981] 1989, 204–5), as well as providing the mainspring to the "successful spread of industrialization" (205). The interaction between the two contrasting tendencies to manufacturing polarization and manufacturing spreading, as well as of their interaction with institutional factors such as the relationship between flexprice markets for primary products and fixprice markets for industrial products, were seen by Kaldor as central issues for further advances in the understanding of long-term structural change (see Kaldor [1985] 1989).

The growth process was considered as not conducive to theoretical analysis of the type traditionally associated with equilibrium growth modeling. In short, Kaldor's study of historical evolution led him to identify sectoral and intersectoral dynamics as central to the investigation of economic growth. However, cumulative causation and increasing returns were considered as essentially historical processes beyond analytical representation and understanding. In particular, as Luigi Pasinetti put it, Kaldor's attempt at sectoral analysis "does not go far in the disaggregation direction" since "he concentrates … on an analysis limited to two sectors" while introducing "a whole series of structural characteristics and of institutionally based rules of behaviour" (Pasinetti 1996, 104). This approach allows Kaldor to handle complex interactions by concentrating on the stylized characteristics of a two-sector model "in which there is primary good production on the one side and manufactured good production on the other side" (Pasinetti 1996, 104), each operating in distinct markets with distinctive pricing practices. As a result, historical processes are at the basis of a stylized treatment that highlights important causal relationships (such as the relationship between decreasing returns in the primary sector and increasing or constant returns in manufacturing) without attempting a full analytical reconstruction of those processes. This contrasts sharply with Kaldor's earlier attitude to equilibrium growth, which he addressed by means of theoretical models. Kaldor's (p. 270) approach to economic dynamics is a characteristic instance of the attitude to long-run analysis in the first generation of Cambridge Keynesians: problems were identified and questions asked, but the theoretical understanding of structural dynamics was not fully addressed.

4. The Road to Disaggregate Structural Change Analysis: Richard Stone

Neither of the above two approaches, that of Joan Robinson or that of Nicholas Kaldor, was significantly concerned with the detailed compositional configuration of the economic system, and/or with the composition of the dynamic impulses affecting its motion through time. In fact, a major Cambridge contribution to structural analysis was to come from Richard Stone. In a paper presented at the Research Section of the Royal Statistical Society in December 1946 (Stone 1947), Stone had addressed the issue that "in applied economics … the amount of information available to test any particular theory is limited, and does not provide the variety of experience necessary for deciding a point at issue" (Stone 1947, 1). Stone's approach to the problem was eminently practical,

even if suggestive of deep methodological implications. For he pointed out that "the variation of a particular variable, say the quantity of a given commodity consumed, can often be explained with only a few of the predictors that would seem to be necessary on theoretical grounds" (1947, 1). In particular, he emphasized that when "large blocks of transactions" (such as national income or consumers' expenditure) are considered, one ends up dealing with "aggregates or averages in which much of the individuality of the component series is lost" (1). However, the practical relevance of a limited number of explanatory factors (see above) suggests that we could "select a set of such (aggregate) variables for analysis, and see how far it is possible to reconstruct their movement from a small number of common factors" (1). More formally, Stone outlines the following argument:

> If we have n variables and m factors and assume linear relationships, this hypothesis is expressed in a system of n equations of the form $x_j = \sum_s a_{js} F_s$ where the x_j, $j = 1, \ldots, n$, are the observed variables and the F_s, $s = 1, \ldots, m$, are the hypothetical factors. If there is a high degree of intercorrelation in the movement of the variables, we may expect to be able to explain most of the variance of the x_j in terms of a number of factors which is small compared with the number of variables.
>
> (1947, 1)[14]

The above point of view is closely related to principal component analysis in statistics but is also relevant for discussion of specifications of structure in dynamic analysis. For Stone's argument describes how the identification of relevant variables impinges directly on the way in which certain dynamic factors are emphasized in lieu of others. The following passage by Stone highlights reasons why different lumping criteria may lead to alternative accounts of a process of change: "suppose $m = 1$; then all the x_j would move in (p. 271) exactly the same way and could be classified by one criterion of classification, the amplitude of their movement. If the x_j required two (independent) factors for their explanation we could not order them by one criterion of classification; we should need two independent criteria. In this case the x_j might move very differently, since in any given x_j the weights of the two factors (the a_{js}) might be very different" (Stone 1947, 2). This type of methodology was going to play an important role in the formation at Cambridge of a tradition of strong research into the structural dynamics of a disaggregate economic system. Stone himself outlined the basic features of that approach when he argued that "if we are trying to analyse the equations of motion of the whole economic system we shall normally begin with a large number of variables and equations. With the object of reducing the labour involved we may try to reduce this number as much as possible. There is, however, another method of approach, namely, to start off with a system of any degree of complexity, extract the principal components of its variation, and concentrate on the explanation of these components or an equivalent number of identifiable components belonging to the same system. This, indeed, is a method of arriving at a set of 'inner variables,' which, if explained, will in turn explain all the other variables with which we started" (Stone 1947, 32).

Stone's approach to the analysis of a disaggregate system initially led to the construction, in collaboration with James Meade, of a model of the British economy, creating a way of representing flows of inputs and the related flows of outputs (Meade and Stone 1948). The model introduced a methodology that opened the way for recognizing structure and possible interdependencies. In his subsequent work Stone discussed the intertwining of the a priori and the empirical in economic model building (Stone [1963] 1966), and how the analytical formulation of practical policy goals requires moving beyond insightful but unrealistic theoretical solutions (as illustrated by Ramsey's theory of saving) and considering the interdependencies between "the growth rates of the outputs of different products" (Stone [1963] 1966, p. 31). This approach was seen as a necessary step in order to "study quantitatively in as great detail as possible, the present structure and future prospects of the British economy, the possibility of stimulating its rate of growth, and the problems to which this would give rise (Stone [1964] 1966, 249)." This point of view gave priority to the identification of objective relationships prior to a full specification of theory. However, it was compatible with the view that objective relationships could be mutually consistent with one another, thereby allowing the gradual development of a theoretical framework. J. A. C. Brown had suggested to Stone that they bring together the three main achievements of the Department of Applied Economics in Stone's time as director: consumer demand, input-output, and national accounts. In particular, Stone and other economists working at the DAE outlined a simple analytical framework aimed at assessing the growth prospects of the British economy in terms of a multi-industry and multi-commodity classification of economic activities. As Richard Stone and J. A. C. Brown wrote in the introductory paper of the *A Programme for Growth* series, their purpose was to separately identify the "anatomy" and the "physiology" of the economic system. The former was represented by means of "a social accounting matrix drawn up on the familiar chessboard pattern, with incomings in the rows and

outgoings in the columns" (Stone and Brown 1962a, 3–4). (p. 272) The latter was represented by "a set of econometric relationships which [described] the organic functions of the economic body," relationships that were divided "into two main groups, the technological and the behavioural" (Stone and Brown 1962a, 4). The operational objective of the model was that of "tracing the consequences of many alternative assumptions" (Stone and Brown 1962a, 5) about desirable consumption goals in view of reasonable projections concerning both changes of technology and consumption behavior (see also Stone and Brown 1962b; Bates and Bacharach 1963; Bacharach 1970, for further analytical developments along this line of research).

A central purpose of Stone and Brown was to formulate a conceptual framework that could be used to arrange empirical evidence so as to provide information about *structural interdependencies* in the economic system, that is, interdependencies that could be discussed independently of specific assumptions on producers' or consumers' choice behavior. The analytical building blocks of Stone and Brown's framework include (1) a revised formulation of Leontief's input-output representation of the economy, so as to account for the fact that industries may deliver both principal and secondary products, and that given commodities can be produced by a plurality of industries; (2) a proportionality assumption concerning the changes of coefficients denoting the shares of any given commodity delivered by different industries, as well as the changes of coefficients denoting the shares of different commodities in any given industry's output; (3) a proportionality assumption concerning the relationship of next year's consumption to this year's consumption. These building blocks lead to the following relationships (see Stone and Brown 1962a, 74): (1.13.1)

$$q = Aq + v + e,$$

$q = Aq + v + e,$

where q is the output vector, A is the matrix of current input-output coefficients, v is the vector of capital goods directly demanded by the different industries, and e is the final consumption vector. (1.13.2)

$$v = K\Delta q,$$

$v = K\Delta q,$

where K is the matrix of input-output coefficients for capital goods and Δq is the positive difference between next year's output and this year's output. (1.13.3)

$$Ee = (I + \hat{r})e,$$

$Ee = (I + \hat{r})e,$

where Ee is the vector of next year's consumptions expressed in terms of this year's consumptions and the diagonal matrix $r\hat{}$ is generated by the vector r of the rates of change of consumption for goods in vector e.

The above relationships convey a disaggregate representation of the interdependence between changes in the composition of final demand (as the different elements of e change at different rates over time) and the input requirements necessary for the expansion of the economy in line with the assumed variations in the consumption vector.

Starting from an explicit inductive premise and policy orientation, Richard Stone and his immediate colleagues had outlined a multisectoral methodology for the analysis of (p. 273) an evolving economic system. As we have seen, the central components of that methodology are (1) the reduction in the complexity of economic relationships by focusing upon a limited number of key aggregate variables; (2) the identification of those variables starting from underlying explanatory factors (rather than the other way round); (3) the idea that, in studying the dynamics of a multisectoral economy, structural specification has to be consistent with the identification of dynamic factors and policy objectives. This methodology has its roots in the idea that the investigation of a system made of multiple connections in view of empirical analysis or policy advice presupposes the ability to "define the state of the system, or some part of it, in terms of a knowledge of the values of certain variables" as well as the availability of "a dynamic theory by means of which we can derive future states of the system by logical implication from a knowledge of the present state" (Stone [1951] 1993, 23). This point of view goes hand in hand with the idea that, if we concentrate on a suitable level of aggregation, we may be able to consider relationships between blocks of transactions (aggregate variables) that are stable in the short run, so that it would be possible to make "short-term predictions" provided "we can determine the laws of motion of such a system" (Stone [1951] 1993, 34). Here

Stone outlines a bold move that *generates* (short-term) structural invariance from the adoption of a specific aggregation criterion and then makes use of invariance in order to outline projections concerning the evolution of aggregate variables. As we have seen, Stone's methodological views exerted an important influence on work in applied economics at Cambridge and elsewhere. Those views also had a considerable influence on subsequent theoretical developments, particularly those associated with the contributions of Richard Goodwin and Luigi Pasinetti (see below).

5. Goodwin's Structural Dynamics

Richard Goodwin's work on the structural dynamics of a capitalist economy is a bold attempt to fully integrate the circular representation of the economic system with the analysis of its unsteady evolution over time. Goodwin carried out his theoretical exploration by means of a multisectoral approach in which the conceptual framework of classical political economy is blended with Keynes's theory of effective demand and with Marx's and Schumpeter's approach to the relationship between technical progress and economic expansion.

A central analytical feature of Goodwin's approach is the emphasis on the circular interdependencies between production processes and the search for algorithms allowing the transformation of any given circular system into a model economy satisfying the condition whereby the same commodities enter, with the same proportions, the gross and net output vector of the system (Goodwin [1976] 1983, 131). Goodwin's system shows both similarities and differences relative to the uniform proportions system developed by Sraffa (Sraffa's Standard system). For, differently from Sraffa's system, Goodwin's system is not independent of the net output distribution between wages and (p. 274) profits, so that for each distributive pattern it is possible to construct a benchmark economy that meets the condition for a Ricardian corn economy: "The *i*th corn is produced by the *i*th corn, by labour that is paid in the *i*th corn, which leaves a profit in *i*th corn" (Goodwin [1976] 1983, 131–32). This device allows net output distribution to be directly linked with the circular flow associated with (and required by) any one of the *n* modes of dynamic behavior which the economic system may show under the analytical device of normalized coordinates: "In normalised co-ordinates there are *n* separated corn economies giving profit rates directly as dimensionless numbers. Normalised prices, in long-run equilibrium, must be such as to equate all these sectoral profit rates. The own rate of return in all sectors, being brought into equality, becomes *the* rate of return for the economy, unambiguously determined, without any circularity of reasoning in relation to distribution" (Goodwin [1976] 1983, 149). For Goodwin the construction of analytical tools is never separate from the need to achieve a theoretical understanding of important historical features of economic dynamics. From this point of view, the relationship between the constraints (and opportunities) of sectoral interdependencies and the unevenness of technical change across productive sectors is central to his attempt to outline a general explanation of the long-run structural dynamics of a capitalist economy. Here Goodwin starts with the consideration of a multiplier-accelerator model of booms and depressions and proposes an account of the lower turning point (from depression to expansion) by having recourse to the role of innovational investment undertaken independently of the need to replace or expand existing capacity (see Goodwin 1989, 133). It is at this point of Goodwin's analytical exploration that history enters the picture. This is because "[t] he dependence of timing and magnitude of innovational investment introduces an accidental, historical element" insofar as "the availability of innovations is not purely economic, but depends upon a wider social and scientific evolution" (Goodwin 1989, 134). In particular, the intensity of expansions will be different depending on whether the most important effects of a major innovation are still unfolding or not: "a major innovation, e.g. steam, electricity, oil, or atomic energy, will require 50 to 100 years to be fully integrated into the productive structure. Therefore, though the collapse of the boom will inhibit innovational investment, it will soon be strongly resumed, thus giving rise to short, sharp recessions and prolonged, vigorous expansions. If, on the other hand, a constellation of innovations has been substantially completed, the economy may remain depressed for a time and experience only weak, short-lived expansions" (Goodwin 1989, 134–35). In short, a medium-term dynamics associated with the specific behavioral and institutional features that we are considering is grafted upon a long-term historical process that is not purely economic in character. Cognitive, technological, and social factors determine historical trends that bring about the "bunching, or 'swarms,' of investment activity" through interaction with the medium-term reaction patterns (Goodwin 1989, 133).

Goodwin proposes that a dual set of causes is at the root of the long-term dynamics of a capitalist economy: on the one hand fundamental long-term trends, on the other hand medium-term reaction patterns. What is most remarkable is that the two sets of causes are taken to be operative at the same time, although within different time

horizons. In (p. 275) other words, the evolution of technological and productive arrangements brings about a set of "material" interdependencies within and across productive sectors that are largely *independent* of medium-term reaction patterns. However, these reaction patterns are central in determining *at which points of time* technological interrelatedness makes itself felt through the economy. Finally, the *intensity* of expansion is in turn dependent on the underlying patterns of interrelatedness. In Goodwin's account, investment in the innovating sector will trigger similar investments "in any other sectors which are stimulated to alter their processes of production" (Goodwin 1989, 135). This in turn generates a dynamic process characterized by strong sequential causality and unevenness across productive sectors: each investment "initiates similarly a convergent sequence of increased demands and outputs. These increases in output will necessitate initially accelerational investment in the innovative sector, and subsequently in other sectors [which] consequently alter processes. Thus there is a highly complicated group of distributed lags of varying length and quite distinctly different effects on the various sectors" (Goodwin 1989, 135).

Technological interrelatedness brings about constraints upon economic dynamics but at the same time generates important new avenues for expansion: "An important innovation in energy, or transport, or automated control, will gradually lead to alteration of least-cost processes in many other sectors and thus will initiate technological change over a long period. This will persist over time, not only because any such improvement undergoes prolonged small improvements, but **a**lso because it usually needs extensive adaptation to a variety of uses" (Goodwin 1987, 147). As a result, economic dynamics under capitalist conditions will be characterized by the plurality of causation and partial overlapping time horizons: interrelatedness brings about patterns of connectivity that, once activated by suitable behavioral and institutional circumstances, generate both short- and medium-term fluctuations and substantially long periods of smooth technical progress.[15] However, the rate and character of technical progress is generally different across productive sectors, so that "the various sectors grow at quite different rates, even though, in the wayward evolution of capitalism, they often move up and down together" (Goodwin 1987, 147).[16] In short, relatively smooth paths of technological evolution may coexist with uneven rates of sectoral output growth as we move along the "cascade of sequential processes initiated by an important innovation" (Goodwin 1987, 146). Indeed the character of innovations will be an important influence upon the intensity of the dynamics generated along the sequential process: "If there is a major change underway, e.g. railways or the internal combustion engine, vigorous and prolonged expansions will be interrupted by contractions which may be violent but will be short and quickly succeeded by renewed growth.… On the other hand, there can be periods of numerous innovations that entail modest investments or limited effects on cost structure in other industries: in that case expansions will be weak and may be short-lived, the depressing phase persisting for a longer time and creating the trough of a long wave" (Goodwin 1987, 150). In this way, the evolution of economic systems under capitalist conditions shows the intertwining of different hierarchically related motions (see Goodwin and Landesmann 1996, 177–83), and lends itself to a type of analysis integrating "formal, but (p. 276) qualitative, analysis of dynamical systems" with the consideration of "historically given data" (Goodwin, 1987, 150).[17] In Goodwin's view, this intertwining of formal analysis and historical investigation is especially required to analyze the specific features of the institutional setup of *laissez-faire* capitalism, in which "morphological instability" is associated with "creative evolution" (Goodwin 1987, 150 and 145).

6. *Pasinetti's* Structural Dynamics

The starting point of Pasinetti's research program had been his early interest in the measurement of technical progress and productivity in a capital-using economy (Pasinetti 1959). Pasinetti had been influenced by ongoing discussions at Cambridge, where Joan Robinson was extending Keynesian ideas to the long run and Stone was disaggregating macro entities into interacting sectors. It may also be conjectured that his interest in the measurement of actual economic magnitudes probably had much to do with his stay at Harvard (1957–58) and his acquaintance with Wassily Leontief and his group. Moreover, Pasinetti's turn to the investigation of structural economic dynamics was certainly influenced also by his involvement in discussions among Italian economists at that time addressing issues connected with industrialization and growth in their country after World War II. A critical phase of Pasinetti's intellectual development found expression in his paper "Verso il superamento della modellistica aggregata nella teoria dello sviluppo economico," jointly written with Luigi Spaventa (Pasinetti and Spaventa 1960) and addressing the shortcomings of aggregate modeling in growth analysis. Pasinetti and Spaventa's paper was influenced by ongoing discussions in capital and growth theory, but it was also influenced by awareness of the

need to move beyond Harrod-type (or Solow-Swan-type) macrodynamics in order to capture the most important characterizing features of a modern growing economy. It is at this point that structural, long-term dynamics becomes for the first time a central interest of Cambridge economics. The basic idea is that modern economic growth is inherently associated with certain changes in the proportions among sectors of the economy, as well as among sectoral levels of employment (*structural change*). In this connection, the conjecture began to appear that appropriate theoretical modeling of an economic system undergoing technical change should have structural change at its core, rather than considering it simply as the result of external (exogenous) influences.

Pasinetti's approach to structural dynamics is thus a blend of economic theory and economic history. The latter provides what we may describe as his foundational narrative. This is the idea that a growing economy shows a long-run tendency to change in sectoral proportions. The former provides the analytical framework to the understanding of constraints and opportunities that may be associated with long-run dynamics as the economy moves on to different constellations of consumer preferences and technical capacities. In a way, Pasinetti's Cambridge program is also a response to the call by Paolo Sylos Labini, who in his inaugural lecture at the **(p. 277)** University of Bologna (Sylos Labini 1961) had emphasized the need for economic theory to be consistent with historical experience without losing the ambition of abstraction and generalization. Last but not least, and coming back to another important strand of the manifold Cambridge influences, we should mention that the Cambridge Growth Project, carried out at the Cambridge Department of Applied Economics and led by Stone, was in those years developing a research program addressing the growth potential and perspectives of the British economy under alternative sets of assumptions (see section 4).

Pasinetti's Cambridge PhD dissertation (1962) became the starting point of a lifelong theoretical investigation into the long-run properties of a growing multisectoral economy. Since its beginnings, investigation has been based upon acknowledgment of two fundamental dynamic factors: (1) the Engel's Law, governing changes in average consumer's expenditure patterns as per capita income increases; (2) the tendency to increasing average labor productivity as a result of technical progress. Pasinetti's theoretical response to the need to understand the underlying structural properties of a growing economy is given in a sequence of steps. First, he identifies as its benchmark economy a system of productive sectors in which all commodities are produced by means of labor alone (*a pure labor economy*), or by means of labor assisted by produced means of production that can nevertheless be "reduced" to quantities of labor in a finite number of steps. Second, Pasinetti rejects the possibility of investigating the "fundamental" structural layers of an economic system by concentrating exclusively on specific behavioral and institutional contexts. Third, he emphasizes that the theoretical questions to be asked are questions about constraints and opportunities, rather than about the identification of specific configurations of economic variables in historical time. The resulting analysis of structural change is quite different from previous attempts at investigating long-run structural dynamics. This is because Pasinetti avoids generalizations about the actual course of structural change (in his approach, compositional change) as the economic system expands over time. Nevertheless, he does put (as Marx did) structural dynamics at the center of his investigation. This is done by *limiting* the role of theory to the identification of general consistency conditions, such as the saving-to-investment relationship, the condition for full employment, and that for the full utilization of productive capacity. In Pasinetti's view, this approach highlights fundamental structural properties (for instance, whether consistency conditions are satisfied or not under given structural parameters) without attempting generalizations that would lead the investigation away from the consideration of actual historical paths. The need to keep economic analysis open to history is at the root of Pasinetti's belief that "the distinction between unknowns and data does not coincide, and must not be confused with, the distinction between variables and constants" (1981, 78). As a matter of fact, Pasinetti's theory of structural dynamics takes as *data* the underlying exogenous forces of long-run change (technical progress and consumers' learning) while considering as *unknowns* those magnitudes that his analysis purports to determine (such as relative prices and physical quantities). This choice of data and unknowns allows Pasinetti to argue that "[u]nknowns may well be constant … and data may well **(p. 278)** be variables. For example, magnitudes such as population and technical knowledge have been taken as given from outside economic analysis (they belong to our data) and nevertheless are essential variables. And magnitudes such as the rates of profit are to be explained by economic investigation, and nevertheless are here taken as constant" (Pasinetti 1981, 78).

In this way, economic theory could highlight fundamental structural properties, for instance, whether the conditions allowing full employment and full capacity utilization under given structural parameters are satisfied or not, without

attempting a direct investigation of actual historical paths. In Pasinetti's framework, the economic theory of structural dynamics cannot tell us where an economy will be twenty years from now. But it can tell us which conditions for full employment have to be satisfied if the economy is to follow a given path of changes in average consumer' s expenditure patterns and production coefficients. Conversely, economic theory could tell us which road to follow (which pattern of structural change we ought to encourage) if we would like the economy to be on a full employment path during a time period of, say, *k* years from now. (Of course, this analytical exercise would or would not lead to realistic results depending on the realism of our assumptions concerning the long-run evolution of per capita consumption coefficients and labor productivity.)

The simplest formulation of Pasinetti's theory of structural dynamics can be given in terms of his model of a pure labor economy. This is an economy in which all commodities are produced by means of labor alone, so that there is no need for capital goods to be produced. The production and consumption structure of that economy at any given time is described by labor and consumption coefficients that reflect, respectively, the technology in use for the production of any commodity and the corresponding per capita consumption:[18]

$$l_1, l_2, \ldots, l_m$$
$$c_1, c_2, \ldots, c_m$$

$l_1, l_2, \ldots, l_m$

$c_1, c_2, \ldots, c_m$

If we denote by $X_1, X_2, \ldots, X_m$ the *m* physical quantities of produced commodities, by $p_1, p_2, \ldots, pm$ the corresponding prices, by *w* the wage rate and by *N* the total amount of available labor, the consistency conditions needed to achieve, respectively, full employment and full cost pricing respectively may be expressed by the two following systems of equations (in matrix form):

$$\begin{bmatrix} 1 & 0 & \ldots & 0 & -c_1 \\ 0 & 1 & \ldots & 0 & -c_2 \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ 0 & 0 & \ldots & 0 & -c_m \\ -l_1 & -l_2 & \ldots & -l_m & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \ldots \\ \ldots \\ X_m \\ N \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \ldots \\ \ldots \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & \ldots & 0 & -c_1 \\ 0 & 1 & \ldots & 0 & -c_2 \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ 0 & 0 & \ldots & 0 & -c_m \\ -l_1 & -l_2 & \ldots & -l_m & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \ldots \\ \ldots \\ X_m \\ N \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \ldots \\ \ldots \\ 0 \\ 0 \end{bmatrix}$$

(p. 279)

$$\begin{bmatrix} 1 & 0 & \ldots & 0 & -l_1 \\ 0 & 1 & \ldots & 0 & -l_2 \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ 0 & 0 & \ldots & 0 & -l_m \\ -c_1 & -c_2 & \ldots & -c_m & 1 \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \\ \ldots \\ \ldots \\ p_m \\ w \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \ldots \\ \ldots \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & \dots & 0 & -l_1 \\ 0 & 1 & \dots & 0 & -l_2 \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & 0 & -l_m \\ -c_1 & -c_2 & \dots & -c_m & 1 \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \\ \dots \\ \dots \\ p_m \\ w \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \dots \\ \dots \\ 0 \\ 0 \end{bmatrix}$$

The above two systems of equations show that the different, specialized processes of production and consumption are linked with one another by the very existence of human beings in their dual character of workers and consumers. This way of setting the problem of system-wise (macroeconomic) consistency suggests a way to handle the inverse problem of identifying which prices and produced quantities would allow the economic system to meet the dual conditions of full employment and full-cost pricing. As noted by Pasinetti, the necessary condition to be satisfied in order to have nontrivial solutions (zero determinant) is the same for both systems (Pasinetti 1993, 18):

$$\sum c_i l_i = 1.$$

$\sum c_i l_i = 1.$

The analysis of structural consistency allows Pasinetti to identify what he calls the "macroeconomic condition" for full employment, that is, the consistency condition grounded in the technological and consumption parameters that would make it *possible* to achieve full employment. This macroeconomic condition calls attention to the structural core of full employment in a multisectoral setting and makes it possible to ask: (1) which combinations of c_i and l_i coefficients are compatible with full employment; (2) which patterns of change of the c_i and l_i coefficients are compatible with full employment. In other words, the macroeconomic condition suggests a normative look at structural economic dynamics and allows the economist to identify a structural benchmark against which to assess the potential and limitations of actual processes of structural dynamics. There is a sense in which the properties of Pasinetti's benchmark economy (his pure labor economy) are more fundamental than those of actual economies. This is because the benchmark economy is deliberately constructed in order to assess the structural compatibility of existing production and consumption coefficients with a macro-goal such as full employment. Indeed, the analysis of conditions for structural compatibility allow identification of what Pasinetti calls a "natural" path of structural change. This is the transformational path induced by externally generated changes in labor and consumption coefficients and associated at any given time with condition $\sum c_i l_i = 1$. A simple numerical example shows how different combinations of the c_i and l_i coefficients may be associated with very different consequences for what concerns the feasibility of full employment. The example also shows that *structural fine-tuning* may be necessary in order to implement a successful effective demand policy at any given time.

(p. 280) Let us consider a two-commodity, two-process economy characterized by the following set of consumption and production (labor) coefficients:

$$c_1 = 0.5$$
$$c_2 = 0.8$$
$$l_1 = 0.2$$
$$l_2 = 0.7$$

$c_1 = 0.5$
$c_2 = 0.8$
$l_1 = 0.2$
$l_2 = 0.7$

In this case, we have $\sum c_i l_i = 0.66$, and the condition for full employment is not satisfied (for $\sum c_i l_i < 1$). This means that full employment is structurally impossible under given conditions.

Let us consider another economy, in which process 1 is more labor-intensive and the commodity it delivers is associated with higher per capita consumption:

$$c_1 = 0.6$$
$$c_2 = 0.8$$
$$l_1 = 0.4$$
$$l_2 = 0.7$$

$c_1 = 0.6$
$c_2 = 0.8$
$l_1 = 0.4$
$l_2 = 0.7$

In this case, we have $\sum c_i l_i = 0.80$, and the full employment condition is again not satisfied (as we still have $\sum c_i l_i < 1$).

Let us finally consider a third case, in which both process 1 and 2 are labor intensive and are associated with the same consumption coefficients indicating a mass consumption commodity:

$$c_1 = 0.8$$
$$c_2 = 0.8$$
$$l_1 = 0.6$$
$$l_2 = 0.7$$

$c_1 = 0.8$
$c_2 = 0.8$
$l_1 = 0.6$
$l_2 = 0.7$

In this case, we have $\sum c_i l_i = 1.04$, and the full employment condition would be more than satisfied (as we have: $\sum c_i l_i > 1$). This means that the structural conditions of this economy may lead to overheating and inflationary pressures.

Pasinetti-type macrodynamics is associated with a view of the economic system centered on the direct Keynesian relationship between the employment of labor and the effective demand generated by final consumption. The consideration of capital goods complicates the picture but does not change the fundamental meaning of the macroeconomic condition for full employment. This can be seen by considering Pasinetti's contribution to the study of vertical integration in a capital-using economy (Pasinetti 1973). In this case, an economic system producing commodities by means of labor and produced capital goods may be "reduced" to a simpler economic system in which commodities are produced by means of a vector of vertically integrated labor coefficients (***v***) and a matrix of units of vertically integrated productive capacity (***H***). A remarkable (p. 281) feature of this construction is that, as vertical integration is iterated *2, 3..., s* times, the residual capital stock ***H*** becomes increasingly smaller as we consider higher-order integration, and eventually vanishes as the order *s* of vertical integration approaches infinity (see Pasinetti [1973] 1980, 30). This means that, in the limit, vertical integration allows the model of a pure labor economy to subsume the more complicated and more realistic cases in which commodities are produced by means of labor and other commodities. Thus we are back to the configurations considered in the previous numerical examples. In short, the structural constraints expressed by the macroeconomic condition for full employment are basically the same independently of the complications introduced by capital goods and sectoral interdependencies.

Pasinetti subsequently elaborated the above line of argument and recently proposed a "separation theorem" by distinguishing between preinstitutional and institutional features of a growing economy (Pasinetti 2007).[19] In his view, the preinstitutional (in Pasinetti's terminology, "natural") level of investigation allows identification of the structural conditions that need to be met for full employment to be possible on a dynamic path. In other words, it is at the natural level of investigation that we may single out which combinations of consumption and labor coefficients are ultimately compatible with full employment. There will generally be multiple ways to meet the above condition, which would point to the behavioral and institutional variety compatible with the full-employment systemic goal. Furthermore, the macroeconomic condition makes clear that, in a given dynamic setting, *not all* combinations of consumption and labor coefficients are compatible with full employment. In short, Pasinetti's focus on the preinstitutional stage of analysis highlights material possibilities and constraints at a fundamental structural

layer that are not necessarily compatible with existing institutions. This makes Pasinetti's study of structural dynamics conducive to the investigation of policies aimed at institutional changes, whenever the latter are required in order to satisfy the conditions for full employment (and full capacity utilization).

7. A Conclusion and an Evaluation

Research into long-run economic dynamics is one of the most enduring legacies of the Cambridge post-Keynesian tradition. And the various attempts at exploring the relationship between economic dynamics and structural change are a distinctive feature of that tradition. In this chapter we have examined the questions raised by some of the prominent first-generation Cambridge Keynesians (Joan Robinson, Nicholas Kaldor, and Richard Stone) about the implications of the Keynesian way of thinking for what concerns the analysis of long-run growth. For example, Joan Robinson introduced her particular conception of "history" and "equilibrium" to indicate to the more abstract theorist the implications arising from the complexities of the economy.

(p. 282) This point of view led to Joan Robinson's explorations into the possibilities *and* limits of any economic theory addressing the long run, as well as to Nicholas Kaldor's investigation of the relationship of technical progress and economic growth under conditions of cumulative causation and increasing returns. However, a *direct* theoretical investigation of structural economic dynamics was only attempted by two economists of the second-generation Cambridge Keynesians, namely Richard Goodwin and Luigi Pasinetti. Both took advantage of a particular combination of influences, for they both endeavored to integrate Keynesian theory with other theoretical strands (primarily Leontief and classical political economy). As we have seen, Goodwin and Pasinetti, although starting from broadly similar premises, took very different routes. Goodwin concentrated on the medium- and long-term *instability features* of a capitalist economy, and developed a highly sophisticated conceptual and analytical framework for the analysis of dynamic impulses, their interrelationships, and their consequences. Pasinetti attempted the identification of long-run *dynamic conditions* for full employment and full capacity utilization independently of any specific institutional setup. This type of analysis led him to consider what he calls the "natural" path of structural dynamics, and to compare and contrast that path with the actual dynamics of historical economic systems. In his most recent work, awareness of the distinction between natural and historical paths of structural change made him increasingly involved in issues of structural policy and institutional change. Pasinetti's interest in disentangling fundamental principles within complex webs of interdependence, and in adopting those principles as a road map for policy, is directly related to the reformist mind-set of Keynes's thought and is a powerful call for the consideration of structural opportunities and constraints when assessing policy options and economic perspectives for the long run. Goodwin's and Pasinetti's lines of thinking are important complementary routes stemming from the Cambridge analytical tradition and highlighting its potential for the construction of dynamic theory. This chapter suggests that the structural investigation of the long-run evolution of economic systems presupposes an integration of both perspectives and is an important task of future research.

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Notes:

(*) We are grateful to Geoff Harcourt and Michael Landesmann for comments and suggestions. The usual caveat applies.

(1.) Pasinetti confronts this problem by introducing his separation theorem, which allows him "to disengage those investigations that concern the foundational bases of economic relations to be detected at a strictly essential level of basic economic analysis—from those investigations that must be carried out at the level of the actual economic institutions, which at any time any economic system is landed with" (Pasinetti 2007, 275), see section 6 below. The institutional stage of economic analysis is open to investigation by other social sciences as well, while investigation of the "natural" level is exclusively by economists. It may be interesting to note the difference between this method of analysis and that of Piero Sraffa. For Pasinetti begins with a general structure, which it would appear exists for the long run, into which he integrates the institutional or "real" details. On the other hand, Sraffa begins with a determination of the objective properties of the subject, only moving to an abstract level when the initial concepts are specified (see Blankenburg 2007).

(2.) These "duals" served more as a rhetorical device than an analytical tool. Insofar as ultimately they must be connected through a common origin, a concept or idea, to which each component of the dual had differently responded, their respective analyses are not as separable as the method of "dualisms" suggests.

(3.) In some sense there is a similarity in the methodologies of Robinson and Pasinetti, as both establish the contingencies for "equilibrium" and different employment levels at given structural and historical moments. The difference lies in selecting the bases of their conceptual choices and the methodological direction of causation.

(4.) For a presentation of some of the interpretations of Robinson's models of accumulation in (1956) see Harcourt and Kerr (2009, chap. 8).

(5.) Her constant self-criticism was that she could not trace movement itself and its effects on the relationships of the structure, but only iterative shifts between positions, with given conditions. But, as with Pasinetti, the shifts were on the basis of those positions. What might happen *within* the structure itself between various elements in the process of moving could not be known precisely in terms of the relationships of the existing analysis. In particular, Robinson was deeply aware of the role of "fossils" left by the process of capital accumulation when moving from one configuration of capital goods to another, and of the inadequacy of steady-state analysis as the starting point of the investigation of dynamic processes brought about by actual economic or technological impulses (see also Scazzieri 1996).

(6.) Some of these difficulties arise from the coexistence of old and new techniques in the production process (see Salter 1960, 1965; see also the discussion of Salter's argument in Harcourt 2001; 2006, 147–57).

(7.) Robinson describes an iterative path ultimately leading to a point of balance: perhaps her argument could be translated into Lowe's instrumental path, thus replacing her deductive limits with ideas about the actual sequence of stages in the adjustment process (see Lowe 1976). The procedure does assume that the end point does not move during the iterative process, that they are independent.

(8.) The sphere of distribution and exchange is depicted here as describing an intersection of the two functions at a low level of growth and rate of profit, but where the investment function remains below the rate of profit curve: i.e., "the current rate of accumulation is less than would be justified by the rate of profit that it is generating" (Robinson 1962, 49); "all possible rates of accumulation are divided between those below the stalling speed, which lead to ruin, and those above, which lead to explosive acceleration" (Robinson 1962, 49 n.1).

(9.) "[T]he desired rate of accumulation is a function of the expected rate of profits, for any given financial situation and state of long-term expectations" (Harcourt 2006, 120).

(10.) Kaldor's interpretation of Keynes's switch from *A Treatise on Money* to *The General Theory* **c**an be seen as further evidence of the attitude to economic theorizing that had been thus described by Ferdinando Targetti: "There was a discrepancy between [Kaldor's] theories on the cycle and on growth. When I asked him [Kaldor] how the two theoretical components could be fitted together, he simply replied that they should be treated as different theories dealing with different historical periods" (Targetti 1992, 349).

(11.) Geoff Harcourt describes the switch from the early to the late phase of Kaldor's growth theory by noting that "Kaldor had changed his mind on the sources of growth and the difficulties of attaining and sustaining steady growth, rejecting both the 'early' neoclassical and his own post-Keynesian approaches. He now argued for an approach that would tackle the mutual interdependence of different sectors where the development of each depends on, and is stimulated by, the development of others" (Harcourt 2006, 134).

(12.) Kaldor emphasized in particular the role of division of labour and interconnectedness of production activities as the breeding ground of increasing returns, especially as we move beyond the consideration of indivisible inputs and technological discontinuities and focus on the new activities that become feasible in a cumulative way—by the splitting of previously integrated processes—as markets expand (see Kaldor [1972] 1978, 196–201).

(13.) The relevance of these stylized facts as the basis of theory will change as contemporary features of the economy change and its problems and objectives change, but Kaldor's methodology of representing his subject in a set of significant empirical and historical propositions, and on the basis of these "stylized facts" constructing his theories, returns the analysis of economic problems to their primary position as the object of theory.

(14.) Stone relates this decomposition criterion to the technique for the analysis of a set of statistical variables into principal components (factor analysis) originally proposed by Harold Hotelling (1933).

(15.) According to Goodwin, this is because "technological change, instead of being lumpy, may be fairly smooth, by virtue of being the result of many small, independent events" (1987, 147).

(16.) This shows the linkage between compositional changes generated by the uneven rate and character of technical progress across productive sectors and the macro-distributional dynamics impacting upon the different sectors and producing the same direction of change for all sectors.

(17.) Michael Landesmann and Robert Stehrer noted in this connection that "Goodwin was keen to use decomposition techniques such that this differentiated sectoral dynamic could be tracked while at the same time making sure that the economy-wide coherence with respect to macro-distributional dynamics (linked to economy-wide employment and wage dynamics) is considered as well" (Landesmann and Stehrer 2006, 503).

(18.) Pasinetti's labor and consumption coefficients are thus derived from a "picture view" of the economic system, and their utilization in dynamic analysis reflects Pasinetti's view that those coefficients are determined, at any given time, by causal relationships to a large extent outside the domain of economic theory.

(19.) Pasinetti introduced this method into the production analysis of his 1981 book (see, for instance, Pasinetti 1981, 25), and subsequently developed his argument on the basis of that distinction (Pasinetti 1986, 1993, 2007).

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The Cambridge Post-Keynesian School of Income and Wealth Distribution

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[–] Abstract and Keywords

This chapter reviews and assesses the genesis and development of the Cambridge post-Keynesian school of income and wealth distribution, the foundations of which were laid in particular by Nicholas Kaldor, Richard Kahn, Luigi Pasinetti, and Geoffrey Harcourt from the middle 1950s onward. The focus of their analysis was to investigate the relationship between the steady-state rate of profits on the one hand, and the saving propensities of the socioeconomic classes and the growth rate of the economy on the other. During half-century and more about 200 scholars have published in this area no fewer than 500 scientific papers and book chapters, as well as thirty volumes. This post-Keynesian school of economic thought has gained a safe entry into the history of economic analysis. In order to evaluate this vast scientific literature this chapter has divided it into eight specific lines: (1) the introduction of a differentiated interest rate on the wealth of the classes; (2) the introduction of the monetary sector and of portfolio choice; (3) the introduction of the public sector, and the Ricardian debt/taxation equivalence; (4) the inclusion of other socioeconomic classes; (5) the introduction of microfoundations; (6) the analysis of the long-term distribution of wealth and of the income share of the socioeconomic classes; (7) the overlapping generation model and the intergenerational transmission of wealth; (8) other general aspects, in particular the applicability of the Meade-Samuelson and Modigliani Dual Theorem.

Keywords: income distribution, wealth distribution, post-Keynesian distribution theory, economic theory, macroeconomics, economic analysis

1. Introduction

The question relating to capital accumulation, income distribution, and profit determination has always occupied a prominent place in economic theory. When in the late 1930s and in the 1940s the first macroeconomic models of economic growth were developed, the theory of income distribution was caught in an impasse, represented by the well-known Harrod-Domar equilibrium condition $s = n(K/Y)$, where s is the aggregate saving ratio, n the natural rate of growth, and K/Y the capital/output ratio.[1] If these three variables were all constant, then it is unlikely that the Harrod-Domar condition could be satisfied. Hence, in order to have a model in which the possibility of steady growth is ensured, it is necessary to relax one or another of the assumptions. The equality between s and $n(K/Y)$ may be obtained by (*a*) flexibility in K/Y, the technology assumption that was primarily adopted by the marginalist or neoclassical school; (*b*) flexibility in s, the saving assumption, which was originally put forward by Nicholas Kaldor in 1955, and (*c*) flexibility in n, which was initially labeled as the labor-market and/or labor-supply assumption, and later taken up by neoclassical economists, giving rise to the so-called endogenous growth models developed from the 1980s onward. We now know for sure (see Mari 2010) that Nicholas Kaldor presented his Keynesian theory of income distribution at a meeting of the Secret Seminar that took place in Ruth Cohen's rooms in Newnham College on Monday, October 31, 1955.[2] Assuming that there exist in the economic system two constant (p. 289) and different saving rates, one for the workers' class and one for the capitalists (or entrepreneurs' class), Kaldor was

able to formulate the equilibrium rate of profits of the system keeping in equilibrium the *ex ante* determined full-employment investment with *ex post* total savings of the system. But in order to obtain the so-called Cambridge equation $P/K = n/s_c$ Kaldor had to assume, along classical lines, that the propensity to save of the workers' class is equal to zero. His analysis drew a lot of attention; but it was hampered by his very restrictive assumption of zero saving out of wages.

In 1962 Luigi Pasinetti generalized this surprising outcome and showed that even if *both* saving rates were positive, the equilibrium rate of profits is totally independent of the saving behavior of the working class. It is in fact determined only by the saving rate of the pure capitalists (s_c) and by the rate of growth of the system (n). The solution $P/K = n/s_c$ was soon labeled as *Kaldor-Pasinetti's Theorem* or *New Cambridge Equation*. (By the same token the share of profits in national income comes to be equal to $P/Y = (n/s_c)K/Y$.) Such a rate of profits is, however, independent of the production function and of the capital/output ratio. In this way the Cambridge (or post-Keynesian) school was in a position to do the following:

1. Provide a solution to the Harrod-Domar dilemma by specifying an aggregate saving ratio determined by the exogenously given rate of growth of population, the capital/output ratio, and capitalists' propensity to save
2. Determine the long-period equilibrium value of the rate of profits, the distribution of income between profits and wages, and the distribution of disposable income between the classes
3. Allow for the existence of an income residual (very much in line with classical and neo-Ricardian models) namely the wages, consistent with the assumption of a relationship between the savings of that class of individuals (the capitalists or entrepreneurs) who determine the process of production and the patterns of capital accumulation[3]
4. Provide valuable insights into the process of accumulation of capital by specifying the equilibrium capital shares of the socioeconomic classes

This range of results is obtained by Pasinetti (1962; 1974a, chap. 6) within a fairly simple framework and on the basis of relatively few assumptions, much less "hybrid, opposite and extreme" than those of the neoclassical model. A superb description of the wide implications of these results has been provided by Geoff Harcourt (2006, 1–31). Harcourt's account is particularly valuable because not only he has *in prima persona* lived through most of this exciting half-century in Cambridge; in fact he has himself widely contributed to this research program; see for instance Harcourt ([1963] 1982; [1965] 1982; 1969; 1972) and Baranzini and Harcourt (1993). This is why we dare labeling it as the *Kaldor-Pasinetti-Harcourt post-Keynesian distribution theory*.

(p. 290) **2. Eight Lines of Research That Have Ramified from the Post-Keynesian Income and Wealth Distribution Framework**

2.1. Introduction

Post-Keynesian distribution theory now occupies, thanks to the seminal contributions of Kalecki, Joan Robinson, Kaldor, Pasinetti and Harcourt, an undisputed place in various textbooks of modern economic analysis. Stemming from the Kaldor/Pasinetti model we uncover a very high number of subsequent contributions branching out in many directions and covering many aspects of the wider research program quite relevant for the general topic of income distribution, profit determination, and wealth accumulation (life-cycle and intergenerational), both from a theoretical and from an applied point of view. The founding fathers of the Cambridge distribution theory did not systematically speak out on the development of their seminal papers, probably because they were very much involved in other research programs (as were Pasinetti and Harcourt), or in a high-level advising role (like Kaldor). On the whole Kaldor was probably more active than Pasinetti, and after his 1966 *Review of Economic Studies* virulent reply to Samuelson and Modigliani, he wrote a series of letters to colleagues and friends from the middle 1960s up to 1982. Copies of the letters are kept in the King's College Modern Archives in Cambridge, and from these it is possible to infer that while he was pleased with the developments of his seminal paper, Kaldor was at the same time worried that they would take the wrong direction. The following passage of the letter addressed to the first author of this paper is representative of his preoccupation:

> you seem to ignore the main criticism I made against Pasinetti, *i.e.* that he is thinking of "workers" and "capitalists" as *persons* and not of profits and wages as types of income. It is an essential feature of

> capitalist enterprise that a high proportion of earnings are ploughed back into the business—because contrary to the Modigliani-Miller theorem internal and external finance are complementary to each other and not substitutes. This is simply on account of uncertainty. Borrowing power is limited to some fraction of the value of a firm's own assets which can be pledged against it. Therefore, in a growing business an increase in external finance requires an increase in the amount of own capital and reserves. That being the case, it is quite irrelevant whether the ultimate owners of businesses are wealthy individuals or whether they are institutions or pension funds whose funds accumulate through workers' savings.
>
> The second point which seemed to me to invalidate the whole of the "anti-Pasinetti" case of Samuelson-Modigliani and Meade is that for profits to be positive investment must exceed external savings. If it did not, then businesses would make losses (Meade and all neo-classics assume that the share of profits is fixed by God, irrespective of the relationship of business receipts to business outlays). Profits, unlike wages, can only be determined "ex post," *not* "ex ante"! This, of course, is complete (p. 291) nonsense since profits can only be positive when business receipts exceed business outlays, and it can be demonstrated that this could only be true under conditions of the Kaldor-Pasinetti inequality (which is the same thing as excluding the case of the "dual" solution). I made all these points in my 1966 article but Samuelson and Modigliani never replied to them or acknowledged them. They simply said they received my paper too late for comment and when I met Samuelson some years later he said that they were certainly intending to write a reply but that was ten years ago!

Pasinetti has commented upon the developments of the Cambridge theory of distribution when directly challenged. In fact he has replied to Samuelson and Modigliani (1966a), Dougherty (1972), Nuti (1974), Campa (1975), Fazi and Salvadori (1981), Fleck and Domenghino (1987, 1990), and a few others. Chapter 6 of his 1974 volume *Growth and Distribution* was entirely devoted to then recent developments in this specific field. For him the debate seems to have gone through two consecutive stages. According to him:

> The considerable amount of literature that was generated by this [Cambridge] theorem has gone through two phases. The first phase was characterised by explorations of what happens *outside* the range within which the theorem holds; and here the best-known contributions are those of Meade (1963, 1966a, 1966b) and Samuelson-Modigliani (1966a, 1966b), who—in an effort to bring back some relevance for the neoclassical theory of marginal productivity—have analysed the range within which the workers' saving propensity is so high as to make their coexistence with the capitalists impossible on a long-run equilibrium-growth path. They claimed to have provided a completely symmetrical "Dual Theorem" stating that, on the steady growth path, with only one group of savers left (the workers), the output/capital ratio is determined by the rate of growth divided by the workers' propensity to save, independently of anything else.
>
> In the second phase that followed, many authors proceeded to relax assumptions, trying out new hypotheses and introducing complications of all sorts. This second phase led only to a strengthening of the original Cambridge Theorem (*i.e.* Kaldor's approach), which has surprisingly proved much more robust to changes of assumptions than the Meade-Samuelson-Modigliani Dual, while the symmetrical aspects, on which Meade, Samuelson and Modigliani relied so much, have receded into the background.
>
> (Pasinetti 1989a, 25)

We divide the "second phase" mentioned by Pasinetti into eight specific lines of research that have generated the vast literature in part reported in the bibliography at the end of this review:

1. The introduction of a differentiated interest rate on wealth
2. The introduction of the monetary sector
3. The introduction of the public sector
4. The inclusion of other socioeconomic classes
5. The introduction of the microfoundations
6. The analysis of the long-term distribution of wealth and of the income share of the socioeconomic classes (p. 292) **7.** The overlapping generation model and the intergenerational transmission of wealth
8. Other general aspects, in particular the applicability of the Meade-Samuelson and Modigliani Dual Theorem

We shall consider the main issues at stake for the above points below.

2.2. The Introduction of a Differentiated Interest Rate on Wealth

This hypothesis rejects the equality, in the long period, between the rate of profits that capitalists get from their investments and the rate of interest received by the workers on their deposits or loans to the capitalists. It all started with Pasinetti's assertion that

> in order to say anything about the share and rate of profits, one needs first a *theory of the rate of interest*. In a long-run equilibrium model, the obvious hypothesis to make is that of a rate of interest equal to the rate of profit.
>
> (Pasinetti 1962, 271–72)

Later on Pasinetti (1974a, 139) would add that

> The foregoing analysis may be generalized further. The assumption, kept so far, of a rate of interest exactly equal to the rate of profit is in fact not necessary…. Suppose that the workers lend their savings to the capitalists and receive interest according to the rate of interest $i=P_w/K_w$, which is lower than the rate of profit the capitalists obtain. If we go back to the relation (VI.6.1) [i.e., $S/K = S_c/K_c = S_w/K_w$], we may realize that such a relation holds independently of whether the rates of profit and of interest are uniform or differentiated. And since, in equilibrium, $I = S$ and $(I/K) = g_n$, it follows immediately from (VI.6.1) that: (VI.12.1) $P_c/K_c = g_n/s_c$. This expression represents in fact a more general version of the "Cambridge equation."
>
> (Pasinetti 1974a, 139–40)

Pasinetti goes further to consider explicitly the case in which the rate of interest is proportional to, but lower than, the rate of profits the capitalists obtain on their capital. In this case he obtains relations (VI.12.6–7) that show that the overall rate of profits is a function of all the parameters of the system, as well as of the equilibrium capital/output ratio and of the coefficient of proportionality of the workers' interest rate. These results confirm those obtained by Laing (1969) and Balestra and Baranzini (1971) and would be confirmed by other analyses published later on. Pasinetti (1974a, 141) concludes that "A rate of interest lower than the rate of profits has the same effect as a higher propensity to save of the capitalists"; this result, as pointed out by various scholars, implies that the possibility of the application of the Dual Theorem is even more remote than ever.

(p. 293) The assumption that the rate of interest received by the workers is equal to the rate of profits generated by the system (and received by capitalists) is of course obvious in a neoclassical world where individuals may be different due to their initial endowments, where equilibrating mechanisms are always at work. In this case the differences between the various rates of return may be explained only in terms of risk differences bound to disappear in the long period if the perfect information context remains valid. But if complete foresight exists as to all possible events in the neoclassical model, as Eichner and Kregel (1975, 1309) point out, in post-Keynesian theory "only the past is known, the future is uncertain." In other words, if we abandon the neoclassical approach it may not be clear which particular mechanism makes the interest rate equal to the rate of profits. Leaving aside for the moment considerations of an analytical nature, several reasons may be adduced in support of a differentiated interest rate, as pointed out in Balestra and Baranzini (1971, 242):

> **1.** First, historically, the interest rate has been considerably lower than the average profit rate of the system, except for some periods characterized by recession or high inflation. In general a ratio of 2 to 3 is more likely to reflect the realities of the world than a ratio of 1 to 1. This observation implies one of two things: either the economy is not on an equilibrium growth path and there is no evident hope of ever achieving such a path; or it becomes necessary to incorporate into the model a different hypothesis which explicitly takes into account the observed difference between the rate of interest on normal life-cycle savings and the overall profit rate.
> **2.** Second, one might argue that the act of saving and the act of investing are two distinct operations. They refer to two distinctive acts of appropriation: one is strictly connected with the wage rate and only indirectly with the average profit rate of the economy; the latter, on the contrary, is more directly connected with capital and its profit rate. One might also say that saving is essentially a passive act, while investment is more active. Not surprisingly a higher remuneration is normally attached to the active act of investing.
> **3.** Third, a different way of looking at the same phenomenon is to postulate that there is a risk factor

associated with the act of investing. This risk should be reflected in the differential between the rate of interest on riskless savings and the overall profit rate.

4. Fourth, it may be said that investment, to be profitable, must be carried out in a certain minimum quantity. The workers, taken individually, are not able to exploit the profit opportunities of big investment. Their saving, accordingly, is likely to carry a smaller reward.

For these reasons a number of authors have assumed that the interest rate is not equal to the profits rate; typically it is assumed to be lower. It should be stressed that in the present context, by interest rate is meant the rate at which the workers place their savings in the hands of the capitalists (or in the hands of the state in a socialist society). It is, in other words, the rate of return on workers' savings.

(p. 294) The implications of the assumption of a different rate of return for the accumulated savings of the various classes are far-reaching. First of all it affects directly the distribution of income among classes, the overall saving ratio as well as the patterns of wealth accumulation. But it does not necessarily affect the value of the equilibrium rate of profits; or in other words the strength of the Cambridge equation is often confirmed, depending on the way in which the differentiated interest rate is introduced. Not surprisingly a new research program has been opened up along these lines. The number of contributions and comments is growing and, chronologically, starts with Kahn (1959),[4] Laing (1969), followed by Balestra and Baranzini (1971), Harcourt (1972), Hu (1973), Maneschi (1974), Moore (1974), Pasinetti (1974a, 139–41), Campa (1975) and Pasinetti's reply (1975), Baranzini (1975b, 1976, 1982a, 1987, 1991a, 2000), Gupta (1976), Mückl (1978), Riese (1981), Fazi and Salvadori (1981) and Pasinetti's reply (1983a), Kaldor (letter to M. Baranzini, February 15, 1982; letter to Luigi L. Pasinetti), Miyazaki (1986), Panico and Salvadori (1993a, 1993b), Teixeira (1998), Teixeira and Araujo (1991, 1996, 1997a), Teixeira, Sugahara, and Baranzini (2002). Other scholars—Samuelson and Modigliani (1966a), Ramanathan (1976), Dougherty (1980), Marglin (1984), Craven (1977, 1979), Panico (1985, 1987, 1988)—although not developing a specific model, enquire into the implications of the long-period equality between the rate of return on capital and the rate of interest earned on accumulated savings. (See also Baranzini and Mari, 2011).

The results obtained within this context vary according to the specific assumptions made and to the framework of analysis adopted, although the basic results may well be obtained in both post-Keynesian and marginalist or neoclassical frameworks: a representative example is the neoclassical model developed in Balestra and Baranzini (1971) and the counterpart exposited in Gupta (1976). In fact in the former analysis the independence of the equilibrium profit rate with respect to the propensity to save of the workers is no longer valid (as it would be pointed out by Pasinetti three years later). Looking at optimal growth, the paper develops two distinct arguments. First, in a traditional manner, the conditions under which there exists an interest rate that maximizes per capita consumption are established. Second, the criterion underlying optimal growth may be seriously questioned. Instead of finding the path that maximizes total consumption per capita, one may be more interested in the path that maximizes workers' consumption, a reasonable criterion in a two-class economy. It is absolutely clear that workers' consumption is maximized and at the same time the consumption of the capitalists is zero. This obviously implies that $s_c = 1$ and that the rate of profits is equal to the rate of interest earned by the workers on their accumulated savings.

If we were free to choose the values of the propensities to save in addition to the interest rate, there would be nothing more to be said. This case, however, is rather uninteresting for at least two reasons. First, it assumes that by appropriate policy measures we may effectively act on the saving propensities so as to reach the optimal growth path. Second, even if these policy measures were to be effective, the requirement that the propensity to save of the capitalists be equal to unity seems to be a rather stringent assumption. Instead, one may ask a more pertinent question. More precisely, given the values of the (p. 295) propensities to save (and a given technology), what value of the rate of interest maximizes the consumption of the workers' class? This question may be especially relevant in a socialist society in which the state spends a given proportion of its revenue on investment and where the natural instrument of economic policy is the rate of interest. An increase in the rate of interest has two distinct effects on the consumption of the workers' class. First, the total income or remuneration perceived by the workers is automatically increased, since the return on their accumulated savings increases. This will have a positive effect on their consumption. Second, given that the propensity to save of the entrepreneurs is higher than that of the working class (i.e., $s_c > s_w$), an increase in the rate of interest means a decrease in overall saving. Hence the exogenously given, that is, *ex ante* determined, level of investment will be matched by the *ex post* determined total saving via a redistribution of income from the workers' class to the capitalists class. This will reduce the income received by the workers, and therefore their total consumption is likely to fall. Since these two

effects play in the opposite direction, presumably they will offset each other at some point. At this point a maximum obtains. The result obtained is rather (though not totally) surprising: it states that the consumption of the workers' class is maximized when the rate of interest is equal to the overall rate of profits of the system. This outcome leads the authors to state: "Thus, at the end of our journey, we rejoin Pasinetti's old proposition of the equality of the interest rate and the profit rate. But there is one important difference: here the equality appears as an *optimality condition*, whereas in Pasinetti's model it is an assumption. In this connection, a parallel may be drawn with respect to the neoclassical Golden Rule, which implies the equality between saving and profits. Here again we are back to the old Ricardian proposition, but the perspective is completely different" (Balestra and Baranzini 1971, 254).

2.3. The Introduction of the Monetary Sector

Since the early 1970s, numerous analyses have focused on the role of the monetary and financial variables in the post-Keynesian Cambridge distribution and accumulation model. These works were first a response to the then common belief that the Cambridge post-Keynesian model does not incorporate money. Jan Kregel in his paper with the eloquent title "Hamlet without the Prince: Cambridge Macroeconomics without Money" stresses the lack of focus on money in the Cambridge models of distribution and accumulation:

> Keynes' *General Theory* was exclusively concerned with a monetary economy in which changing beliefs about the future influence the quantity of employment. Yet money plays no more than a perfunctory role in the Cambridge theories of growth, capital, and distribution developed after Keynes. This essay attempts to explain this paradox with reference to the relation between Keynes' monetary revolution and the value theory revolution which simultaneously occurred in Cambridge in the 1930's.
>
> (Kregel 1985, 133)

(p. 296) Numerous scholars share this view. Paolo Pettenati remarks,

> It should be emphasized … that whether money "matters" or not, the explicit introduction of variables representing the Government's budget and the rate of growth of the money supply into the neo-Keynesian models of distribution and growth is just not a question of greater or lower realism, but also a logical necessity…. In other words, unless the behaviour of the monetary sector is taken into explicit consideration, we do not know whether the system is viable or not.
>
> (Pettenati 1993, 393)

A second aim of the research done in this field was motivated by the desire to assess the neutrality or nonneutrality of money in these models of growth and distribution; thirdly it was aimed at assessing whether the equilibrium rate of interest, in a monetary context, would maintain the same characteristics as in the nonmonetary model.[5] As Ramanathan points out:

> The introduction of a monetary asset that competes with a capital asset substantially alters not only the behavioural characteristics of an economic system but the long run implications as well. For instance, in the standard two-class model with capitalists (or firms) and workers (or households), the proportion of capital held by each group is endogenously determined. If a monetary asset exists, then firms and households will not only save different proportions of their respective incomes and earn dividend income on capital assets but also have different demands for money.
>
> (Ramanathan 1976, 389)

The way in which the demand for money is determined and introduced into the real model is hence crucial. But here another problem arises, making the introduction of money even more challenging. To quote Ramanathan again:

> The two groups [of consumers and savers] will thus respond differently in terms of money demand to changes in the inflation rate of return to capital. This in turn alters the portfolio composition in a dissimilar way with substantial impacts on capital accumulation and the balanced growth path of real and monetary variables.

(1976, 389)

The results in general confirm the relevance of the monetary sector in growth models, but at the same time, in quite a few cases, they confirm the relative strength of the results obtained in the real models. This is the case of Baranzini (1975b); also Ramanathan (1976) shows that when a monetary sector is added, the condition for the Pasinetti theorem to hold is empirically more plausible than that of the Meade-Samuelson and Modigliani Dual Theorem. Other analyses enquire into the optimal conditions for steady-state growth in the presence of money, while others consider the role of money in a model where individuals, or groups, try to maximize their utility function under given conditions (Hu 1973), or the neutrality of money in a model that considers a different rate of interest for the socioeconomic classes (Baranzini 1971, 1975b).

Recently a number of papers have been published in which the monetary or banking sectors are grafted into the Kaldor-Pasinetti "real models." In particular we would (p. 297) like to mention Commendatore (2002), Palley (1996a, 1996b, 1996c, 1996d, 2002), Park (2002a, 2002b, 2004, 2006), and Seccareccia (1996). These contributions are all important; but it seems to us that Park (2004, 2006) is the most general one. He starts by noting that Palley (1996a, 2002) considers the Kaldor-Pasinetti theorem in the context of a credit money system where the banking sector is allowed to create money in an "endogenous" manner; always, according to Palley, the Cambridge theorem ceases to hold. It continues, however, to be valid in a system characterized by a "loanable funds system," where capitalists' saving finances workers' borrowing for consumption as well as capitalists' own capital growth. Park's model (2006) instead "traces the roots of Palley's claim to his assumption regarding the ownership arrangement" and restores the validity of the Kaldor-Pasinetti theorem in a credit money system. To do this Park considers a "credit money system" (CMS) where banks may create credit endogenously (i.e., quite independently of preexisting savings) for the financing of workers' consumption beyond their income. This, of course, makes it unnecessary for workers' consumption to be financed out of capitalists' savings. According to this approach, bank deposits are part of the wealth of those who hold them, and it is the growth of total wealth, not the growth of capital only, that becomes relevant for the distribution process. Hence, according to Park, the economy has three classes: workers, capitalists, and bankers. The working class has two sources of income: wages and interest on their accumulated savings (where positive); it is assumed that workers' saving takes entirely the form of the holding of *bonds* issues by firms. Capitalists receive profits on their capital only. According to Park:

> In production, capitalists use two kinds of capital: own capital and external capital, the latter coming to existence by way of issuing bonds to workers and bankers.... Capitalists earn gross profits on the total of these capitals, out of which they have to pay interest for using external capital. Thus the earnings of capitalists are profits net of interest on bonds (and loans). Bankers are different from capitalists in that they are not directly involved with production activities: what they do is to provide the banking service. Bankers are more akin to workers in that they earn their income in return [for] their "labour" in the form of the banking service; however, they are obviously different from the latter in that they work for banks (providing the banking service), not for firms (manufacturing commodities). The banking service in our simple setting consists of providing funds to those who need them *in addition to* (already existing) saving.
>
> (Park 2006, 203; author's emphasis)

In the case of the "loanable funds system," as we said, the funds provided by the bankers are made up by preexisting savings, while in the case of the "credit money system" bankers can create money "endogenously." In both cases, however, according to Park (2006, 203) the granting of bank loans originates a corresponding bank deposit; and the earnings of banks are the difference between these two kind of interest. Earnings of banks are entirely paid out to the class of bankers. Obviously the latter can save out of their income and own some capital in the form of corporate bonds. Park concludes that thus, like workers, bankers have two sources of income: net interest on bank loans and interest on their holding of bonds. The author then proceeds to examine two separate cases: the first (p. 298) one, where only consumers borrow from the banking sector, in order to finance their consumption above their current earnings; and the second case, where the only borrowers of the economy are the capitalists, in order to finance their physical investment. The conclusions reached by Park are interesting and come to confirm the "strength" of the Cambridge equation:

> When capitalists are independent of banks which are the only institution that creates credit endogenously, their saving is entirely and exclusively used in forming capitalists' own capital: $S_c=\Delta K_c$. The steady state

> growth (the "proportionality condition") requires that the capital stock being formed by this saving grow by the common steady-state rate: $\Delta K_c = gK_c$. Then the relationship between the net rate of profits on capitalists' own capital and the steady-state growth rate ($g = s_c\pi$) is derived straightforwardly—independently of the behaviour of the other social classes and the technology, and also independently of the financial system in which the economy is situated. In this "more general version," it is most clearly seen that the Pasinetti theorem is established owing to the existence of the social class whose net income, in the single form of net profits, accrues from a single source: their own capital. That social class is the capitalist one when capitalists are independent of the institution (or another social class) which is allowed to create credit *ex nihilo*.
>
> (Park 2006, 215–16)

2.4. The Introduction of the Public Sector

Yet another line of research has been taken up by several authors who set themselves the task of answering the question:[6] in what way will the post-Keynesian model be affected by the introduction of a public sector, with its own propensity to save, to consume, to accumulate, and to run into deficits or surpluses? This question is particularly important, since it was Keynes himself who underlined the necessity of a nonneutral public sector.[7]

Steedman (1972) considers the case of a perfectly balanced government budget and states that the existence of government expenditure and taxes should not affect the validity of the Kaldor-Pasinetti theorem while, except in quite particular cases, it denies the possibility of the Meade-Samuelson and Modigliani Dual Theorem. Domenghino (1982) and Fleck and Domenghino (1987) analyze an extension of the Cambridge model that incorporates direct and indirect taxes and government spending, so arriving at a more generalized version of the Cambridge equation according to which the workers' propensity to save determines, inter alia, the steady-state income distribution. Domenghino points out that

> Pasinetti's Theorem continues to be valid with government activity if one specific requirement is fulfilled: government must have a balanced budget.
>
> (Domenghino 1982, 299)

(p. 299) In this case, obviously, the system has many similarities with the Kaldor-Pasinetti original two-class model. In the more general case in which the public sector does not show a balanced-budget situation, according to Fleck and Domenghino, two quite different "Anti-Pasinetti cases" may arise:

> **(a)** The government underspends a steady ratio of its tax income—here it is proved that the higher the workers' propensity to save, the lower the share of income going to capital, a result in line with the Kaldor-Pasinetti approach, and referred to as the "well-behaved anti-Pasinetti case."
> **(b)** The public sector constantly overspends a fraction of its tax revenue (and accumulates a national debt at a steady rate)—here the higher the workers' propensity to save, the higher the share of steady-state profits, a result that has been labeled the "pathological anti-Pasinetti case."

The point about this result is that in the presence of a nonbalanced state budget the workers' propensity to save does determine the distribution of income between profits and wages. The results obtained by Fleck and Domenghino have been challenged by Pasinetti (1989a, 1989b), Teixeira and Araujo (1991), and partly by Dalziel (1989, 1991b, 1991–92), who consider a corrected version of the two-class model with a central government that levies direct and indirect taxes. For the case of a balanced budget Pasinetti (1989a, 1989b) obtains the classic Cambridge equation, for which the long-period rate of profits is determined by the natural rate of growth divided by the capitalists' propensity to save, now corrected by the taxation parameter, independently of anything else. The following quotation may be of interest:

> It must also be pointed out that, at this stage already, any symmetry with the Meade-Samuelson-Modigliani case has disappeared. Unless … the workers' *net* propensities to save out of wages and out of profit coincide, the Meade-Samuelson-Modigliani Dual Theorem no longer holds, as it has been pointed out already by Steedman (1972). The reason is very simple. With the introduction of differentiated taxes on wages and on profits, the workers' *net* saving propensities out of wages and out of profits are different.

> Therefore, the capital/output ratio is no longer determined independently of the rate of profits (and of the distribution of income).
>
> (Pasinetti 1989b, 28)

But also in the case of government budget deficit or surplus the Cambridge equation maintains its relevance. As a matter of fact for this specific case Pasinetti (1989b, 30) proves that the equilibrium rate of profits is determined by the natural rate of growth divided by the capitalists' propensity to save, here corrected by the effects *both* of taxation on profits *and* of government deficit spending. According to Pasinetti:

> This means that, given the rate of taxation and of deficit spending, an equilibrium rate of profits, and consequently an equilibrium share of profits in income, exist, which are sufficiently high as to leave—net of capitalists' consumption, of profit taxes, and **(p. 300)** of Government destruction of savings—that amount of savings that are exactly equal to required equilibrium-growth investments. As in the cases earlier considered in the literature, workers' savings do not have any effect on the determination of this equilibrium rate, and share, of profits.
>
> (Pasinetti 1989a, 31)

Teixeira (2009) reconsiders the issue of "government budget surplus." He writes:

> The simplest case of balanced government budget presents no difficulties. He [Pasinetti] shows that the result is consistent with his original contribution concerning the irrelevance of workers' rate of savings. After, he analyses formally the case of a permanent government deficit (a case that cannot be dismissed on empirical grounds) not only to show that it can be consistent with Cambridge Result of growth and distribution, but also to point out that in this model there arises a "way of receiving of the meaning and consequences of public debt" which "goes back to Ricardo" (p. 33).… He also argues that a systematic government surplus is "hardly justifiable as a long-run policy, and … it is in any case symmetrical … to the case of a government systematic deficit."
>
> (Pasinetti, 1989a, p. 30)
>
> I have been puzzled by part of Pasinetti's view on two points. Firstly, I am not convinced that a permanent budget surplus makes no sense.… Secondly, from the theoretical standpoint the argument concerning a permanently positive propensity to save of the government may somewhat be analogous to the one applied by Pasinetti to Kaldor's "logical slip." Provided that the government systematically spends less than it raises from taxation, it will gradually become owner of part of the capital stock and, therefore, will receive both profits and taxes as income.
>
> (Teixeira 2009, 4–5)

Teixeira mainly lives and works in Brazil and argues that in many developing countries (but not exclusively in them) the propensity to save of the state is positive, a sort of "forced saving," with the aim of channeling it into "socially good" projects; or large-scale projects that cannot or will not be carried out by the private sector, as "something like the concept of a National Bank of Social-Economic Development, a kind of BNDES in Brazil. Reactions to this depend in large part, I think, on whether society trusts the government to invest well in a socially beneficial way (broadly defined)" (Teixeira 2009, 5). After analytically solving his model characterized by a constant budget surplus, the author obtains an extended Cambridge equation for the rate of profits that is fundamentally the same as that obtained by Pasinetti (1989b), and adds: "This characterizes the generality of his result. Even if workers are allowed to save, they have no influence on the long-run rate of profits" (Teixeira 2009, 8). However, the stability conditions of Teixeira's model are not straightforward, unless additional assumptions are included. It is worth reporting the author's conclusions:

> Lines of research such as international trade and foreign debt, different rates of interest and profit for public and private assets, monetary sector, Ricardian debt/taxation equivalence, inter-generational wealth accumulation are some of the challenges being tackled. These contributions have tended to show that the essential features of the Cambridge result are not invalidated under a wide range of general assumptions, **(p. 301)** thus corroborating the generality and robustness of Pasinetti's original insight. Thus, extensions

> of such [a] heterodox branch of the theory of growth and distribution is alive and flourishing, with newer promises of today for a more enlightened tomorrow; questioning propositions which rule the academia, the policy makers, the media and international institutions and chartering out new roads ahead in order to ensure that all citizens of the world live with dignity.
>
> (Teixeira 2009, 9)

Other important aspects of the model are hence considered by Pasinetti, with particular reference to the way in which the deficit may be covered (monetary financing or debt financing) and to the links between the Ricardian and Kaldorian theory of distribution. From the early 1990s onwards a new stream of contributions in this field has appeared.[8]

2.5. The Inclusion of Other Socioeconomic Classes

The first step in this direction was taken by Pasinetti (1977, 58):

> Ricardo's theoretical effort has been aimed at "eliminating" rent from his theory of value and profits—that means precisely the opposite of making it "crucial." The same approach is pursued by Sraffa, in whose theory land plays the role of a non-basic commodity, so that the rate of profits is determined *independently* of land and of rent. What my own analysis has introduced is a hitherto neglected relation between profits and savings, which makes it necessary to consider the consequences of different savings assumptions. For example, if one were to take Ricardo's view that landlords save nothing and are a separate class from capitalists, then the long-run rate of profits would precisely be determined by the "Cambridge equation." Stiglitz is therefore incorrect when he thinks that there is any incompatibility with Ricardo. But even if one were to take Stiglitz' own view that "the distinction between *rentiers* and pure capitalists in modern economies does not seem to carry much force," one cannot simply dismiss the Cambridge theory out of hand. Actually, by considering landlords and capitalists together and adding total rent to capitalists' profits in the equations on pp. 110–11 of my book, one ends up with the equation $r=g_n/(1+\delta)s_c$, where r is the long-run rate of profits, g_n is the "natural" rate of growth, s_c is the landlord-capitalists' propensity to save, and δ is the long-run ratio of total rent to capitalists' profits. This ratio simply comes here to reinforce s_c. The only condition that must be satisfied is that total rent itself enters the savings relations in a constant proportion, otherwise a *steady state* path would not exist, and we would be outside the scope of this type of analysis. The "Cambridge equation," as can be seen, is much more robust than Professor Stiglitz would wish it to be.
>
> (Pasinetti 1977, 58)

After this brief analysis of the role of rentiers in a post-Keynesian model of profit determination and income distribution, a number of specific analyses followed. The first of the present authors in 1975 wrote a paper "Growth and Distribution in a Three-Class Economy" while he was at The Queen's College, Oxford. The paper was published later, jointly with Roberto Scazzieri, as a working paper of the IDSE, Milan, and, in a revised form, in 1997 in the first volume of *Essays of Geoff Harcourt*. In this work the authors (p. 302) investigate features of structural economic dynamics that may have relevant implications for the long-periods distribution of income and wealth among socioeconomic classes. In this way is taken up a theme closely related to Joan Robinson's emphasis upon the time structure of rents along an expanding path characterized by "technological disequilibria" with the coexistence of techniques of different degrees of efficiency (see Robinson 1956, bk. 2; Quadrio-Curzio 1993),[9] and to Harcourt's (1972, 217) original remark on the significance of the equality between the rate of profits and the rate of interest. The authors stress that the post-Keynesian view of long-periods distribution of income and wealth, as first exposited by Kaldor, and then by Pasinetti and others, retains the basic structure of classical economic theory while investigating its scheme of causal determination: profits are associated with the requirements of steady growth while wages become residual. A natural step would seem to be that of resuming a view of the economy in which a third class (not considered by Kaldor or Pasinetti) is introduced; in this specific case a class of rentiers whose income may be derived from both profits and rent. This assumption gives the model more flexibility and makes it more compatible with a vision of the economic system emphasizing technological rigidities and market imperfections, as these features are often associated with the existence of distinct incomes or social classes.

As we have already pointed out above, a possible way of generalizing the original two-classes, two-incomes model has been suggested by Pasinetti (1977, 58). In fact he suggests a model with two classes of savers (the class of workers, and the class of capitalists and rentiers) and three categories of income (wages, profits, and rents). The validity of Pasinetti's result is, however, limited to the case in which total rent is a constant proportion of capitalists' profits. Otherwise, "a *steady-state* path would not exist, and we would be outside the scope of this kind of analysis" (Pasinetti 1977, 58). The model put forward is based on the hypothesis that total net income, Y, is divided into wages, profits, and rent; but total net saving is divided into three categories: workers' saving (S_w), capitalists' saving (S_c) and rentiers' saving (S_r). Workers receive wage and profits payments, the latter in the form of interest on their accumulated savings. Capitalists are, as in the Kaldor-Pasinetti model, pure profit-receivers. Rentiers receive interest on their accumulated savings and, at the same time, receive a rent. The latter includes all kinds of incomes that are not remuneration of labor, at the current wage-rate, nor derive from accumulated savings. It follows that the term "rent" refers, in the present framework, to a range of incomes that may include, among others, Ricardian rents and monopolists' extra-profits: such a general formulation may be justified by the fact that the purpose of these kinds of analyses is that of studying those characteristics of steady-state growth which do not depend on the differences among all such incomes. In addition, it may be important to add that one of the main aims of this research line is to focus on the long-run distribution compatible with steady growth, so that this definition of rent is independent of any particular assumption about production technology. For instance, the long-term steady-state conditions have to be satisfied in the cases both of decreasing and of constant-returns technology. We denote s_w, s_c, and s_r as the saving propensities of the workers, capitalists and rentiers respectively (where $0 < s_w < s_c$, $s_r < 1$); as the classes, (p. 303) as usual, are supposed to be intergenerationally stable. By denoting P_w, P_c, and P_r the amount of profits received respectively by workers, capitalists, and rentiers, and K_w, K_c, and K_r the capital stock owned by the same classes, it is possible to write the savings equation as follows: $S = S_c + S_w + S_r = s_c rK_c + s_w(rK_w + W) + s_r(rK_r + rK_r\delta)$, where the variables r and δ are the rate of profits and the long-period ratio of total rent to rentiers' profits (R/P_r) respectively.[10] The last term may be rewritten as $s_r\phi K_r$; then, in this way, $\phi = r(1 + \delta)$ becomes the long-period ratio of rentiers' income to their capital stock. Solving the model by setting the *ex ante* determined investment equal to the *ex post* determined savings, in equilibrium one obtains the following relations (or combinations of them): (1.14.1)

$$r = n/s_c$$

$r = n/s_c$

(1.14.2)

$$Y/K = n/s_w$$

$Y/K = n/s_w$

(1.14.3)

$$\phi = n/s_r$$

$\phi = n/s_r$

The first solution is the well-known "Cambridge equation," as it was formulated by Kaldor (1956) and Pasinetti (1962) for the case in which national income is made up by profits and wages only. The second relation corresponds to the Meade-Samuelson-Modigliani Dual Theorem. The third relation may be defined as the rentiers' long-period equilibrium. In this case the long-period ratio of rentiers' income to their capital stock, ϕ, is equal to the rate of growth divided by the propensity to save of the rentiers' class; it is therefore independent of the production technology and of the propensities to save of the other classes. In this case the capitalists' share of the capital stock must equal zero, so that only the workers and the rentiers will own a positive share of capital; they only will contribute to the process of accumulation. The solutions obtained cannot hold simultaneously, and the respective capital share of the three classes is also provided. The results are, to a certain extent, paradoxical. The workers' class, which in the post-Keynesian model of income distribution receives a residual income, cannot be squeezed out of the model and will always hold a positive fraction of the capital stock (at least as long as their propensity to save is positive). On the other hand, the capitalists' class and the rentiers' class (which, whenever they contribute a positive share of overall savings, maintain a strategic importance in the determination of the distribution income) can maintain a positive capital share only for one of the three equilibria mentioned above.

But what are the implications of the results obtained within this "classical" three-class framework of analysis? It seems to us that the above analysis brings to the fore a number of remarkable features of the dynamic path that may be followed by a capitalist economy that is subject to intense structural dynamics, and thus bound to show a pattern of differentiation among the flows of income and wealth, with the emergence of rent as a category of income characteristically associated with technological disequilibria and market asymmetries. In particular this investigation has shown the inherent instability of the three-class configuration (workers, capitalists, and rentiers) and the existence of alternative long-period equilibria corresponding to different socioeconomic structures. (p. 304) One case (that of the coexistence of entrepreneurs and workers) corresponds to the "classical situation" of a capitalist economy. Another case (workers only) corresponds to a worker-owned economy in which pure capitalists have disappeared, so making room for the classes of wage-earners and rent-earners. The latter socioeconomic structure (which is compatible with a long-period growth equilibrium) points to the possibility of some kind of "capitalists" euthanasia along an expanding path, a situation to be compared with Keynes's "rentiers' euthanasia" within the framework of a mature and sluggish economic system (see Keynes [1936] 1973, chap. 24).

This line of inquiry was also taken up by Augusto Schianchi in 1978 in his paper "Growth and Distribution in a Three-Class Model: A Note," which starts by quoting Joseph Stiglitz (1975, 1328), according to whom "the basic Cambridge equation, that the rate of return on capital is equal to the rate of growth divided by the savings propensity of capitalists, is only true if there is no land, no exhaustible natural resources, *etc*." In his paper, Schianchi once again proves the validity of the "Cambridge equation." He develops a three-class model in which the rentiers earn an income equal to $R + P/K \cdot K_r$ with a propensity to save equal to s_r. In this case Schianchi obtains two solutions for the equilibrium rate of profits: the first is equal to the "Cambridge equation" ($P/K = n/s_c$), while the second, not surprisingly, is equal to the Dual Theorem ($1/Y = s_w/I$). As Schianchi notes, in a three-class economy where rentiers earn on their accumulated savings a normal profit rate and additionally earn a rent equal to R, while the capitalists earn a normal profit rate on their capital, and workers earn their usual income from wages and from accumulated savings (with an usual P/K interest rate), the "Cambridge equation" represents a general solution for which the capital stock of the three classes increases at the equilibrium rate $n = I/K$. But an interesting by-product of the analysis concerns the applicability of the Meade-Samuelson and Modigliani Dual Theorem: in this case, when it applies (indeed for very unrealistic values of the propensities to save) the distribution will depend also on the propensities to save of the rentiers' class.

In 2001 Greg Hill, of the City Budget Office of Seattle, published yet another article along this line of research, with the title "The Immiseration of the Landlords: Rent in a Kaldorian Theory of Income Distribution." (The paper does not refer to the works previously published in this field.) According to him, his model has been prompted by the desire to interpret the significance of the secular decline in rents as a share of national income and to specify the circumstances under which both the capital/output ratio and the wage share in national income may rise. In fact the author pursues Keynes's suggestive remarks about the liquidity value of land and proves that an increase in the demand for land reduces the equilibrium rate of profits and therefore the inducement to invest. To start with, the author gives the sort of reasons for which he treats rent as a source of income that is separate from profits and other capital income. He lists them as follows:

> **1.** Rent accounts for a significant share of property income even in the industrialised countries. In the US, for example, rent paid to individuals in 1997 was nearly one-fifth as much as corporate profits.
> (p. 305) **2.** The secular decline in rent as a share of national income is itself worthy of study because of the enormous social and economic consequences of this transformation.
> **3.** The propensity to save out of rent paid to persons differs from both the propensity to save out of profits (because of retained earnings) as well as from the propensity to save out of wages (because rent accrues mainly to high-income individuals).
> **4.** As Keynes observed, the demand for land as a store of wealth, like the demand for money as a store of wealth, can retard investment in newly produced capital goods (1936, p. 241).
> **5.** Unlike other forms of property income, which are closely related to the growth of the capital stock, "rent is a kind of levy upon the rest of the economy which is not related to any increase in production" (Robinson 1956, p. 327). (Hill 2001, 483)

Following Nicholas Kaldor (and not Pasinetti) Hill defines national income as $Y \equiv W + P + R$, where W, P, and R denote respectively wages, profits, and rent paid to individuals; total saving hence is equal to $S = I = s_p P + s_r R + s_w W$. This means that the saving rate is related to the kind of income rather than to the class. As in Kaldor's model

the equilibrium between the *ex ante* determined investment and the *ex post* determined savings is ensured by changes in the distribution of income.

> The difference is that this adjustment process now encompasses three sources of income, and three saving propensities, rather than two, and two prices—for consumption goods and for the use of rental property—rather than one. Following a change in investment, prices and rents will adjust until total income is divided among profits, rents and (real) wages such that, given the different saving propensities, aggregate saving is brought into balance with aggregate investment.
>
> (Hill 2001, 484)

By assuming that $s_p > s_w$ and $s_r > s_w$, quite a reasonable assumption, it turns out that any change in profits requires an opposing change in rents and vice versa, independently of whether wages change or not. The author underlines this fact as follows:

> This relationship, in which profits are a decreasing function of rents, is consistent with Ricardo's view that rising rents entail falling profits. But whereas Ricardo regarded rent as an impediment to economic growth because he assumed all income from rent was consumed by improvident landlords, we have arrived at our results, viz., that *if* rents rise, profits must fall, reasoning from the premise that a portion of the income from rent is saved. If the whole of rent were consumed, $s_r = 0$, as Ricardo supposed, then an increase in rent would have no effect at all on profits!
>
> (Hill 2001, 485)

In fact for the classical case where saving out of wages is zero (an hypothesis put forward by Kaldor) the distribution of income according to Hill becomes determined as follows: $P/Y = (nK/Y - s_rR/Y)/s_p$. By making the further assumption that $s_r = 0$, the (p. 306) distribution of income would be $P/Y = (nK/Y)/s_p$ and hence rent would have no effect on profits; in this case obviously the Cambridge equation would apply. As may be seen from the more general solution above, the partial derivative of the share of profits in national income with respect to the propensity to save out of rents is negative; an increase in s_p would lower the share of profits in national income. This result does not come as unexpected; but there is more than that. As the author rightly points out:

> In economic terms, an increase in saving out of rents will reduce the demand for consumption goods, thereby driving down prices and profits. Contrariwise, a decrease in saving out of rents, say, because land ownership has become less concentrated …, will push up consumer goods prices, thereby increasing profits.
>
> (Hill 2001, 485)

The author then develops three additional arguments. First, he considers the role of profits and rents in Kaldor's and Ricardo's model, then he considers rents and wages in a Kaldorian model, and finally he refers to the possibility of "the *immiseration* of landlords." This allows the author to conclude along the following lines:

1. Provided that the propensities to save out of profits and out of rents are both higher than the propensity to save out of wages, variations in rents lead to opposite variations in profits (and vice versa). In the same way, an increase (decrease) in the propensity to save out of rents leads to a decrease (increase) in the share of profits in national income.
2. The effect of a change in rents on wages depends on the value of the propensity to save of the rentiers. If they have a higher propensity to save than the "pure" profits-earners (or entrepreneurs), the rent and wages will move in the same direction.
3. Structural dynamics will depend on the propensity to save of entrepreneurs and landlords. If the propensity to save out of profits is higher than the propensity to save out of rents, then the capital/output ratio and the share of wages in national income may rise, and the same time the share of rents in national income will decline.
4. In more general terms "in a Kaldorian model that includes rent, investment is self-limiting because continued increases in investment eventually drive up rents (and land values), which reduces the rate of profit and, hence, the inducement to invest"; additionally "under certain conditions, an increase in the demand for land—as a site for production, as a store of wealth or a speculative placement, or to meet the

> housing needs of a growing population—can restrain investment in newly produced capital goods." (Hill 2001, 491)

Adding up, the introduction of a rentiers' class into the two-class model of Kaldor and Pasinetti provides a modern view of the consideration of a third kind of income besides wages and profits. If on the one hand the validity of the "Cambridge equation" is often considered, on the other the examination of structural dynamics explains why, under certain (p. 307) conditions, the capital/output ratio and the share of wages in national income rises, while at the same time the share of rents tends to decline. We cannot consider here a number of analyses that have introduced other classes of savers; maybe the most reputed is that of Tobin (1960), who develops a model with *n* classes of savers, each with its own propensity to save; but in his work the validity of the Cambridge equation is not disproved.

Another important contribution in this area is that of Thomas Michl and Duncan Foley, published in the *Cambridge Journal of Economics* in the 2004 January issue. Their paper develops a model of growth and distribution of income and wealth with overlapping generations of both workers who save according to the life-cycle theory and capitalists who save for a bequest motive. Their model is, to a certain extent, similar to the one developed in Baranzini (1976, 1977, 1978, 1982b, 1991a) and proves that the incorporation of the life-cycle theory in the Keynes-Kaldor-Pasinetti model of accumulation and distribution is a quite appealing exercise. According to them:

> The population of workers accommodates growth, so that the rate of capital accumulation is endogenous and determined by the growth of employment. Two regimes are possible, one in which workers' saving dominates the long run, and a second in which the long-run equilibrium growth rate is determined completely by the capitalist saving function, sometimes called the Cambridge equation. The second regime exhibits a version of the Pasinetti paradox: changes in workers' saving affect the level, but not the growth rate, of capital in the long run. Applied to social security, this result implies that an unfunded system relying on payroll taxes reduces workers' lifetime wealth and saving, creating level effects on the capital stock without affecting its long-run growth rate. These effects are mitigated by the presence of a reserve fund, various levels of which are examined. Calibrating the model to realistic parameters values for the US facilitates an interpretation of the controversies over the percentage of the national wealth originating in life-cycle saving and the effects of social security on saving.
>
> (Michl and Foley 2004, 1)

In fact the authors by considering the applicability of the Meade-Samuelson and Modigliani Dual Theorem maintain that: "This occurs when the workers' growth factor exceeds the capitalists' growth factor.… In the limit, the share of wealth owned by workers will approach unity. The 1960s saw controversy over the plausibility of these two regimes. We know considerably more about the patterns of wealth accumulation in the United States and other advanced economies, and it is now impossible to deny the existence of a fairly large amount of purely capitalist, bequest-originating wealth" (Michl and Foley 2004, 8). For econometrically reasonable values of the parameters, the two authors show that the neoclassical Dual Theorem is valid only if workers save over 25 percent of their lifetime earnings. This is well above the average and even marginal propensity to save of low- and middle-income earners, as Dynan, Skinner, and Zeldes (2004) have recently discussed. More importantly, the authors maintain that even accepting Modigliani's (1988) interpretation, according to which the intergenerational bequest is about 20 percent of the total capital stock, and not 70–80 percent, as Kotlikoff and Summers (1981) have found, "we are still apparently living in a (p. 308) Kaldor-Pasinetti-Robinson world" (Michl and Foley 2004, 13). And since Gale and Scholz (1994) have recently shown that in the United States less than 50 percent of wealth originates in life-cycle saving, the results obtained by Michl and Foley additionally reinforce the validity of the Cambridge equation. These and still other results lead the two authors to conclude that

> By combining a dynastic capitalist class with overlapping generations of workers who save for retirement, we have been able to interpret the range of estimates for the shares of wealth in the US that can be attributed to life-cycle saving and bequests, and to analyse the comparative equilibrium effects of changes in workers' saving, for example, those brought about through social security. The range of estimates for the share of life-cycle wealth suggests that growth depends critically on the existence of a capitalist's class which accumulates wealth for bequest purposes. This confirms the vision of the Classical economists and their modern followers who have continued to insist that any clear thinking about *capitalist* society

must acknowledge the existence of a distinct class of *capitalists*.

(Michl and Foley 2004, 19)

We may finally note that Park (2004, 2006) has also considered a third class in the original Kaldor-Pasinetti model, that is, that of bankers. According to Park, bankers are not directly involved in production activities, since their role is to provide a "banking service" to workers and/or capitalists.

2.6. The Introduction of the Microfoundations

2.6.1. The State of the Art

The main features of the post-Keynesian, neo-Ricardian, and marginalist growth models elaborated since the mid-1950s and which consider a class of "pure" capitalists (or rentiers) whose income is derived entirely (or mainly in certain cases) from capital, and a class of workers whose income is derived from both work and accumulated savings, are the following:

1. The saving ratio of the classes is exogenously given and hence independent, for instance, of the rate of interest received on savings (both life-cycle and intergenerational).
2. Little attempt is made to explain the "historical" importance of the intergenerational bequest of the system.
3. The equality in the long-period equilibrium between the rate of profit received by the entrepreneurs and the rates of interest received by the other classes on their accumulated savings is exogenously given.

The general purpose of this line of research has been that of studying, essentially from a dynamic and historical point of view, the patterns of accumulation of capital in a two- or multiclass model incorporating the basic ingredients of the life-cycle theory **(p. 309)** and the possibility of the existence of an intergenerational bequest. The basic contribution to this analysis, namely the introduction of the life-cycle hypothesis into the traditional two-class growth model, was originally suggested by Samuelson and Modigliani (1966a, 297), who, when concluding their essay "The Pasinetti Paradox in Neoclassical and More General Models," admitted their uneasiness with the assumption of permanent classes of capitalists and workers ("pure profit and mixed-income receivers" in their words) with given and unchanging saving propensities. To quote the two MIT economists:

> This assumption completely disregards the life cycle and its effect on saving and working behaviour. In the first place with a large portion of saving known to occur in some phases of the life cycle in order to finance dissaving in other phases, it is unrealistic to posit values for (s_c, s_w) [the propensities to save of the two classes] which are independent of n [the rate of growth of the system].
>
> (Samuelson and Modigliani 1966a, 297)

Soon a number of analyses took up this suggestion, like those of Bevan and Stiglitz (1978), Britto (1969, 1972), Hahn and Matthews (1971), Atkinson (1971, 1974), Bevan (1974, 1979), Baranzini (1976, 1982b, 1991a, 2008), Faria (2001), Faria and Araujo (2004), and Teixeira, Sugahara, and Baranzini (2002).

2.6.2. The Aims of This Line of Inquiry

The purpose of these contributions was not exclusively that of providing some microfoundations to the model of distribution, but also of providing a framework where the propensities to save of the various classes are no longer exogenously given but are a function of the rate of interest and of other economic, demographic, and institutional variables. In fact the essential contributions that the life-cycle theory can contribute in a society characterized by the presence of socioeconomic classes with different income structures and different consumption and saving propensities are manifold:[11]

1. More insight into the determination of the distribution of income among classes (at least when they all own a positive share of the capital stock) and determining the equilibrium variables of the model
2. An understanding of the sort of reasons that may lead to historical class differences, to a different accumulation of capital (both life-cycle and inter-generational), and to the particular conditions under which a class may start accumulating intergenerational assets
3. An elucidation of the applicability of the Meade-Samuelson and Modigliani condition (following which the

capitalists' capital share vanishes in the long period) or of the opposite condition (following which the workers' inter-generational capital share tends to zero). This should permit the determination of when the equilibrium rate of interest is the same for all classes of the system and when there exists the possibility of multiple *equilibria*.

(p. 310) **4.** An assessment of the relative strength of the life-cycle versus the intergenerational capital stock and the conditions that favor one or the other of the capital stocks

5. An evaluation of the consequences of the introduction (both in a deterministic and stochastic context) of the hypothesis of an imperfect capital market, which is rather appealing in a two-class or multiclass context? Additionally, what are the consequences of the introduction of uncertainty (relative to the rate of return on accumulated savings) on the optimal consumption and accumulation rates of two classes; and how relevant is uncertainty in generating differences among classes, that is, classes with a higher propensity to save (or to accumulate) than average. And finally, in what way will classes react, according to their risk-aversion, to the existence of different investment and placement possibilities, with different rates of return and different expectations?

There is no pretence that all relevant aspect of a life-cycle growth model with fixed technology and classes characterized by homogeneous socioeconomic behavior à la Kaldor-Pasinetti have been analyzed by the various scholars engaged in this kind of analysis. However, this line of research has extended a little further our knowledge concerning important aspects of economic growth, wealth accumulation, and class distinction.

2.6.3. Methodological Issues

A task of this kind raises a number of questions, even before one starts formulating analytical models. One possible way is that of first encapsulating the life-cycle theory into the post-Keynesian macro-model of distribution and accumulation. Then one may set up a very simple two-period model (without technical progress, pension rate, and so on, and with just one member for each socioeconomic class—distinguished here on the basis of the composition of their income) including most of the main issues, that is, the patterns of income distribution, capital accumulation, and the mechanisms of class differentiation or class homogenization. In the first framework, thanks to the relative simplicity of the model considered, one may derive a number of basic results and try to capture some further implications of the problem. In this way the line of research becomes a thread much easier to evaluate and to follow in order to acquire additional insights. For instance, it is possible to write down explicitly the value of the equilibrium interest rate and of the other equilibrium variables of the model whose properties may be studied in detail. This approach, among other things, enables us to compare the results obtained with those formulated in the post-Keynesian (i.e., Kaldor-Pasinetti) model as well as neoclassical models that do not include some sort of microfoundations. It is also possible to compare a number of the results obtained in the traditional life-cycle saving-and-consumption model, without class distinction, with those of a model that includes a socioeconomic class division. In this way the significance and relevance of such class distinction may be evaluated.

It is worth pausing for a moment on the strategy followed in order to reach the results obtained, a strategy that may well be altered or even reversed in future research programs. (p. 311) According to the life-cycle theory, individuals, during the first part of their life, may choose to allocate their income (*a*) to consumption, (*b*) to life-cycle savings, or (*c*) to the next generation; the latter decision may be taken later on in their life. Additionally, in the case of "pure" profits receivers, there is a unique rate of interest (*a*) that they can earn on their intergenerational and life-cycle savings, (*b*) that optimizes their consumption and saving plans (on the basis of a given utility function), and (*c*) that ensures equilibrium growth of their intergenerational capital stock, so ensuring a steady-state growth of the system. Hence, on the basis of such simultaneous constraints it is possible to define the equilibrium and optimal distribution of income and to study the properties and the patterns of wealth accumulation. Note that this strategy implies that equilibrium and optimal positions are reached, at least for the entrepreneurs' class, and maintained in the long period. The latter is a condition that might seem rather restrictive, but it represents an exclusive and precious tool of analysis and is also justified by convergence analysis.

Of course, within this framework, alternative strategies of analysis may be chosen. One may, for instance, postulate a certain relationship between the life-cycle and the intergenerational capital stock, perhaps associated with a given composition of income, a given socioeconomic status, a given family composition or age-cohort, or even a given level of income and/or wealth. However, this approach would have the drawback of leading to an almost constant process of development and would not allow for a consistent differentiation among the classes

(other than the life-cycle savings / long-term capital stock ratio in the first case). Yet another strategy, quite common in neoclassical models, would consist in assuming constant factor shares instead of a fixed capital/output ratio, and by considering the dynastic bequest as exogenously given and not by a bequest utility function. Other approaches would still be possible, and the rather large literature that considers the intergenerational transmission of wealth[12] (though not the laws of distribution) shows a variety of methods of analysis in this field. However, it seems to us that the two major constraints associated with the post-Keynesian approach (i.e., that of a constant capital/output ratio and of the presence of at least a class of "pure" capitalists in the system) are among the least restrictive.

Additionally, we should not overlook the fact that the introduction of the life-cycle hypothesis into the post-Keynesian model of distribution does confirm the existence in the system of endogenous long-term mechanisms that maintain and in certain cases lead to the formation of different classes. In other terms the cycle of analysis seems to be at least satisfying, since the outcome, in general terms, confirms the validity of one of the most important hypotheses of most classical and Keynesian models of distribution, that is, the presence of different intergenerationally stable socioeconomic classes with different compositions of income.

The initial rigidity of the life-cycle model introduced into the macroeconomic Keynesian framework, à la Kaldor-Pasinetti, may of course be relaxed after the initial stage. This must always be done by bearing in mind that often there exists a trade-off between simplicity of the model and clarity of the results obtained. However, in this perspective the most obvious next step is that of lifting a crucial, as well as implicit, assumption of most classical and post-Keynesian models of distribution. We refer to the fact (p. 312) that the workers' or "pure" consumers' class do save very little, let alone transmit a sizable amount of intergenerational (financial) wealth. One might note that the original models of distribution of Ricardo, Kaldor, and Robinson do not even allow the workers to accumulate life-cycle savings, whereas in those formulated by Pasinetti, Meade, Samuelson, and Modigliani both classes save and receive a rate of interest on their accumulated savings. The assignment of an intergenerational capital to all socioeconomic classes of the model seems then to represent a further generalization. In fact the results obtained provide a more flexible and comprehensive picture of the historical reasons that determine the long-term economic strength of groups, dynasties, or classes, and of the conditions for which one group, dynasty, or class may come to modify its relative position.

The results obtained[13] throw additional light on the behavior of consumers and, more importantly, on the process of capital accumulation. In particular they show that in the very long period the system may explain the evolution toward a two-class (or multiclass) society of financial capital owners. The chain of causality in the decisional processes of individuals or dynasties has been identified with exactitude beforehand. In this framework of analysis it is far more important to chain the causality of the process of accumulation than simply to derive a number of analytical results. The following conclusions may be drawn from a life-cycle two-class model:

1. The optimal equilibrium interest rate does not depend on the form of the production function or on the value of the capital/labor ratio. It depends only on the rate of growth of the economy and on the behavioral parameters of the life-cycle model. In a certain sense the simplicity of the Kaldor-Pasinetti, as well as the Meade-Samuelson and the Modigliani, theorems is repeated. Additionally, the fact that the equilibrium interest rate does not depend on the form of the production function seems to confirm the validity of the Cambridge equation of Kaldor and Pasinetti.
2. It is interesting to note that the equilibrium interest rate, equal here to the profits rate, is greater than the natural rate of growth of population, g. In this life-cycle model this outcome is particularly important since it guarantees the existence, in equilibrium, of the entrepreneurial class, which, on the one hand, has an income equal to rB_t and, on the other, is expected to leave to the next generation gB_t (B_t is the per capita intergenerational capital stock of the capitalist class). Hence, in order to ensure steady-state growth and enjoy a positive consumption during their life-cycle, entrepreneurs must receive on their capital an interest rate higher than the rate of growth of population. If this were not the case, lower capital accumulation would take place, and/or a lower demographic rate of growth of the dynasty or class.
3. The third point concerns the maximization of consumption per capita, which in a state of balanced growth is maximized when the profits rate is equal to the rate of growth. In this life-cycle post-Keynesian model consumption per capita may be maximized only when there is a very strong desire to leave a bequest to the next generation and/or a negative subjective consumption discount rate. In (p. 313) other terms the maximization of consumption per capita requires an intensive accumulation of capital per capita.

4. It may be noted that the same identical behavioral parameters have been postulated for both classes, that is, entrepreneurs or pure profit receivers and workers. Had it been assumed that they are different, then the equilibrium interest rate would not depend on the behavioral parameters of the working class at all.

At this point we might consider the case in which all classes may pass on a financial bequest (excluding education) to their children. In this case in order to have a steady-state path, the capitalists must have a much stronger will to bequeath capital to their children than the other dynasties or classes. It is only in such a situation that all classes will hold a positive share of the total capital stock. Can this analytical result be reconciled with economic reality and common sense? To a certain extent the answer may be positive, since (*a*) the workers' class, by definition, derives a high proportion of its income from the human capital stock, so that the class may be inclined to discount its intergenerational bequest at a rate lower than average; and (*b*) it is not unrealistic to posit a situation where, in general, low-income families give higher priority to life-cycle consumption and, consequently, a lower one to the intergenerational capital stock. Classes that derive a high proportion of their income from intergenerational wealth (and the remaining part from life-cycle savings) in a long-term perspective are bound to give weight to the accumulation of such wealth, by discounting it at a rate higher than average. Notwithstanding this different approach to the intergenerational bequest, there exists a real possibility of a balanced growth of the system, where the classes maintain a constant relative economic strength and a constant share of the total capital stock of the system. Obviously the system may well leave such a path: this would happen if the capitalists were to show a too low propensity to pass on bequests to their children, so diminishing their strength; similarly a much stronger desire to transmit intergenerational wealth by the workers would eventually achieve the same result.

A number of conclusions exposited above are confirmed, in a slightly different context, by Wolff's (1988, 261–80) analysis of the "life-cycle savings and the individual distribution of wealth by class." Wolff in fact develops a similar life-cycle model for the workers' class but supposes that capitalists save a fixed proportion of their income. In particular he focuses on the significance of modifications in steady-state wealth inequality of the system resulting from changes in the following six parameters: (*a*) changes in productivity growth; (*b*) changes in the capitalists' propensity to save; (*c*) changes in the life span and retirement age; (*d*) changes in the relative size of the capitalists' class; (*e*) changes in the covariance of earnings with age; and (*f*) changes in the social security system. As the author points out, some of these factors may have played an important role in the historical decline in wealth inequality that took place in a number of countries from 1900 to 1980 (see, for instance, Phelps Brown 1988). And Wolff concludes that

> Two principal theoretical results emerge from the model developed in this paper. First, the specification of a life-cycle savings model for workers in a two-class model (p. 314) is found to be consistent with the Pasinetti results regarding the rate of interest and productivity growth in steady-state equilibrium. Second, in steady-state equilibrium, wealth inequality among individuals is found to remain constant over time.
>
> (Wolff 1988, 276)

Such conclusions come to reinforce the validity of the introduction of the microeconomic foundations into the two-class fixed savings model; as a matter of fact Wolff stresses that he has not proved that there is always a two-class solution. "In particular, it is possible that under certain conditions (parameter values) the workers' savings propensity is so high that they accumulate wealth faster than the capitalists. In this case, the only equilibrium which results is a one-class worker economy" (Wolff 1988, 277). One may note the similarity with our model (Baranzini 1991a, chaps. 5 and 6), although we have explicitly considered a life-cycle function for the capitalists as well. Finally the results obtained by Baranzini (1991a, 140–41) may be compared with the following long-term properties of Wolff's model:

> Various factors were adduced which might help to explain the observed reduction in personal wealth inequality over the last 50 years or so. Of these, the increased life expectancy and reduction in work life and hence increase in the number of years of retirement seems the strongest force leading to increased wealth inequality. Second, a slowdown in productivity growth and a decline in the profit (or real interest) rate may have led to greater wealth equality. Third, an increasing size of the capitalist class may have contributed to a decline in personal wealth inequality. Fourth, a decline in the rate of return to age or experience on wages may have led to reduced wealth inequality. Fifth, the increase of the social security tax rate from zero % in 1934 to 7% or so today has probably led to increasing inequality.

> (Wolff 1988, 278)

In a certain sense Wolff's inequality in personal wealth distribution may, in the post-Keynesian model of distribution cum life-cycle, be partially replaced by the distinction between workers' and capitalists' intergenerational capital stock, while a number of his other conclusions coincide with those indicated above.

2.6.4. Extensions of the Post-Keynesian Life-Cycle Model

A number of works have been elaborated in order to expand the life-cycle approach grafted onto the Cambridge post-Keynesian model of accumulation and distribution. Among these we find the early works of Ronald Britto, "The Life-Cycle Savings in a Two-Class Growth Model" (1969) and "On Differential Saving Propensities in Two-Class Growth Models" (1972). These are, in a sense, pioneering works; they do not, however, explicitly consider an intertemporal consumption u-function or a bequest function, so excluding the analysis of the overlapping generation model. The issue of inheritance is, however, explicitly considered by David Bevan in his "Savings, Inheritance and Economic Growth in the Presence of Earning Inequality" (1974). Here the processes of concentration and dispersion of wealth are made a function of the (variable) level of earning inequalities. In this framework we want also to mention the work **(p. 315)** of W. A. Darity, "The Simple Analytics of Neo-Ricardian Growth and Distribution" (1981).

The so-called *Brazilian post-Keynesian school of Economics* (which includes, among others, Joanilio Rodolpho Teixeira—the unquestionable leader—Ricardo Azevedo Araújo, Maria de Lourdes Rollemberg Mollo, Rodolfo Marcilio Teixeira, Adriana Moreira Amado, Mauro Boianovsky, José Luis da Costa Oreiro, Flávio de Oliveira Gonçalves, Leopoldo Costa Junior, Márcio Bruno Ribeiro, Joao Ricardo Faria, and Cristiane Soares Nathália Almeida de Souza) has recently explored other directions. Of note are, first, Faria in his "The Pasinetti Paradox in an Intertemporal Dynamic Model" (2001), and then Faria and Araujo in their "An Intertemporal Pasinettian Model with Government Sector" (2002). This last contribution is intriguing. After recalling that Fleck and Domenghino (1987, 1990) argue that the assumption of a balanced budget would be essential for the Kaldor-Pasinetti theorem to hold in an economy with government activity, Faria and Araujo stress that a number of analyses have proved just the opposite viewpoint, that is, that the Cambridge theorem would be valid even with long-term unbalanced budgets.[14] Following these lines of investigation, Faria and Araujo (2004) study the relevance of the Cambridge equation in the presence of a government sector when the assumption of fixed savings for all classes is relaxed. Their analysis has been written with the aim to elucidate the issue by introducing the life-cycle hypothesis into a three-class model including consumers, entrepreneurs, and the state. It may be summarized as follows. Consumers are allowed to choose how much to consume and to save in order to accumulate wealth providing consumption in the future at each moment of time in an infinite-time horizon. As a result the average and marginal propensities to save are made endogenous. The neoclassical representative agent framework is then adapted to include most of the traditional features of the post-Keynesian distribution model, characterized above all by different socioeconomic intergenerationally stable classes.[15] Faria and Araujo conclude that the main result of their paper is that the Cambridge equation, that is, the Kaldor-Pasinetti theorem, is consistent with their model. However, the rate of profits is not determined by it.

> In this vein we provide microfoundations for the two-class growth model of capital accumulation and income distribution. As Samuelson and Modigliani (1966a) argued, the Cambridge equation applies to any system capable of a golden-age path, which is the case of our model. However, due to its intertemporal structure, the rate of profit is determined by the rate of time preference. This is a standard result in the neoclassical Ramsey-type models. Consequently, the Pasinetti paradox is no longer a paradox.
>
> (Faria and Araujo 2004, 2)

In Faria and Araujo's (2004) model the Cambridge equation provides the conditions for the determination of the capitalists' marginal propensity to save. The relevance of the marginal productivity of capital is that it provides the necessary conditions for the determination of the optimum quantity of capital in the economy. Moreover, it is important to notice that the Cambridge equation still holds true independently of the marginal productivity of capital or any other parameter related to the production function.

(p. 316) But the functional relationship is here reversed. The Cambridge equation determined the equilibrium value of the capitalists' propensity to save, for the case in which both classes coexist in the system. Finally Faria

and Araujo (2004) show that only taxation on profits affects the equilibrium profits rate and, as a consequence, capital accumulation (and its distribution among classes), wages, and output. Contrariwise, direct taxation of wages does not affect the equilibrium profits rate and/or capital accumulation and output. More importantly in this life-cycle framework the equilibrium distribution of income between wages and profits, as stated by the Kaldor-Pasinetti theorem, is not affected by the occurrence of sustained deficits or surpluses. Faria and Araujo (2004) point out that this result is consistent with the conclusions of Pasinetti (1989a, 1989b), Dalziel (1989), Denicolò and Matteuzzi (1990), as well as Araujo (1992).

The validity of the life-cycle (cum intergenerational approach) grafted onto the Cambridge post-Keynesian model of profit determination, income distribution, and capital accumulation has been also briefly commented on by Pasinetti as follows:

> A separate, but obviously connected, field of theoretical investigations is the one concerning consumers' decisions on how to distribute consumption over their lifetime, as the flows of personal incomes and the needs of personal, or family, consumption do not exactly coincide in time. In this respect, it may be interesting to note that the elaborations concerning life-cycle theories of personal consumption and savings (as those of Modigliani and Brumberg [1955]) are perfectly insertable into the present theoretical scheme, which actually seems to offer, for such elaborations, a simpler and more appropriate context than that of traditional pure utility analysis. A confirmation may be seen in Baranzini (1991b).
>
> (Pasinetti 1993, 109 n. 6)

2.6.5. Personal and Functional Distribution of Income and Wealth

In the first part of this chapter we made only limited reference to the possible links between personal and functional (i.e., relative to factors of production or, in this case, to specific socioeconomic classes) distribution of income and wealth. We have also provided little reference to the empirical evidence of historical accumulation and distribution of life-cycle and intergenerational wealth. This is to be connected with the study of the laws of functional distribution of wealth in a growth context, especially with respect to the long-term transmission of dynastic wealth and to a model based on microeconomic foundations. This element must, however, be integrated with the mechanisms that, both in a deterministic and in a stochastic context, might contribute directly or indirectly to the maintenance and even generation of different socioeconomic classes. (Note that these two qualifications of the whole model are equally important.) In order to do this, not surprisingly we have to introduce a number of restrictive assumptions, not unusual in a long-term context.

Here we shall first consider the relevance of the particular assumptions made (and of their role in the general patterns of the whole process of growth) and then the links between personal and functional distribution of wealth with the aim of providing a much wider historical perspective for our research program. There is a precise reason for first considering the relevance of the most important assumptions formulated throughout most of the above analysis, and in particular the role of interest-uncertainty in the process (p. 317) of accumulation. In fact such assumptions do not only refer to the process of concentration or of dispersion of economic power (i.e., of income and both types of wealth); but they are at the very basis of all growth models that consider multiple aspects of economic growth. Here in particular we shall refer to the role of a constant rate of growth of population, to the fact that such a rate of population growth must be neither too high nor too low (with respect to the long-period rate of growth of population, say between 0.5 and 1 percent in advanced economies), and to the intergenerational stability of dynasties.

The rate of growth of population. Within the above framework it is postulated that the rate of growth of population (a weighted average of both the growth rate of the working population and that of the wealth-owning population) is equal for all socioeconomic classes and is exogenously given, that is, unaffected by economic changes. As pointed out by Meade (1968), a variation in the standard of living (thanks to a change in disposable income from work and accumulated savings or inherited assets)

> might affect the growth rate of population either through its effect upon mortality or through its effect upon fertility or through both influences. Suppose that a low standard of living led to malnutrition and that this caused (i) a higher incidence of disease and death and (ii) a lower biological fecundity among women. Then a fall in the standard of living would tend to raise death rates and lower birth rates and this in turn

> would tend to lower the rate of growth of population.
>
> (Meade 1968, 118)

But one may argue that, as has happened in certain cases in affluent societies, richer classes tend to have fewer children than average; in this case, all other things being equal, a progressive concentration of wealth should take place. (Note that the same process of concentration should take place in the case in which the whole, or the greatest part, of the estate is left to one of the children, normally the eldest son or daughter.) In fact:

> It is, however, not certain that a fall in the real income per head of a population will reduce the growth rate of that population and *vice versa*. It is conceivable that the opposite will be the case—namely that a rise in real income *per head* will reduce the growth of a population, and *vice versa*. It is in fact often maintained that a rise in the standard of living leads to a greater degree of birth control and to a smaller family pattern of life. In this case the demographic factor, instead of mitigating, could intensify the changes in the movements of labour's income. For suppose that a too rapid rate of growth of labour was causing the workers' income per head to fall. If then the fall in the workers' income caused the working population to grow more rapidly, the growth of labour relatively to other resources would be intensified. In fact in the real world we do often see a high fertility and consequently high rates of growth of population associated with poverty. But we must be careful not to conclude from this that poverty is necessarily the direct cause of high fertility, and wealth the direct cause of low fertility.
>
> (Meade 1968, 118–19)

To conclude on the role of the rate of population growth, we may note that in a multiclass model the demographic constraint (as we have considered it) must be valid (*a*) for all socioeconomic classes and (*b*) through the whole process considered—in our case in the long period. For this reason it is obvious that demography may be considered as one (p. 318) of the central elements of the model. A differentiated rate of growth of population, as we shall point out again below, is bound to lead to a higher or lower concentration of wealth (and/or income), which in turn may lead to further changes in demographic patterns.

The rate of growth of population must be neither too high nor too low. As may be observed in most models exposited above, the rate of growth of population may be technically equal to zero; in particular the value of the equilibrium rate of profits in a two-period, two-class life-cycle model is still positive, even if $g = 0$. This is not the case for the Kaldor-Pasinetti or Meade-Samuelson and Modigliani's solutions for the rate of profits, where a nonpositive rate of growth (of population and technical progress), implies a zero equilibrium rate of profits and hence a nil share for profits in national income. The analysis of the implications of interest uncertainty has, however, proved that a low rate of growth of population could mean a higher concentration of personal wealth. Also, in the case of a deterministic model a low value of the rate of growth of population may imply an inadequate rate of profits.

A too high rate of growth of population may slow down the process of growth via a progressive dispersion of wealth per capita; this may be observed in figure 7.3 in Baranzini 1991a, 192. Here a rate of growth of population higher than $r-\delta$ (where r is the mean rate of return on the risky asset and δ is the subjective discount rate) would prevent most dynasties from endowing their children with the same wealth as that inherited by their parents. The point is that an average value of the rate of growth of population may, among other things, create or ensure conditions for a steady-state system where the classes may accumulate positive wealth per capita and possibly hold a positive share of the intergenerational capital stock. Values for the same variable that are either too low or too high may not allow for the existence of such a steady-state path. They may generate extreme situations like a rapid concentration or dispersion of wealth. Consequently, an orderly or smooth development of the economic system may be difficult to achieve and may prevent a given economy from completing all stages of the process of development.

The assumption of intergenerational stability of classes. Within our framework the concept of "stability of classes" means that during the process of economic expansion, dynasties belonging to one class do not mix with dynasties belonging to other classes; or that transfers are exactly compensated by countertransfers. Classes are defined on the basis of

a. *Income composition*. For the capitalists' class is postulated an income predominantly from capital, mainly intergenerational; for the worker's class is postulated a mainly life-cycle income from both work and capital (interest on savings).
b. *The capacity of transmitting intergenerational assets*. This applies to capitalists in any case; in general not to workers (and this reflects the formulation of most classical and early post-Keynesian models). A model where all classes are allowed to transmit intergenerational wealth has also been examined.

It is easy to see that in this case the stability of social classes has mainly to do with the way in which intergenerational wealth is transmitted. (We do not exclude the possibility that other elements like education and social networks should be considered in the study of the patterns of transmission of economic power.) More precisely, the way in **(p. 319)** which marriages take place in our society becomes relevant. James Meade has considered this issue in great detail:

> In fact mating is somewhere between the completely random and the perfectly assortative. A bachelor at a given position in the bachelor's pecking order will not inevitably marry the spinster at the corresponding position in the spinster's pecking order; but the choice is not purely random; the nearer any given bachelor and any given spinster are at the same position in their two pecking orders the more likely they are to choose each other as mates. But as long as mating is not perfectly assortative there is some averaging and equalizing tendency at work. If Tom's and Mary's fortunes do not correspond, then the joint family's fortune will be an average of whichever is the greater fortune and whichever is the lesser fortune. This is an equalizing tendency; and if this were the whole of the story, inequalities would progressively disappear as the generations succeeded each other. For as long as differences of fortune persisted there would be a force at work taking two different fortunes, joining them together, and averaging them. This force is known as the regression towards the mean.… If this regression towards the mean were the whole of the story we would expect to find society continually moving towards a more and more equal distribution of endowments.
>
> (Meade 1973, 18)[16]

But together with this factor of "regression toward the mean" there exists another set of forces at work that tend to reintroduce inequalities and hence to maintain a certain balance among classes. In Meade's words:

> But elements of random luck in genetic make-up, and in social and economic fortune, cause a dispersion about the average; and the more marked are these elements, the greater will be the ultimate degree of inequality in society. Finally, the more marked are the positive feedbacks and the less marked the negative feedbacks … of structured developments of endowments, the greater the ultimate degree of inequalities.
>
> (Meade 1973, 21)

In this way inequalities between the most and least able—as Meade himself points out—will be reestablished: "in their careers some will strike lucky in education, social contacts, investments, and jobs and will go uphill, while others will go downhill" (Meade 1973, 21). The degree of intergenerational stability of socioeconomic classes (Meade's "ultimate self-perpetuating degree of inequality" in the distribution of fortunes) is thus the outcome of the interaction of a number of forces. If the forces that account for the "regression toward the mean" are equivalent to those accounting for a greater dispersion, in the long-run there might be a good degree of intergenerational mobility. It must, however, be pointed out that in order to ensure stability of classes such a complex process must

1. be supplemented by stability in the functional distribution of income;
2. be considered in the long run, since different classes of people might have different ages, and hence different propensities to save and to endow their own children; and
3. take place in association with a constant intergenerational/life-cycle wealth ratio.

(p. 320) The issue of intergenerational mobility of classes is of course much more complex than described here, but it is not the aim of this review to examine it exhaustively. Here we have confined ourselves to those elements that, in the framework of an integrated model of income and wealth distribution, are directly connected with the issues at stake.

Personal and functional distribution of income and wealth: long-term trends. At this point we may set up the

results obtained in the life-cycle version cum intergenerational bequest of the post-Keynesian model against the issue of the progressive concentration or dispersion of wealth. We have already pointed out that there exist a number of elements that are continuously at work in the determination of the progressive concentration or dispersion of wealth. Let us reassess these elements in the light of the results obtained, with particular attention to the way in which they may alter such results in the medium and long term. We shall start by considering the main elements of dispersion of wealth, which on the one hand may tend to level off the life-cycle savings, and on the other may reduce the relevance of intergenerational assets in total wealth. Such elements concern (1) fiscal policies of redistribution; (2) falls in the value of holdings; (3) drawing-down on savings; (4) transfers in the donor's lifetime; and (5) dispersion at death.

Fiscal policies of redistribution. The role of this instrument of economic policy has become increasingly important in recent decades. In certain cases these policies[17] have been successful in stopping or slowing down the progressive concentration of wealth, while in other cases the forces acting in favor of such a concentration have been overwhelming. A large number of economists have considered in detail the relevance of all direct and indirect taxes on the process of wealth accumulation; their conclusions have often been ambiguous. Nevertheless it seems clear that wealth taxes and estate duties have led to a lower concentration of wealth than one would otherwise have experienced. Nonetheless, the results outlined seem to confirm the validity of the Cambridge equation even in the presence of fiscal policies of redistribution and of "estate duties." Even before the elaboration of these specific models, it became clear that taxes on income from interest at a differential rate might serve to modify (partially) the difference between the rate of return on capitalists' and workers' income from accumulated savings. The inclusion in the bequest discount rate of an explicit tax on transfers should serve to reinforce one of the main results obtained in the framework of the post-Keynesian cum life-cycle model: that is, that in a steady-state situation, in order to maintain their relative economic power, "pure" capitalists must exhibit a markedly higher propensity to leave assets to their children than average.[18]

But we should also take into account the overall impact of taxes on savings, which to a certain extent represent the starting point of the accumulation process. As Atkinson and Stiglitz point out:

> When part of the motive for saving arises from uncertainty associated with future income or future needs, the effect of taxation on savings may be markedly different from that in the life-cycle model. Assume that a person expects to have a fairly high income next period; so that in the absence of uncertainty he would do no saving; but **(p. 321)** there is a small chance that he will be unemployed. He therefore sets aside a small amount of "insurance" against this contingency. The interest income tax effectively increases the price of this insurance, and this may induce individuals to purchase less. On the other hand, assume that the person wishes to be sure that, after tax, he has a minimum level of consumption if he is unemployed. His precautionary saving is targeted at providing exactly that amount. Then, to maintain that minimum level of consumption, with an interest income tax, the person must actually increase his savings. Thus, once again, we observe an ambiguity in the effect of taxation on savings, but now it depends on the individual's attitude towards the risks he faces.
>
> (Atkinson and Stiglitz 1980, 84)

For this reason it is clear that the implications of fiscal policies on the consumption and saving behavior of individuals—especially in a stochastic context—deserve additional attention in the context of this research line.[19]

Falls in the value of holdings. As pointed out by Sir Henry Phelps Brown (1988), this element occurs only occasionally but still is important especially in the wake of the financial and other bubbles of these last decades:

> Particular investments may collapse; a fall in farm prices may depress land values, or a depression may lower the valuation of all manner of assets. Since the proportion of assets held in the form of stocks and shares rise [*sic*] with the size of the holding, the wealth of the top 1 per cent of holders is particularly vulnerable to a fall in the stock market. The number of probated British estates of £100,000 and over, which had been rising steeply since the 1850s, hardly rose at all in 1875–9 and 1885–9, the two troughs of the great Victorian depression …; that the fall in another severe depression, that of 1930–4, was small may be explained by the rise in gilt-edged at that time.
>
> (Phelps Brown 1988, 451–52)

Such phenomena, although of a rather sporadic nature, might contribute to a drastic reduction in the intergenerational capital share of the "pure" capitalists' class. This may lead to (*a*) an increase—however slight—in the intergenerational share of the other classes and/or (*b*) a fast increase in the "pure" capitalists' propensity to bequeath (and this is more likely to happen). The latter result, which would be the outcome of an emergency situation, may paradoxically lead to a more stable long-term coexistence of the various classes of the system. In fact, the analysis of this post-Keynesian cum both life-cycle and intergenerational bequest model has shown that in a deterministic model, equilibrium growth is ensured only in the case in which the propensity to bequeath of the capitalists is markedly higher than that of the other class(es) that derive income from other sources. This applies also in the case in which there exists a minimum degree of market imperfection, which may be more likely to happen in a situation of economic instability. Finally we may note that phenomena like those described here may, in certain cases, have a rather neutral effect on the forces that account for the processes of distribution of income and accumulation of assets; and in this event no particular problems arise. Such phenomena would be more relevant if "neutrality" did not apply, or in the case in which there was more than one shock.

(p. 322) *The drawing-down of savings*. This occurs to maintain a sustained level of consumption after retirement. This element of dispersion has been incorporated in the deterministic life-cycle models exposited above; its relevance does determine the role of life-cycle savings. Phelps Brown (1988, 452) emphasizes that "although it occurs in some cases, it is far from being a general practice," probably because nowadays pensioners tend to have a sufficient global disposable income flow for their needs. In fact during the last part of the twentieth century and the first years of this century the saving ratio of retired people has gone up noticeably. From a more general point of view it may be argued that better pension schemes and Medicare (which are important for old age) are bound not only to increase the saving ratio of pensioners, but possibly to increase the share of the intergenerational wealth in total wealth.[20]

Transfers in the donor's lifetime. Such transfers are also an element of dispersion of wealth. It may, however, be noted that if transfers simply anticipate transmissions that would normally take place at death, they are equivalent to a simple modification of the bequest discount rate, that is, of the willingness to leave an estate to the next generation. Actually, if practiced by the richer classes (for instance for fiscal reasons) it would simply imply, other things being equal, that capitalists have a lower bequest discount rate than the other classes, a condition that we have found to be essential for the coexistence of all classes in equilibrium. However, as Phelps Brown has indicated, there are no reasons to infer that transfers in the donor's lifetime "play a substantial part in forming the British distribution; but we lack direct observations" (Phelps Brown 1988, 452). If, however, transfers in the donor's lifetime are made to other than natural heirs, or in different proportions among heirs, the outcome may lead to additional complications.

First, endowments to nonheirs may imply concentration or dispersion of wealth according to the financial position of the beneficiary; second, transfers in unequal proportions to heirs imply a general process of concentration of wealth; all this of course also depends on the number of children and heirs and on the amount transferred. The UK Royal Commission in 1977 found that in half of the estates with two or more children the global bequest was more or less equally split among the heirs. With regard to the remaining half "on average the most-favoured child received 74 per cent of the property bequeathed to the two children, and about 51 per cent where there were three or four children." But Phelps Brown goes further and adds,

> The extent of inequality did not vary with size of the estate. Thus there was no dominance of primogeniture; and in the half of the cases where one child received more than an unequal share, the others still had substantial portions. There were also significant bequests to grandchildren.
>
> (Phelps Brown 1988, 453–54)

If we consider the role of the bequest discount rate (or of any other analytical device linking present and future consumption with the intergenerational bequest) in the post-Keynesian macroeconomic model with microfoundations exposited above, we note that an increase in the bequest discount rate (denoting a lower willingness of parents to leave assets to their children) would paradoxically lead to a lower proportion of **(p. 323)** intergenerational wealth in the total capital stock of the nation, at least for econometrically reasonable value of the parameters.[21] It is worth noting that this result is likely to be obtained in all cases with one or both classes holding intergenerational wealth. Hence a modification of the patterns of transmission of wealth is likely to have more

specific consequences for the value and relative strength of the aggregate variables of the system, including the long-term equilibrium rate of profits, the functional distribution of income, and wealth among social groups, while such a modification will have a less clear influence on the personal distribution of income and wealth. This is due to the fact that it is not easy to identify the repercussions of such changes on the relationships among individuals or dynasties.

Dispersion at death. This phenomenon, due to a large number of children (and/or grandchildren), should also be considered here. This may easily be observed in the case of the accumulation of capital with interest uncertainty: here the rate of growth of population will determine (*a*) the amount of wealth that is left to successive generations, and, more importantly, (*b*) the relevance and even the existence of socioeconomic classes. A link with the overall share of intergenerational wealth in the total capital stock may be, at this point, established. The results obtained within the post-Keynesian cum life-cycle theory framework show that the share of the intergenerational capital stock in total capital is, in general, negatively connected with the rate of growth of population. In other words, an increase in the rate of growth of population has a negative effect on the relative share of the intergenerational assets; and, not surprisingly, it has a positive effect on the life-cycle savings of the families and dynasties. Modigliani and Brumberg (1954) already pointed out the latter result when they first formulated the life-cycle theory; actually it was the higher rate of savings of certain countries that initially drew their attention. The former result may be interpreted in various ways; but the more plausible may be that individuals and dynasties that cannot rely on large revenue from accumulated savings will be forced, all other things being equal, to accumulate more life-cycle savings in order to enjoy a consistent level of consumption during their own lifetime.

To conclude on the chief factors that account for the progressive dispersion of personal wealth we may stress that (*a*) only a number of such factors may alter the relative economic strength of social groups and classes; (*b*) their effect is not always unambiguous on the functional distribution of income; and (*c*) it is not easy to work out exactly the implications of such factors for the aggregate values of the economic system. The implications of such modifications may, however, be much easier to observe in a model assigning a certain degree of rigidity of behavior to socioeconomic classes and assuming a fixed technology.

Let us now consider some of the forces that usually account for the *progressive concentration of personal wealth.* We shall also consider their implications for its functional distribution. Among these forces we shall distinguish (1) the unequal distribution of personal income; (2) the different propensities to save; (3) a different portfolio composition and hence a different rate of growth of the mean wealth; (4) an unequal distribution of bequests and/or concentration at death due to a small number of children; and finally (5) the life-cycle accumulation of savings. Let us consider these elements in detail.

(p. 324) *The unequal distribution of personal income*. Its implications may be considered both at the micro- (i.e., personal) and macro- (i.e., functional) level. At the macro-level the models of growth developed in the traditional post-Keynesian literature on growth and distribution focus on two-class or more than two-class systems characterized by different propensities to save, to consume, and to endow their children with wealth. In this way relevant modifications in the distribution of personal income and wealth may be incorporated in class behavior, as we have endeavored to show in this paragraph. However, strong modifications in personal distribution, especially across classes, may significantly alter the value of the equilibrium variables, that is, of variables that maximize the life-cycle and intergenerational utility of consumption and bequeathed (as well as inherited) wealth. Additionally, along the traverse from one steady state to another, we do not know what will happen precisely. It is also not clear in what circumstances the traverse will (*a*) modify the relative position of wealth-owning dynasties or classes; or (*b*) lead to a final steady state with all classes present in the system.

The different propensities to save. This is an important element of the process of concentration of wealth.[22] It has, however, been demonstrated that the propensity to save is not merely a function of the amount of disposable income and/or wealth; there are a number of other variables that come into play, such as age, number of children, composition of income, socioeconomic background, professional status, and so on.[23] In this sense the introduction of such differences within a life-cycle cum bequest multiclass model such as those exposited above seems to present a number of advantages. The propensity to save of individuals and of dynasties is directly connected with the consumption discount rate as well as the bequest discount rate, or in any case with a sort of analytical device that links the various consumptions among them, and still another sort of link between life-cycle consumption and the bequest left to heirs.

We may recall that if we use a log-normal utility function[24] for consumption and bequest, and if we postulate that noncapitalists do not transfer wealth from one generation to the next, an increase in the bequest discount rate has a positive effect on the rate of interest. The opposite result applies with respect to the consumption discount rate. Usually an increase in the bequest discount rate, which indicates a lower willingness to leave assets to the next generation, has (not surprisingly) a negative effect on the intergenerational capital stock of the system. More ambiguous is the outcome in the case of an increase in the life-cycle consumption discount rate. We would expect that an increase in it (i.e., in δ, the subjective discount rate), meaning a lower willingness to accumulate life-cycle savings, ought to lead to a higher proportion of intergenerational wealth in the total capital stock of one generation. The results that we have obtained (in Baranzini 1991a) and exposited above indicate that although this may well be the usual case, it is possible that in specific circumstances the opposite outcome applies. Again, it is worth noting that a change in the propensity to save at whatever possible level (individual, family of dynasty, single class,[25] or of all classes) exerts an influence on the distribution of income and wealth in general, and on the relevance of the life-cycle and intergenerational capital stock.

(p. 325) *A different portfolio composition*. This factor implies a different rate of growth of the mean wealth: and it may be considered at two different levels. In a deterministic context one may simply postulate a differentiated mean rate of return (due to factors, such as the size of investment, different information, direct investment as against passive saving, and so on). Always in the absence of risk Baranzini (1991a) demonstrated that a different rate of return on wealth may be a "device" or an "opportunity" through which all classes in the system may be able to transfer wealth to the next generation. Additionally Baranzini (1991a) measured the implications of a smaller or larger difference between the mean rates of return on accumulated or intergenerational wealth. In general such variations have an influence over the value of all equilibrium variables of the model. However, the concept of "portfolio" is often associated with risk.

For this reason, the portfolio composition has been explicitly considered in a stochastic context, first by inquiring into the sort of reasons that may lead to a different portfolio holding and then by analytically describing its effects on the mean rate of saving, accumulation, and consumption of households or dynasties. The role of relative risk-aversion in the determination of the optimal portfolio holding has also been studied; this hypothesis is particularly appealing in a dynastic and class model like the one that is under scrutiny in this framework. Again, the effect of other changes in the parameters on the general composition of the portfolio has been outlined.[26] In this way it is also easy to establish a direct link between personal, family, dynastic, and class distribution of income and wealth by taking into account the demographic composition of population and the characteristics of the socioeconomic classes.

An unequal distribution of bequests and/or a *concentration at death* due to a small number of children. We have considered above the main elements at work in this case, that is, the forces accounting for the dispersion of wealth. Obviously, in this case the process of concentration concerns the systematic transmission of the largest (or whole) share of the estate to an only child. But we have seen above that an unequal distribution of wealth among heirs nowadays does not often occur. Where it occurs there is no dominance of primogeniture. The number of children of dynasties will also determine the speed of such a process of concentration. In particular, if a class were to have fewer children than the other classes, then there would be an overall progressive concentration of wealth.[27] Of course relevant modifications in the distribution of wealth at the personal level may well be incorporated in macro-level analyses. Take the case of the introduction of a new class, with a specific composition of income, wealth endowment, bequest discount rate, and number of heirs.

The life-cycle accumulation of savings. According to scholars like the late Franco Modigliani, this remains one of the most important elements of wealth concentration. We have seen that the patterns of life-cycle accumulation of wealth in a micro-post-Keynesian model cum overlapping generations depend on all main variables and parameters of the model, and in particular on the consumption and bequest discount rate of the entrepreneurial class. Their impact at the personal and more aggregate level has been exposited in detail (see, for instance, Baranzini 1991a, part 2). Of course at the end of this list of factors of concentration of wealth, reference should be (p. 326) made to the conclusions drawn in connections with the factors involved in the dispersion of wealth. It should, however, be recalled that the assumption of specific socioeconomic classes implies a minimum level of rigidity in the model, which is not to be found at the individual level. In other words a specific change in the behavior of a given class may not always be fully compatible with steady-state growth, while it does not suffer any limitation at the individual or dynastic level.

2.6.6. Economic Analysis and Empirical Observations

Let us reconsider one of the main conclusions reached within the deterministic post-Keynesian cum life-cycle framework. If we allow, in a simplified two-period life-cycle model, all socioeconomic classes to accumulate both life-cycle as well as intergenerational assets, then the existence and continuity of such classes in equilibrium will be guaranteed only provided that the propensity to bequeath of the "pure" capitalists is markedly higher than that of the other classes. The theoretical implications of this result (as well as of a number of other results) are clear; and such results also describe the kind of conditions that must hold in a situation of long-term steady-state growth, both with respect to the nature and determination of the equilibrium variables, as well as to the relative importance of the socioeconomic classes.

It may also be worth reassessing the significance of these conclusions in the light of recent trends in personal and functional wealth distribution. As a matter of fact two historical phenomena concerning the distribution of wealth have occurred in developed countries since about 1920. The first one is a relative blurring of property ownership in the shape of widely dispersed ownership of homes, cars, durables, liquidities, and even social security wealth (and sometimes even stocks and shares). This diffusion (or dispersion), in the middle class, of these basically "consumption assets" is precisely what seems to justify the life-cycle theory component of wealth, the proportion of savings to income, and the apparent absence of class division in this model. But Modigliani himself accepts another nonirrelevant form of wealth "earmarked for transmission" and concentrated among the wealthiest classes.[28] This is exactly the basis for a return to (or conservation of) class division, which is not too far from the basic assumptions of the post-Keynesian distribution model cum life-cycle and intergenerational bequest. In this case the capitalists could be defined as owning a minimum amount of non-life-cycle wealth making up the largest share of their property. In addition to the workers, a third class could also be identified, grouping the poor with no hope of embarking on any life-cycle accumulation; or indeed in a more sophisticated model with no bequest motive.[29]

The second phenomenon concerns the increasing relevance of the process of accumulation and transmission of human capital, which for a number of authors appears to dwarf financial wealth accumulation. Some scholars consider that this Beckerian line of thought appears to constitute a serious challenge to the life-cycle hypothesis and, to a certain extent, to be an element of dispersion of wealth and hence a denial of class differentiation. The point, however, is that as long as there exists an intergenerational financial bequest, connected with a different way of discounting for different income-earners,[30] the life-cycle model exposited above maintains its validity. But there is more than that. In (p. 327) fact the process of accumulation and transmission of human capital may be, at least partially, assimilated to the process of accumulation and transmission of material wealth. Indeed, as Meade (1968, 1973) has repeatedly pointed out, investment in human capital is high on the list of priorities among the wealthiest classes.[31] Second, there are other ways through which the younger generation may be endowed, that is, through social contacts, which again may be better provided by classes with high incomes. Finally, if education is provided on a free or quasi-free basis by the state, it will not directly enter the bequest function; its effect is that of providing better opportunities for the worse off (and hence it is an element of wealth dispersion). Summing up we may stress that as long as (*a*) the development of our societies is characterized by the existence of an intergenerational capital stock; (*b*) the distribution of the latter is unequal among dynasties or classes; and/or (*c*) there is a different propensity to endow the next generation (both with financial or human wealth), the post-Keynesian cum life-cycle model of distribution will be useful in providing additional insight into the long-term process of wealth accumulation.

2.7. The Analysis of the Long-Term Distribution of Wealth and of the Income Share of the Socioeconomic Classes

In this section we focus on the long-term properties of the model, with particular reference to the functional distribution of income and to the share of income earned or received by the classes in equilibrium. A large number of authors have considered the adjustment time required for the economy to return to steady-state situations from any initial disturbance, and stability and instability conditions in general. In this context the conditions under which one group of savers may not be able to hold a positive share of the total capital stock are also analyzed, and the mechanisms at the basis of capital accumulation are brought in the forefront. Always within this context various authors (mainly working with neoclassical models, which seems appropriate for deriving complicated analytical results) consider long-term adaptations of wealth distribution between the two classes to their respective saving-

supply functions, while at the same time it is postulated that the short-period saving-investment equilibrium is immediately realized.[32]

As it was to be anticipated, the adjustment-time that is required to arrive at the steady-state solutions (or to return to them in the case of initial disturbances) is, in general, quite long. For instance Atkinson in his paper "The Timescale of Economic Models: How Long is the Long Run" (1969), with some quite restrictive assumptions, estimates that it would take several decades for the system to come back to the equilibrium situation. But even this result is quite understandable, since the Kaldor-Pasinetti steady state (as any other long-term steady-state growth path) exhibits fairly strong local and global stability, so that an external shock or disturbance will take a long time to work its way through a modification of the distribution of income and wealth. But we should not forget that the scope of comparative-static analysis is not primarily to (p. 328) consider the conditions under which the system may converge toward, or may deviate from, its long-term steady-state growth path, but to enquire into the mechanisms that under general conditions are bound to influence and determine the distribution of income and wealth. However, the analysis of the long-term properties of these models may still yield interesting insights, since, as Mückl (1975a, 1975b) points out, it cannot be disregarded that in any adjustment process most parameters of the model affect the distribution of income and wealth. In other words we should be aware that outside any equilibrium situation all variables and parameters come to play an equally important role in the determination of the evolution of the system.

Taniguchi (1987) has shown that, in the specific case of the Kaldor-Pasinetti model, there exists a traverse from which one steady-state equilibrium approaches asymptotically a new long-period equilibrium path, provided the rate of profits is constant in the long-period; the conditions of existence of such a traverse also correspond to the stability conditions of the equilibrium situation of the model. If this were to be confirmed, the global stability of the model, once again, would be proved.

Still another controversy about the long-term properties of the distributive model is the one that includes contributions by Maneschi (1974), Gupta (1977), and Mückl (1978). Maneschi in his paper "The Existence of a Two-Class Economy in the Kaldor and Pasinetti Models of Growth and Distribution," using a generalized saving function, tries to show that Kaldor's special assumption about the propensities to save of the two classes would imply a dynamic equilibrium where the share of wages in national income turns out to be equal to zero. This would be a sort of Anti-Meade-Samuelson and Modigliani Dual Theorem, and would rule out the existence of the working class that earns wages and interest on their accumulated savings. Gupta (1977) came to the conclusion that Maneschi's (1974) findings may be obtained without the use of a neoclassical "generalized saving function." Mückl (1978) reassesses the whole issue and tries to demonstrate that Maneschi's and Gupta's conclusions about the possibility of an Anti-Dual Theorem (i.e., a state where just the capitalists can survive) are not possible. Very exceptional circumstances apart, Mückl shows that Kaldor's assumptions about the saving behavior of the two classes lead to a definite steady-state solution, where only the working class survives. This solution may be equally derived whether we rely on neoclassical or on post-Keynesian assumptions. Therefore, as the author points out, "Gupta's so called 'dual theorem' is neither dual nor equivalent to the homonymous theorem of Samuelson and Modigliani" (Mückl 1978, 509).

2.8. The Overlapping Generation Model and the Intergenerational Transmission of Wealth

A number of extensions of the Cambridge post-Keynesian life-cycle model have been explored in the last two decades. Among these we shall mention Wolff's (1988) "Life Cycle Savings and the Individual Distribution of Wealth by Class." It is not surprising that the topic of intergenerational transmission of wealth should come to be included into the Cambridge model. After all, the Cambridge equation remains valid as long as (p. 329) there exists a class of "pure" capitalists who are intergenerationally stable. In other words it is important to study the conditions under which the present generation is able and/or willing to transmit its wealth to their children. Broadly speaking, the "pure" capitalists, under general conditions, will be able to maintain their position and their capital share if one, or a combination, of the following conditions apply: (*a*) they exhibit a strong propensity to transmit intergenerational assets to their off springs; (*b*) they decide to have fewer children than the other classes; (*c*) they decide to work and earn a wage-rate in order to supplement their property income.

The intergenerational transmission of wealth not surprisingly has attracted a great deal of attention in the last decades. Suffice it to mention the controversy between Modigliani (1986, 1988) on one side, and Kotlikoff and

Summers (1981) on the other, as exposited in Baranzini (1991a, 2005). Even John Maynard Keynes pointed out the injustice connected with the unequal distribution of wealth:

> The outstanding faults of the economic society in which we live are its failure to provide for full employment and its arbitrary and inequitable distribution of wealth and incomes. The bearing of the foregoing theory on the first of these is obvious. But there are also two important respects in which it is relevant to the second. Since the end of the nineteenth century significant progress towards the removal of very great disparities of wealth and income has been achieved through the instrument of direct taxation—income tax and surtax and death duties—especially in Great Britain. Many people would wish to see this process carried much further, but they are deterred by two considerations: partly by the fear of making skilful evasions too much worthwhile and also diminishing unduly the motive towards risk-taking, but mainly, I think, by the belief that the growth of capital depends upon the strength of the motive toward individual saving and that for a large proportion of this growth we are dependent on the savings of the rich out of their superfluity. Our argument does not affect the first of these considerations. But it may considerably modify our attitude towards the second. For we have seen that, up to the point where full employment prevails, the growth of capital depends not at all on a low propensity to consume but is, on the contrary, held back by it; and only in conditions of full employment is a low propensity to consume conducive to the growth of capital. Moreover, experience suggests that in the existing conditions saving by institutions and through sinking funds is more than adequate, and that measures for the redistribution of incomes in a way likely to raise the propensity to consume may prove positively favourable to the growth of capital.
>
> (Keynes [1936] 1973, 373–74)

So much for the impact of income redistribution on aggregate consumption, capital accumulation, and growth according to Keynes. But the redistribution of wealth is quite another matter: first because wealth is a stock (and not a flow like income); second because wealth is a factor of production, and hence more directly connected to economic growth than income, or indeed consumption. According to Keynes the implications of wealth redistribution are more difficult to assess:

> The existing confusion of the public mind on the matter is well illustrated by the very common belief that the death duties are responsible for a reduction in the capital (p. 330) wealth of the country. Assuming that the State applies the proceeds of these duties to its ordinary outgoings so that taxes of income and consumption are correspondingly reduced or avoided, it is, of course, true that a fiscal policy of heavy death duties has the effect of increasing the community's propensity to consume. But inasmuch as an increase in the habitual propensity to consume will in general (*i.e.* except in conditions of full employment) serve to increase at the same time the inducement to invest, the inference commonly drawn is the exact opposite of the truth. Thus our argument leads towards the conclusion that in contemporary conditions the growth of wealth, so far from being dependent on the abstinence of the rich, as is commonly supposed, is more likely to be impeded by it. One of the chief social justifications of great inequality of wealth is, therefore, removed. I am not saying that there are no other reasons, unaffected by our theory, capable of justifying some measure of inequality in some circumstances. But it does dispose of the most important of the reasons why hitherto we have thought it prudent to move carefully. This particularly affects our attitude towards death duties; for there are certain justifications for inequality of incomes which do not apply equally to inequality of inheritances.
>
> (Keynes [1936] 1973, 374–75)

A number of conclusions may be drawn from these long passages of the last chapter of *The General Theory*. First of all, the fact that through direct taxation the state has achieved a lower concentration of disposable income and of wealth. For the former is certainly true: in most advanced countries between 10 percent and 20 percent of total GDP is transferred from high-income to low-income families. Such a transfer is achieved in multiple ways, both pretax and after-tax, and in general it lowers the Gini index by a full 10 percentage points, from about .35–.45 to about .25–.35. The ethical and political implications of such a transfer are easy to understand. The direct and most observable economic implications in a situation of less than full employment are those of an increase in consumption, and indirectly of an increase in investment and growth. However, it is not yet proved that taxes on wealth (or indeed on income from wealth as it was and still is the case in many countries) have led to a significantly

lower concentration of wealth: First, because in many advanced countries a generalized wealth tax does not exist; second, because marginal tax rates on total wealth are seldom higher than 1 percent yearly, so that they simply contribute to slowing down the accumulation of average wealth and they are not a hindrance to the process of concentration. However, as Keynes duly points out, a high level of taxation might represent a disincentive to invest (and accumulate) under certain extreme conditions.

Another argument that is considered by Keynes concerns the "estate duty," also called "inheritance tax." Of all taxes, this seems to be the least controversial. According to Keynes a fiscal policy of heavy death duties has the effect of increasing total consumption, and "inasmuch as an increase in the habitual propensity to consume will in general (*i.e.* except in conditions of full employment) serve to increase at the same time the inducement to invest," it will enhance the accumulation of the capital of the system. (The editor G. C. H. notes that even at full employment greater consumption should have a positive effect on planned investment, but it may not be realized unless $S/Y_{(full\ employ.)}$ also rises.) But what will be the final outcome of the introduction of, or of an increase in, the inheritance tax?

(p. 331) To this question the works of Teixeira (1999), Teixeira, Sugahara, and Baranzini (1998), and Baranzini, Benjuino, and Teixeira (2003) provide a first and tentative framework of analysis. What effect has the introduction of an inheritance tax that will be used to supplement the workers' pensions? In other words, what effect will the transfer of part of the intergenerational capital stock of the rich classes to the retired working class have? Will there be an increase in total consumption or not? Additionally, is it likely to have a disincentive effect on the formation of the total capital or not? In the paper "Taxation on Intergenerational Bequests and Redistribution of Wealth in a Class- Setting," Baranzini, Benjuino, and Teixeira (2003) modify and extend Baranzini's (1991a) two-class overlapping generations model based upon the Lewis (1954), Kaldor (1956), and Pasinetti (1962) models to the case in which there is taxation on capitalists' bequests to their heirs. Taxation on capitalists' intergenerational bequests is introduced by assuming that such levy is fully transferred to the workers (who in this case do not leave bequests to their descendents). Within this framework it is possible to show that under somewhat restrictive assumptions on the redistributive transmission of wealth, total capital as well as total savings of the economy will expand, contrarily to what one might presume. It is important to note that these results are obtained in the case of a continuous-time model: capitalists leave the same per capita bequest as they have themselves received; but otherwise they have the same preferences of workers for their life-cycle consumption.

A similar model is considered in Teixeira, Sugahara, and Baranzini (1998), where we conclude that the life-cycle hypothesis and the bequest motive are compatible with government activities within a post-Keynesian framework. Here the state becomes the third class, with its own capital, consumption and propensity to save (or dissave) and to consume. According to this analysis we conclude that the main features of the Cambridge equation are preserved in this extension meant to include taxation on capitalists' bequest. Despite the higher formal complexity of the new formulation, it is worth highlighting the fact that the essential nature of the distribution equilibrium remains unaffected: the key components are still the propensity to reinvest of the entrepreneurial class and the equilibrium rate of growth of the system, only "corrected" by the major features of the new economic environment that now includes the public sector. Within this framework, technology (here represented by the K/Y ratio) does not influence the optimum equilibrium rate of interest that ensures steady-state growth of the capital stock of the classes. However, the latter is solely dependent on the discount rate of the utility function (equal for all classes), on the bequest discount rate of the entrepreneurial class and on the rate of growth of population. Furthermore, the propensity to save of the capitalists and workers are no longer exogenously given, but are related to the intertemporal preference to consume and to the rate of population growth, as was the case with the previous model without taxation on bequest (and without the presence of the public sector). Needless to say, the requirement according to which the capitalists' propensity to save is greater than that of the workers is also endogenously satisfied. In this way our analysis not only confirms but also strengthens the microeconomic support for the post-Keynesian Kaldor-Pasinetti model.

(p. 332) It is also worth recalling that in this life-cycle cum public sector and estate duty context, total investment, according to the post-Keynesian tradition, is exogenously given and determined by the entrepreneurial animal spirits as well as governmental economic and social policy. Normally it would take the form of full employment but, as Bortis (1976) has shown, it may also be consistent with positions of less-than-full employment. The presence of the state makes such a goal (full employment) more plausible or somewhat easier to attain. But we know that saving adjusts itself passively to *ex ante* investment.[33] In this way the distribution solutions that have been

obtained ensure that

1. the distribution of income between profits, wages and taxes is such that total saving equals *ex ante* investment;
2. individuals maximize the flow of their life-cycle consumption utilities;
3. the intergenerational bequests of capitalists grow in line with the population.

Within this framework the equality between investment and saving is ensured by redistribution between profits and wages, as well as among capitalists, workers, and the state. The state as such represents a third class. This means that, first, an additional actor makes the whole saving process more flexible, since there will always be a distribution of disposable income among profits, wages, and taxes that, by means of the subjective discount rates and other behavioral parameters of the classes, ensures the possibility of steady-state equilibrium. This makes the determination of the equilibrium variables of the model easier to grasp and to achieve. Second, the government may play an active part, both in the determination of *ex post* saving and in the determination of *ex ante* investment. In particular, the state may, quite independently of the "animal spirits" of the entrepreneurs, try to implement a total level of investment great enough to produce full employment. Alternatively, it may aim at a different level for reasons of economic policy. Third and finally, the state may decide to run a budget deficit or surplus, so that in the case of equality between total investment and saving, the saving of the socioeconomic classes will have to cover such a deficit or surplus.

Teixeira, Sugahara, and Baranzini (1998) also conclude that when the state decides to increase its expenditure beyond explicit taxation, and to go in for a budget deficit to be met by public debt, it should take into account that debt financing may involve sophisticated arguments, as pointed out by Pasinetti (1989b), based on the "Ricardian Equivalence Theory."[34] Naturally, the presence of a Ricardian intergenerational bequest motive requires further analysis concerning the effects of this budget, both on intergenerational distribution and on saving. It may be useful, however, to consider a further aspect of this point, namely that taxes may not be neutral in various ways. First of all, taxes may be progressive (it is not the case in Teixeira, Sugahara, and Baranzini's model) and may cause a strong transfer from one class to another. Second, taxes may be heavier on capital income than on other kinds of income. Third, taxes may play in favor of life-cycle savings as opposed to intergenerational capital. This last argument is particularly important insofar as the two kinds of wealth accumulation are rather different in their nature. A number of countries have introduced a more or less heavy tax (p. 333) on intergenerational transfers (see estate duty), with various sorts of allowances and exceptions. Such a tax may be more useful for improving the finances of the state rather than for stopping the progressive concentration of wealth. But during the individual life-cycle, wealth is normally taxed in the same manner—whether life-cycle or intergenerational bequest. However, it is difficult to distinguish, while individuals are still living, what is what. And even if this were possible, one might still not know what will be left to the next generation and what will be consumed by the present generation.[35] For this reason the hypothesis of a flat tax rate on capitalists' earnings seems quite plausible, although we are fully aware of its implications and shortcomings. Teixeira, Sugahara, and Baranzini (1998, 2002) conclude their analysis as follows:

> with the introduction of transfers there is a relative decline of the capitalists' share of the total capital stock. On the other hand, the new rate of interest (in equilibrium) is in tune with the inclusion of taxation on profits as indicated by Steedman (1972). We can go no further here, but it must be said that as soon as we move away from the simplest version of Baranzini's model, and relax the assumption on the role of government taxation and expenditure, many difficulties arise. Most of them have yet to be solved in this research programme, to incorporate the rich literature developed by some authors, notably by Barro (1974) on public debt and Becker (1993) on altruism, inter-generational mobility and human capital transfers. As well as James E. Meade in a number of papers and books published in the Nineteen Sixties and Seventies, where he has introduced the concept of "pure altruism," "altruism" and "selfishness" applying to the relationships between generations.
>
> (Teixeira, Sugahara, and Baranzini 1998, 14)

From these excerpts it is clear that this research line is one of the most promising, since it introduces a modified version of the microeconomic life-cycle hypothesis into the macroeconomic post-Keynesian framework. In this way one of the most quoted shortcomings of the post-Keynesian model finds an appropriate remedy. There is an

important aspect that requires further analysis, that is, the consumption and bequest-discounting concept. In an excellent paper published in the *Journal of Economic Literature* in 2002 with the title "Time Discounting and Time Preference: A Critical Review" Shane Frederick, George Loewenstein, and Ted O'Donoghue conclude:

> The DU [discounted-utility] model, which continues to be widely used by economists, has little empirical support. Even its developers—Samuelson, who originally proposed the model, and Koopmans, who provided the first axiomatic derivation—had concerns about its descriptive realism, and it was never empirically validated as the appropriate model for intertemporal choice.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 393)

But this is not all, since the three authors add:

> While the DU [discounted-utility] model assumes that intertemporal preferences can be characterized by a single discount rate, the large empirical literature **(p. 334)** devoted to measuring discount rates has failed to establish any stable estimate. There is extraordinary variation across studies, and sometimes even within studies. This failure is partly due to variations in the degree to which the studies take account of factors that confound the computation of discount rates (e.g., uncertainty about the delivery of future outcomes or non-linearity in the utility function). But the spectacular cross-studies differences in discount rates also reflect the diversity of considerations that are relevant in intertemporal choices and that legitimately affect different types of intertemporal choices differently. Thus, there is no reason to expect that discount rates *should* be consistent across different choices.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 393)

For these and still other reasons, the authors suggest "resurrecting" the idea of early twentieth-century economists that "intertemporal choices reflect an interplay of disparate and often competing psychological motives." In fact they state:

> Reintroducing the multiple-motives approach to intertemporal choice will help us to better understand and better explain the intertemporal choices we observe in the real world. For instance, it permits more scope for understanding individual differences (e.g., why one person is a spendthrift while his neighbour is a miser, or why one person does drugs while her brother does not), because people may differ in the degree to which they experience anticipatory utility or are influenced by visceral factors.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 393)

This proposal hence reinforces the validity of the assumption of classes and/or dynasties characterized by a different propensity to save and to consume. But this would still not explain the validity of a differentiated discount rate for life-cycle consumption and for the intergenerational bequest. Nor it would indeed explain the validity of not allowing given classes to transmit intergenerational assets. To these questions Frederick, Loewenstein, and O'Donoghue provide the following reply:

> The multiple-motive approach may be even more important for understanding *intra*-individual differences. When one looks at the behavior of a single individual across different domains, there is often a wide range of apparent attitudes toward the future. Someone may smoke heavily, but carefully study the returns of various retirement packages. Another may squirrel money away while, at the same time, giving little thought to electrical efficiency when purchasing an air conditioner. Someone else may devote two decades of his life to establishing a career, and then jeopardize this long-term investment for some highly transient pleasure.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 393)

This may also apply to individuals, dynasties, or classes that attach a different value to present and future consumption as well as to the intergenerational bequest. Note that the microeconomic foundations of the post-Keynesian model may well include the presence of such classes, as exposited above. **(p. 335)**

> Since the DU [discounted utility] model assumes a unitary discount rate that applies to all acts of consumption, such intra-individual heterogeneities pose a theoretical challenge. The multiple-motive

> approach, by contrast, allows us to readily interpret such differences in terms of more narrow, more legitimate, and more stable constructs—e.g., the degree to which people are skeptical of promises, experience anticipatory utility, are influenced by visceral factors, or are able to correctly predict their future utility.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 394)

These conclusions on the one hand confirm the validity of the above-exposited approach; but on the other hand they open up promising research lines for the microfoundations of the post-Keynesian model of income distribution, profit determination, and capital accumulation. It is clear that in order to be able to determine the equilibrium and optimal rate of profits is will be necessary to link the life-cycle periods and the generations among each other in an analytical way; and the exact nature of such links is just what has to be determined. The life-cycle behavior and the intergenerational transmission of wealth might indeed be drastically separated. It may well be that a given individual, dynasty, or class decides to leave no assets to its heirs, as it is the case of childless couples (on the basis of a growing empirical evidence) or of a growing number of US and UK families that do not even plan to leave their houses to their offspring. It may be postulated that a number of individuals, families, dynasties, and the like reduce to a bare minimum their life-cycle consumption, in order to leave all their wealth (often of a dynastic nature) to their children or heirs in general. These are the questions that must be answered in order to strengthen the microfoundations of the macro-model. It may be worth quoting the conclusion:

> In sum, we believe that economists' understanding of intertemporal choices will progress more rapidly by continuing to import insight from psychology, by relinquishing the assumption that the key to understanding intertemporal choices is finding the right discount rate (or even the right discount function), and by readopting the view that intertemporal choices reflect many distinct considerations and often involve the interplay of several competing motives. Since different motives may be evoked to different degrees by different situations (and by different descriptions of the *same* situation), developing descriptively adequate models of intertemporal choice will not be easy.
>
> (Frederick, Loewenstein, and O'Donoghue 2002, 394)

For instance we may compute a matrix where the kind of income on the one hand and the propensity to leave a bequest on the other may be combined to obtain a topology of families, dynasties, or classes with different utility functions. Among other variables that may be taken into consideration we may mention the number of children (or of grandchildren or nephews), special beliefs, as well as other socioeconomic data playing an important role in the consumption and saving behavior of families, dynasties, or classes. This approach has, first, the advantage of, partially at least, eliminating the drawbacks associated with the use of a unique discount-utility function. Second, it allows for a further disaggregation of the model, a research line that has long been suggested by a number of authors.

(p. 336) 2.9. Other General Aspects, in Particular the Applicability of the Meade-Samuelson and Modigliani Dual Theorem

A large number of contributions have concentrated on aspects of the Kaldor-Pasinetti model of distribution that do not fall into the previous headings of this survey (see Araujo 1999; Araujo and Harcourt 1993; Araujo and Teixeira 2004; Araujo, Teixeira, and Araujo 1999; Arena 1982, 1995; Arestis, Palma, and Sawyer 1997; Arestis and Skouras 1985). This does not mean that the topics considered are of second order; they simply cannot be grouped easily. A given number of these papers concern, in one way or another, the applicability of the Meade-Samuelson and Modigliani Dual Theorem that, under very restrictive assumptions, ought to replace the Cambridge equation.[36]

The range of applicability of the Cambridge equation has already been discussed in sections 2.4 and 2.5 above. But it may be interesting to note what Paul Samuelson writes in his 1991 paper:

> A quarter of a century ago Luigi Pasinetti (1962) proposed a two-caste saving model that grew out of the macroeconomic model of Nicholas Kaldor (1955–6). The 1962 model was shown to have the remarkable property that it defined a balanced-growth equilibrium configuration with an interest rate independent of the fraction of workers' wage-and-property income that they chose to save (so long as the saving propensity of workers was sufficiently small relative to the capitalist-rentier's saving propensity). James Meade (1963)

> and Samuelson and Modigliani (1966) pointed out that in this 2-caste model, when the worker-caste's saving propensity became sufficiently large, the Pasinetti equilibrium just described ceases to obtain and is succeeded by a *dual* equilibrium in which *only* the workers' saving propensity has an effect on the interest rate and the distribution of income, the rentier's saving propensity becoming asymptotically of zero importance. Because Pasinetti (and Kaldor) are known to be trenchant critics of neoclassical marginalism, and because Meade, Samuelson, and Modigliani have been known to explore neoclassical models, there has grown up the dubious tradition of dubbing the Pasinetti equilibrium a macro-post-Keynesian distribution paradigm, while the dual equilibrium (non-optimally dubbed the anti-Pasinetti equilibrium) is sometimes thought to be peculiarly connected with the kind of neoclassical marginalism paradigm that Piero Sraffa (1960) proposed to subject to a careful critique. Speaking for no-one other than Samuelson, I wish to dissociate myself from such identifications. Moving far from the Clark and Cobb-Douglas marginal products in the form of smooth partial derivatives, we can envisage a discrete-activities Sraffian technology where output is producible out of labor and itself by alternative competing techniques. We then expect that high enough workers' propensity to save will be able to alter the balanced-growth equilibrium configuration in the anti-Pasinetti way, causing the competitive riskless profit rate to come to fall short of the Kaldor-Kalecki-Pasinetti ratio, (natural growth rate)/(rentier saving propensity).
>
> (Samuelson 1991, 177)

It is worth pausing a moment on the expression "when the worker-caste's saving propensity became sufficiently large, the Pasinetti equilibrium just described ceases to (p. 337) obtain." Samuelson refers to his inequality (6), $s_w > s_c(P/Y)^*$, which means that in the case where $P/Y = .2$, that is, where the share of profits in national income is equal to .20, an econometrically reasonable assumption for European and US economies during the last fifty years or so, the propensity to save of the workers must not be higher than one-fifth of the propensity to save of the entrepreneurial class. Otherwise the Cambridge equation would not apply. The quite low saving rates[37] of households in most of the industrialized world seem to exclude the possibility of the Dual Theorem, even sixty or so years after the initial formulation of the Cambridge equation. Samuelson's paper of 1991, written a quarter of a century after the 1966 paper of Samuelson and Modigliani, seems to suggest that the neoclassical school has not yet accepted the generality of the Cambridge equation, according to which the profits rate is determined quite independently of the marginal productivity of capital, thus making the whole neoclassical theory irrelevant. The point is that, as in the case of the capital theory and life-cycle controversies (the latter between Modigliani on one side and Kotlikoff and Summers on the other), in the field of income distribution and capital accumulation the debate is still raging on, especially because it is characterized by personal and emotional elements that often are passed down through generations of scholars of the various schools of thought.

3. Conclusions

Summing up, we may stress that over a span of more than fifty years the *Keynes-Kaldor-Pasinetti-Harcourt research program* has been developed and refined to include a number of issues associated with the distribution of income and wealth, and with the determination of the rate of profits in a steady-state growth model compatible with full employment growth. Such a research program enlightens the economic behavior of the "pure" entrepreneurs' class for the determination of the relevant economic variables of the model. The historical, demographic, institutional, and microeconomic aspects of these models have come under close scrutiny, and a number of relevant questions seem to have received adequate answers. It is worth noting that about two hundred scholars have contributed to this research program. Their contribution is to be found in all the eight research lines we have examined above. Moreover, a number of research lines are at present under investigation and require further work.

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Notes:

(1.) On this point see Pasinetti (1974b, 121).

(2.) Joan Robinson wrote to Richard Kahn, who was in Geneva at that time, an account of this particular meeting on Wednesday, November 2, 1955.

(3.) In other words, the behavior of the working class, as it is represented by their propensity to consume and to save, as well by their pattern of accumulation, does not interfere with the distribution of income between profits and wages, or with the determination of the profit rate (as well as the wage rate). In a certain sense we find again the classical proposition: the capitalist class provides most of the savings held within the system and determines the path of capital accumulation of the whole society; through their behavior they heavily influence the distribution of income among factors of production. Of course the nonentrepreneurial classes may, through their saving, consumption, and accumulation behavior, influence (as it seems logical) the distribution of income among classes and their accumulation of savings path. The decisions relative to investment and growth of the productive system then comes to be taken by a sort of "entrepreneurial elite." The case of our modern and postindustrial societies is quite illuminating: public authorities, via their fiscal and monetary policies, try to reach a predetermined "required" rate of growth for the system that will allow them both to check public expenditure and to reach other economic policy goals.

(4.) We came across Kahn's contribution by reading the introduction to Panico and Salvadori (1993b, xv). In fact they write: "Besides, like Kaldor, Kahn recognised the importance of the questions related to the role of the State and of financial markets in the maintenance of steady growth conditions, and claimed that steady growth analysis should assume that the rate of interest is lower than the rate of profit, an assumption that will become crucial in the development of post Keynesian theory." Then Panico and Salvadori go on quoting Kahn as follows:

> The fact that in a Golden Age capitalists' expectations are realised *in the broad* does not exclude the risks involved in the vagaries of technical processes and of consumers' behaviour. For these reasons the risk-free rate of interest would even in a Golden Age lie below the rate of profit, with which yields on ordinary shares are more comparable since they involve the same kind of risks as physical investment.
>
> (Kahn, 1959, 150)

Kahn's article published (in the *Oxford Economic Papers*) three years before Pasinetti's 1962 paper (in the *Review of Economic Studies*) must have been familiar to the latter. In fact it was Kahn who was behind the appointment of Pasinetti as a fellow of King's College in 1960. But strangely Pasinetti does not refer to the quoted passage of Kahn in his original work and develops his model, leading to the Cambridge equation, by assuming, as we have already pointed out, that "in a long-run equilibrium model, the obvious hypothesis to make is that of a rate of interest equal to the rate of profit" (Pasinetti 1962, 271–72). Asked explicitly about this episode, Pasinetti replied that at that time he was well aware of Kahn's article "Exercises in the Analysis of Growth" when he drafted and redrafted his "Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth," but he didn't recall the above passage when he discussed the relationship between the rate of profit and the rate of interest. Not even Kahn, who read the draft of the article leading to the Cambridge equation, as far as Pasinetti remembers, raised any specific question. Pasinetti recalls, however, that Kahn insisted that the paper (although freshly published in the *Review of Economic Studies*) should be added as an appendix to his Cambridge PhD thesis.

(5.) In this framework we find the contributions of Kaldor (1966), Davidson (1968), Hu (1973), Baranzini (1975b), Ramanathan (1976), Kregel (1977), Skott (1981a, 1981b, 1989b); but see also Darity (1981), Kano (1985), Mastromatteo (1996, 2000), Delli Gatti (1987), Delli Gatti and Gallegati (1990) and van Ewijk (1989, 1991).

(6.) Panico and Salvadori start their review of the Cambridge post-Keynesian theory on the "public sector and international trade" by writing:

> Some other extensions of the Post Keynesian theory of growth and distribution have examined the influence of government activity and international trade. An article published in 1972 by Steedman introduced government activity into a model of growth and distribution which used Pasinetti's institutional distinction between workers and capitalists. Steedman moved from Meade's analysis of the "Pasinetti" and "dual theorem" to argue that in the presence of government activity a "Pasinetti equilibrium" is still possible but, in general, an equilibrium in which the capital/output ratio is independent of the methods of production is not. Steedman characterized government activity in terms of *fiscal* policy interventions, introducing into the analysis different forms of taxation, government consumption and transfer payments to the workers. He assumed that the government budget is always balanced, so that no problem arises related to *monetary* policy and to the existence of financial assets issued by the government.
>
> (Panico and Salvadori 1993b, xxii)

(7.) "It is surprising that the various authors, while trying so many extensions, should have paid so little attention to the role of Government taxation and expenditure, a topic on which Kaldor worked so much in his life" (Pasinetti 1989a, 26). The contributions in this field are those of Mückl (1970), Steedman (1972), Domenghino (1982), Fleck and Domenghino (1987, 1990), Pasinetti (1983a, 1989b), Dalziel (1989, 1991b, 1991–92), Sepehri (1989), Mastromatteo (1989a, 1989b, 1994), Denicolò and Matteuzzi (1990), Araujo (1992, 1994, 1995), Araujo and Teixeira (2002), Teixeira (1991, 1998, 2009), Teixeira and Araujo (1991, 1996, 1997a, 1997b, 2004), Teixeira, Sugahara, and Baranzini (1998, 2002), and Baranzini (1991a, 1991b, 1992, 1995, 2001). In this area one may also quote the analyses of Masamichi (1987) and Noda (1987), as well as Dougherty (1980, 158–59), who consider the role of fiscal policy in more general terms.

(8.) First we might mention the (fairly arrogant) reply of Fleck and Domenghino (1990) to Pasinetti, with the title "Government Activity *Does* Invalidate the 'Cambridge Theorem of the Rate of Profit,'" Palley (1996a, 1996c, 1997b, 2002), Commendatore (1993, 1997, 1999a, 1999b, 2002, 2003), Dalziel (1989, 1991a, 1991b, 1991–92), Mastromatteo (1989a, 1989b, 1994), Panico (1997, 1999), Panico and Salvadori (1993b), Park (2002b, 2006) Denicolò and Matteuzzi (1990), Araujo (1992, 1994, 1995), Araujo and Teixeira (2002), Teixeira (1991, 1998, 2009), Teixeira and Araujo (1991, 1996, 1997a, 1997b, 2004), and Teixeira, Sugahara, and Baranzini (1998, 2002).

(9.) The role of rent and the relative distribution of income in a neo-Ricardian model of accumulation have been at the center of numerous analyses by Alberto Quadrio-Curzio, who has more than once made reference also to the post-Keynesian model of distribution. See in particular Quadrio-Curzio (1967, 1972, 1975 and 1980) and Quadrio-Curzio and Pellizzari (1999). In the latter they maintain that rent, resources, and technologies are three issues crucial to the understanding of history and economics. They investigate the scarcity of resources, its interplay with technology, and the role of rent in the determination of income distribution and economic growth within a multisectoral and nonproportional framework. They find that scarce resources impose several scale constraints that, at the same time, may indeed slow economic growth, but may also contribute to the development of new technologies. They conclude that in such a dynamic framework, rent acquires a new dimension with relevant implications for the system of prices and hence for income distribution. The analytical results are quite complicated and are not reproduced here.

(10.) This relation might seem at odds with the established view that rent does not derive from the ownership of a capital stock; but it is important to stress that it is simply an *ex post* analytical relation that does not represent the process of rent determination; it refers instead to the link that exists between rent and rentiers' capital stock (both life-cycle and intergenerational) when rentiers contribute a positive share of overall saving.

(11.) Some of these points were made to me in a letter by my supervisor, Sir James Mirrlees, when I was writing my DPhil thesis at Oxford (1972–76). Even if we did not agree on all issues that I tackled, Mirrlees's supervision was, to

say the least, superb and full of insights. [M. Baranzini]

(12.) See, for instance the special issue of *Economica*, November 1979, with contributions by A. S. Goldberger, P. L. Menchik, J. S. Flemming, D. L. Bevan, J. P. Laitner, and A. S. Shorroks.

(13.) See, for instance, Baranzini, 1991a, chap. 7.

(14.) Among these works Faria and Araujo quote Pasinetti (1989a, 1989b), Dalziel (1989), Denicolò and Matteuzzi (1990), as well as Araujo (1992).

(15.) According to Faria and Araujo, "Hu (1973) provides a description of the optimal programme of capital accumulation in the framework of the post-Keynesian two-class growth model. However, he considers a centrally planned economy, in which the central planner performs the dynamic optimisation. As a consequence the propensities to save remain exogenous and are not necessarily the optimal ones" (Faria and Araujo 2004, n4).

(16.) This thesis has been recently reassessed by Mazumder (2005).

(17.) Atkinson and Stiglitz (1980, 63) mention a variety of types of taxes on capital and on return on capital: (*a*) taxes on interest income, either at the same rate as on other income or at a differential rate (for instance the UK investment surcharge); (*b*) taxes on (short-term or long-term) capital gains; (*c*) wealth taxes on the net value of assets owned (with special provisions that reduce the effective rate—like special treatment of housing, or life insurance and pensions, as well as certain tax-exempt bonds); and (*d*) special taxes, such as those on houses, land, etc. (labelled as "property taxes" in the United States, "council tax" in the UK, *imposta sulla casa* in Italy, *revenu présumé* in Switzerland).

(18.) On this point see, for instance, Atkinson and Stiglitz (1980, 85–88).

(19.) On the normative aspect of taxes on wealth or on income from wealth we shall not enter. We confine ourselves to report a passage of Flemming and Little (1974) that raises a number of interesting points: "Capitalism may well require reforms, which both prevent the accumulation of great personal wealth and disperse existing accumulation, if it is to survive. Some supporters of capitalism fear that a wealth tax would be particularly difficult for small but progressive businessmen. We do not think that this needs to be the case; indeed if we thought so we would not support so heavy a wealth tax as we do, since we believe that anything tending to lead to greater industrial concentration is undesirable, and inimical to capitalism" (Flemming and Little 1974, 1–2).

(20.) On this point Modigliani states: "The basic LCH (life-cycle hypothesis) implies that, with retirement, saving should become negative, and thus assets decline at a fairly constant rate, reaching zero at death. The empirical evidence seems to reveal a very different picture: dissaving in old age appears to be at best modest.… According to Mirer, the wealth/income ratio actually continues to rise in retirement. Note, however, that his estimate is biased as a result of including education in his regression.… Most of the other recent analysts have found that the wealth of a given cohort tends to decline after reaching its peak in the 60–65 age range …, though there are exceptions. … To be sure, the results depend on the concept of saving and wealth used. If one makes proper allowance for participation in pension funds, then the dissaving (or the decline in wealth) of the old tends to be more apparent, and it becomes quite pronounced if one includes an estimate of Social Security benefits. But when the saving and wealth measures include only cash saving and marketable wealth, the dissaving and the decline appear weaker or even absent" (Modigliani 1986, 306).

(21.) Frederick, Loewenstein, and O'Donoghue (2002, 377) observe what follows concerning the estimates of the discount rates of a number of recent studies: "First, there is tremendous variability in the estimates (the corresponding implicit annual discount rates range from –6 percent to infinity). Second, in contrast to estimates of physical phenomena such as the speed of light, there is no evidence of methodological progress; the range of estimates is not shrinking over time. Third, high discounting predominates, as most of the data points are well below 1, which represents equal weighting of present and future." However a careful examination of their figure 2 (Discount factor by year of study publication) reveals that about two-thirds of the imputed discount factor hovers between .8 and 1.

(22.) For instance in Italy (a country with quite high saving propensities) in 1998 the average gross propensity to save of households was −17.73 percent for yearly incomes below 20 million lire; +19.08 percent for incomes

between 20 and 40 million lire; +33.01 percent for incomes between 40 and 60 million lire; +42.87 percent for incomes between 60 and 80 million lire; and a hefty +51.78 percent for incomes above 80 million lire. For the same year, but on fairly different calculation bases, in Switzerland it was −80.4 percent for incomes below 2,000 francs per month; −21.2 percent for incomes between 2,000 and 3,000 francs; −11.1 percent for incomes between 3,000 and 4,000 francs; −5.1 percent for incomes between 4,000 and 5,000 francs; +2.6 percent for incomes between 5,000 and 6,000 francs; +5.0 percent for income between 6,000 and 7,000 francs; +7.8 percent for incomes between 7,000 and 8,000 francs; +12.4 percent for incomes between 8,000 and 9,000 francs; +11.2 percent for incomes between 9,000 and 10,000 francs, and finally +29.2 percent for incomes above 10,000 francs. Hence the Keynesian law according to which, all other things being equal, the marginal and average propensity to save increases as income grows, is confirmed. At the same time a number of aspects emphasised by the life-cycle theory are also confirmed. On this point, see Baranzini, Marangoni, and Rossi (2001, chap. 15).

(23.) In Switzerland, religion (Catholic and Reformed Protestants) and ownership of residence seem to be important factors for the determination of the average propensity to save. These two elements are also connected with the number of children per household and their length of staying in the families. A higher proportion of Catholics live in their own house or flat (mainly in rural areas), have more children, and bear them earlier than the Protestants. But the issue is more complicated than these results seem to imply.

(24.) The log-normal utility function, where $\alpha = 0$, leads to very simplified results; it is surely a good reason for concentrating on it. The late John Flemming, then a fellow of Nuffield College, Oxford, encouraged us to use it within this framework.

(25.) We might say that individuals make up families, families make up dynasties, and dynasties make up classes. But it is more complicated that this, since the behaviour of dynasties is more important for the composition of the capitalists' class.

(26.) We are well aware of a number of issues associated with this approach. First of all it may well be that during his lifetime an individual or a family decides to change the portfolio composition, due to a change in risk-aversion, or to an unforeseen modification of the amount of wealth. Second, when wealth is transferred from one generation to the other, the heirs may well decide to modify the consumption, saving, and portfolio composition plans. We are well aware that the dynastic behaviour in certain cases is less continuous than the one illustrated by theoretical studies. Accordingly, the results obtained may well be different from those exposited above.

(27.) This is what is happening in certain parts of the Old Continent, especially in northern Italy, Spain, and still other regions where well-educated parents have both a well-paid work and delay as long as possible having a child, with the result that they often have just one offspring who, in the tradition of most European families, will be the recipient of the inherited wealth of both parents, plus their life-cycle savings.

(28.) In his Nobel Lecture Modigliani reports that the proportion of wealth held for bequests "rises with wealth, reaching ⅓ for the top class. Similar, though somewhat less extreme, results are reported in the Brookings study….Thus the bequest motive seems to be limited to the highest economic classes. This hypothesis is supported by the findings of Menchik and David that for (and only for) the top 20 per cent, bequests rise proportionately faster than total resources, something which presumably cannot be explained by the precautionary motive. Furthermore, it is consistent, incidentally, with the observation that the decline in wealth with age tends to be more pronounced and systematic in terms of the median than of the mean. But, then the top fifth of the income distribution can be expected to account for substantially more than 1/5 of all bequests" (Modigliani 1986, 310). Certainly this contrasts with Marshall's statement, "That men labour and save chiefly for the sake of their families and not for themselves, is shown by the fact that they seldom spend, after they have retired from work, more than the income that comes in from their savings, preferring to leave their stored up wealth intact for their families" (Marshall 1890, iv, vii, 6; quoted in Phelps Brown 1988, 449). The evidence emerging since 1986 seems, however, to confirm that reality is about middle of the road of the two opposite positions; probably leaning more toward Modigliani's position in North America and Australia; and leaning more toward Marshall's position in western Europe.

(29.) As the one exposited above and considered in Baranzini (1991a, sec. 5.9).

(30.) This seems to confirm the necessity of differentiating as much as possible between the consumption- and bequest-discount rate among individuals, dynasties, or socioeconomic classes.

(31.) This may be due to various reasons. First, rich classes have more financial means than other classes. Second, education carries with it prestige and strong earnings prospects. Finally, a specific education may be necessary for a dynastic transmission of a given profession.

(32.) In this wide field of research we find, in chronological order, the following contributions: Tobin (1960), Moore (1967), Stiglitz (1967), Britto (1968), Kubota (1968), W. W. Chang (1969), McCallum (1969), Colinsk and Ramanathan (1970), Furono (1970), Dernburg and Dernburg (1969), Darity (1981), Guha (1972), Mückl (1972, 1975, 1978), Steedman (1972), Folkers (1974a, 1974b), Maneschi (1974), Gupta (1977), Marrelli and Salvadori (1979), Vaughan (1979, 1988), Fazi and Salvadori (1981, 1985, 1993), O'Connell (1985, 1995), Pasinetti (1983), Franke (1985), Bidard and Franke (1986a, 1986b, 1987), Taniguchi (1987), Miyazaki (1987a, 1988, 1991), Baranzini (1991a), Samuelson (1991).

(33.) We refer to the Robinsonian-Kaleckian-Kaldorian argument according to which if $S > I$, consumption is lower than expected and profit margins will fall, leading to a redistribution of income from profits to wages. Since saving out of wages is lower than saving out of profits, such a process will continue until $S = I$ and vice versa.

(34.) This proposition maintains that the undertaking of a public debt or the imposition of taxes ends up having the same effects on taxpayers. In its more stringent form, it became known as the "neutrality theorem" (see Barro 1974).

(35.) Empirical work (Horioka and Watanabe 1997) on Japan has shown that the motives to be found behind total personal savings are many, and, above all, they change along the life cycle. Some of them are clearly associated with a strong willingness to endow the next generation (saving for housing, since Japanese parents in general leave their houses to their children).

(36.) Such a list includes Tobin (1960), Meade (1963, 1964, 1966a), Pasinetti (1965a; 1966b; 1974a, chap. 6; 1974b; 1974c; 1975; 1983a; 1989a; 1989b), Samuelson and Modigliani (1966a, 1966b), P. P. Chang (1964), Baranzini (1975b, 1982a, 1982b, 1991a, 1991b, 2001), Craven (1979), Woodfield and McDonald (1979, 1981, 1982), Miyazaki (1988, 1991), Samuelson (1991), O'Connell (1995), Teixeira (1998), and Faria and Teixeira (1999).

(37.) This is especially true for the United States, where the saving rates of households declined through most of the twentieth century, and have been in certain cases negative at the beginning of the twenty-first century.

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Reinventing Macroeconomics: What are the Questions?

Edward J. Nell

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[–] Abstract and Keywords

Joan Robinson asked, "What are the Questions?" in her seventy-fifth year. Economics, she felt, was no longer focusing on the important issues; it had become bogged down in the mathematical detail of models. She asked this because she wanted to force the profession to face the fact that there was very little apparent progress in economics. It was time to ask again what was economics supposed to explain, in particular, not only how growth took place, but what was the point of growth and economic expansion, what were they for? This chapter considers two kinds of questions. First are those that concern how each of the different parts of the macro-system work—production, labor market, money and banking, taxation and government spending. Second are those questions about how these different parts interact, how they are tied together to make a system that works in a certain way—inflation and Phillips curves, for example.

Keywords: Joan Robinson, macroeconomics, production, labor market, money, banking, government spending, taxation, Phillips curves, inflation

Joan Robinson asked, "What are the Questions?" in her seventy-fifth year. Economics, she felt, was no longer focusing on the important issues; it had become bogged down in the mathematical detail of models. She asked this because she wanted to force the profession to face the fact that there was very little apparent progress in economics. Instead of making progress, in her view, the profession had mired itself in confusion: so many quarrels had led to so little agreement. In her view the profession had lost its understanding of what economics was *for*. It was time to ask again what was economics supposed to explain, in particular, not only how growth took place, but what was the point of growth and economic expansion, what were they *for*? But this opens Pandora's box, and the questions come flying out.

Even to approach these questions we have first to know how the economy works. Earlier, in a review of Joan Robinson's *The Economics of Imperfect Competition* Schumpeter (who believed she had taken economic theory to a new level) asked "where shall we go now?" and wrote in answer:

> First, the element of time must be got hold of in a much more efficient manner.... Second, the element of money cannot any longer remain in the background to which long and good tradition has relegated it. We must face the fact that most of our quantities are either monetary expressions or corrected monetary expressions.... Third, we probably all agree that our equilibrium analysis is really a tool for the analysis of chronic disequilibria ... and this means we must build the economic cycle into our general theory. Fourth, in some lines of advance the time has probably come to get rid of the apparatus of supply and demand, so useful for one range of problems but an intolerable bearing-rein for another.
>
> (Schumpeter 1934, 256–57)

(p. 363) Economics in general and macro in particular can still be seen struggling with these questions. The

development of dynamics, and efforts to build in history, both represent attempts to deal with the questions of time. Most macro approaches try to deal seriously (if not always realistically or correctly) with money—though it can be argued that these efforts fail (Rogers 2006) and certainly high-end neoclassical theory still has trouble finding a place for it. All Keynesian and "alternative" approaches willingly abandon equilibrium at least in parts of their analysis; only New Classical theory insists on it always, all the time. The aggregate demand–aggregate supply approach of the textbooks is a regrettable extension of "the apparatus" (supply and demand) to the macro arena, but again, the true Keynesians and all "alternative" thinking have developed more appropriate kinds of analyses.

1. The Macro Picture Today

A great deal has been written on all of these questions, and different approaches—schools, in the European sense?—have developed, each taking a set of positions and weaving them into a more or less coherent framework. We can easily identify three types of more or less mainstream Keynesians:

- Old Keynesians (OK), mostly students and colleagues of Keynes, committed to the theory of effective demand as a basis for demand management policies, but paying little attention to optimizing
- Standard Keynesians (SK), the "grand neoclassical synthesis" of Samuelson, following the IS-LM and Modigliani models; committed to the theory of effective demand, but setting it in the framework of neoclassical theory, and more recently,
- New Keynesians (NK), who are concerned to show that Keynesian analysis and policies are compatible with optimizing and rational choice, but in the framework of realistic assumptions about uncertainty and market imperfections.

All these support interventionist policies to combat unemployment and inflation, with many Old Keynesians supporting "functional finance."

Two schools of anti-Keynesians can be distinguished:

- Monetarists (M), who argue that the market tends to reach a stable full employment position (in the long run, but if markets were unimpeded, in the short, too) and that disturbances largely result from mismanaged monetary policy or other government interventions, and
- New Classicals (NC), who reach similar results with greater analytical clarity and force, relying on intertemporal optimizing based on the assumption of rational expectations.

(p. 364) Both generally claim to oppose activist policies and do oppose expansionist policies, but likewise support active interventions to bring about austerity. A deviant sub-school of monetarism, however, calling itself "supply-side economics" supports expansionist policies, including deficit spending, so long as the expansionist stimulus comes from tax cuts.

Finally, a new entrant in the competition,

- the New Consensus (NCS), a blend, developed recently, of New Keynesian and New Classical thinking, based on intertemporal rational choice and especially rational expectations, in a general equilibrium setting, but allowing for some kinds of unemployment, fluctuations, and market failures, due to rigidities, adjustment costs, imperfect or asymmetric information, and the like.

In each case there can be variations and subdivisions, but each seems to have an identifiable set of core propositions. All regard macroeconomics as based on an empirical approach; standard Keynesians, some old Keynesians and some monetarists all developed macroeconometric models following the Cowles Commission approach, roughly estimating simultaneous equation macro models following the probabilistic approach. The Cambridge Old Keynesians tended to be suspicious of complete models and instead estimated particular functions—consumption, investment, liquidity, output, and employment—following a "partial equilibrium" methodology (e.g., cf. Thomas 1997). To make a full model, they put these together with the "identities"; later writers, especially post-Keynesians, developed this approach to a high degree by paying special attention to the consistency of the national accounts (Godley and Lavoie 2007). In spite of theoretical insight and forecasting success, critics

considered this "ad hoc." New Keynesians and New Classicals tended to reject the Cowles approach on the basis of criticism by Lucas, Sims, and others, even though their own work may be vulnerable to some of the same criticism.[1] They have largely ignored the partial equilibrium methodology, supported recently by Ray Fair (2013), who shows that it provides a foundation for asserting a number of important general facts about the US economy. By contrast, NKs and NCs have advocated a general equilibrium approach that emphasizes not only rational choice but also rational expectations. This has ended up in the New Consensus, where the macro behavioral functions are defined by intertemporal optimizing in a context of market imperfections.

Of particular interest here is the post-Keynesian, or PK, approach, which is not mainstream—that is, it does not accept any variant of the neoclassical framework of rational choice and substitution—but does seek to develop the Keynesian theory of effective demand, both long run and short. Kalecki and Pasinetti, along with Joan Robinson, can be considered forerunners; Richard Goodwin, too, in some respects, but he was more interested in the dynamics of the real economy, as represented by Sraffa-type wage/profit trade-off models. PK also develops the analysis of monetary-real interaction, especially in relation to instability (e.g., Minsky), more fully than the other schools. Godley and Lavoie have put PK ideas into a social accounting framework, very useful for empirical (p. 365) work. Structuralist macroeconomics focuses largely on development; its models differ largely in identifying two kinds of investment functions, one of which responds chiefly to profits—higher retained earnings makes investment easier—the other to wages—higher wages means large consumer markets.

Two extensions of PK will be briefly considered: first, what might be called the Bielefeld–New School approach, which reaches typically post-Keynesian results in the context of models which exhibit many neoclassical and even Consensus features, by concentrating on and developing the dynamics. Then we will also examine the theory of Transformational Growth, which extends the post-Keynesian vision, first by developing the connections with modern versions of the classical approach to production and distribution, and then grounds it more firmly in history, by considering the effects of the changing character of technology on the way markets adjust.

Let's try to line up the questions that would have to be answered by a good, complete macroeconomic theory, capable of determining output and employment in the short run. First, let's consider how to ask—and answer—Robinson's first question (perhaps not the way she would have done it), what is economics for? Neoclassical theory suggests a straightforward answer: the purpose of economic analysis is to understand how markets work to optimize the allocation of scarce resources among given and competing ends, so as to maximize the welfare of economic agents. This, of course, includes analyzing both market failures and nonmarket optimizing (e.g., planning). So the mainstream approaches would offer this answer, with the exception of some, at least, of the Old Keynesians.

If the basic activity of markets is to allocate scarce resources in the best way possible, then there is a problem in understanding unemployment in modern economic systems. A basic theorem states that if a resource is scarce, it will have a positive price that measures its marginal contribution to output, but if it is underutilized, its price will be zero, or tend to zero. So if there is genuine, persistent involuntary unemployment, the real wage must be zero, or at least clearly falling; conversely, if real wages are positive and steady, there *cannot* be widespread and persistent involuntary unemployment. Thus the mainstream acceptance of the neoclassical scarcity-based theory of value conflicts with the Keynesian program, which is to *explain* persistent involuntary unemployment—a phenomenon that a basic neoclassical theorem tells us is impossible.[2]

The adoption of the scarcity approach to economics requires that agents be supposed to optimize; yet a great deal of macroeconomics has nothing to do with optimizing. The questions concern the properties of solutions of macroeconomic equations—for example, equations for output and employment, consumption and income, investment depending on expected income and interest, money also depending on expected income[3] and interest—regardless of how these equations are derived, whether they are the outcomes of some sort of optimizing, or satisficing, or whether they result from following socially defined rules and practices without any optimizing at all. Do solutions always exist, is there a unique solution, and perhaps most important, are the solutions stable? Locally, or globally? What kinds of dynamics will lead toward, or away from, a solution? Answering these questions does not necessarily depend on assuming that (p. 366) agents must solve some kind of full-scale optimizing problem. Their reactions may be based on socially defined rules, or rules of thumb that are the products of learning, or just common sense. But full-scale optimizing, based on complete information, including probability assumptions, and full or even bounded rationality, is not necessary—and is undesirable. Such optimizing is more than unrealistic; it

idealizes the agents, attributing qualities and powers to them, and characteristics to their environment, that they do not and for the most part could not have.

But economics has always, from the start, assumed that agents are seeking the best deal, trying to make the most money, trying to keep costs down—buy cheap and sell dear. Or, anyway, they act "as if" this were so. Surely this is a form of optimizing? So it is, and it should always be assumed. Let us call this Optimizing 1. It is the foundation of the Law of One Price; it is the reason we can talk about *the* price of a good or service (when we know perfectly well that many, probably most, goods and services, are sold at various prices in varying places and times.) There will be a tendency for agents to try to get the best price, which will tend to reduce the variance of prices, and also to make sure that the distribution of prices moves together. This will tend to pull rates of return together, long and short interest rates, equity returns and rates of profit;[4] it will tend to establish uniformities in the complex of wage rates and to ensure that the elements of this complex move together. Optimizing 1 is a foundation stone on which our definitions of economic variables rest.

The problems arise when this is extended to what can be called Optimizing 2, where agents are assumed to face, understand, and solve a sophisticated optimizing problem, often, these days, an intertemporal problem. The first step toward this seems innocuous enough, however. Marshall and his followers assumed that firms would settle on the minimum cost *point of operation*; competition would push them to that point in the long run. By analogy, he assumed that households would purchase the maximum (expected) utility bundle of goods, given their incomes, where "utility" was an indicator of their preferences or priorities among the available goods. In a certain sense this *is* an innocuous extension—given their plant and equipment, surely firms could readily work out what is the least-cost level of operation, and given a simple schedule of priorities, surely households could figure out the best combination of goods. (At the end of the nineteenth century four categories of goods—food, clothing, shelter, and fuel—accounted for over 90 percent of the average household budget! Consumer choice was not so difficult.)

But the next step took the idea of choice beyond the pale—out of the realm of plausibility. Firms were supposed to be able to make the least-cost choice of *method of production*, rather than just the least-cost point of operating a given facility. To choose the best method of production requires knowing how the different technologies will work out over time, how well the firm's management can handle them, how the market will react to changes in the characteristics of the firms' products, how well the labor force can handle working with the different technologies—among many other things! But these are kinds of information that no one can really come to know except on the basis of experience, and much of this information will be not only probabilistic, but *uncertain*, in Keynes's sense. To assume that firms, let alone households, have such knowledge of a (p. 367) number of techniques (an infinite number!) at a given moment when they make their choice, is to *idealize* them in an unacceptable way.

In actual fact methods of production are *developed*, not "chosen"; firms set up pilot projects and embark on a course of innovation, adaptation, trial and error. At the outset they are typically working with an "idea," not a "blueprint," and they are likely to revise the project as they move along. Different firms may develop the same initial idea in different ways. The outcome is "path dependent." In general, new methods of production will also result, over time, in products with new and hopefully improved characteristics, and will define new job descriptions for labor. By contrast, the choice model presents agents choosing at a point in time among many different fully developed "blueprints" for producing exactly the same product. In the simplified paradigm case, the agents have a clear criterion and all relevant knowledge, at least of probabilities. This picture is misleading; for a start there are a number of different investment criteria,[5] and the assumed conditions must be unrealistic for them to give the same results, and for the results to be unique. As the model is made more realistic, the chances of the criteria giving different answers increases. In any case it gives a misleading picture of the actual processes, which involve learning and innovation, and create path dependency. Moreover, it idealizes the agents, attributing to them skills and knowledge they do not and could not have, and it presents their choice as static, an optimization at a point in time based on the givens (including expectations) that they face at that moment.

Post-Keynesians, of course, run into no such problems. They take Optimizing 1 for granted, but are skeptical about Optimizing 2. They answer the question "What is economics for?" by referring to the working of the system as a whole—the way it grows, fluctuates, generates a standard of living and a pattern of inequality. This has little to do with optimizing, or with scarcity. They point to the facts that, on the one hand, competition tends to encourage innovation and therefore growth, but on the other, innovation tends to generate market instability, which can drag the economy into depression. Economics is the study of how these two tendencies operate and interact, and its

analytical results can be used develop policies to further growth and to ensure that its benefits are widespread and therefore bring prosperity to all.

But, as we shall see, post-Keynesians tend to be eclectic and skeptical; they do not have an agreed-upon theory of value, and do not appear convinced that they need one. They tend to study the problems of unemployment and inflation, and even growth, drawing on the idea that economic activity is (under most conditions) "demand-led" in the short run—and sometimes in the long run also. They take the capital structure and technology as given—but they also study how demand conditions might affect both. In particular they tend to think that changes in distribution will affect aggregate demand, and conversely changes in demand may affect distribution. Moreover, distribution is strongly connected to growth, and this leads to the study of "demand-led" growth.

Transformational Growth takes this a stage further and considers the impact of changing technology on both institutions and markets, especially on the way markets adjust. In particular, Transformational Growth contends that changes in technology (ultimately! the causality is complex) account for changes in three sets of institutions: (p. 368) business firms, households, and government. Businesses develop from optimal-sized (minimum-cost) family firms to modern corporations that grow by reinvesting retained earnings; households change from large multigeneration units that engage in producing and bartering of domestic goods and services to nuclear families (and single-parent families) that, hobbies apart, are strictly final consumers; governments grow from small and limited to large and complex, from roughly 5 percent of GNP to 30 to 50 percent or more, as they are compelled to take on more and more varied functions, as agriculture, along with rural and small-town life, declines and urbanization increases. These institutional changes in turn interact to bring about a change in patterns of market adjustment from processes based on prices changes to ones based on quantity changes. But changes in patterns of market adjustment, in turn, set up pressures for developing technology in ways that will control or reduce the costs associated with the new patterns of adjustment.

2. The Questions for Macroeconomics

We consider two kinds of questions. First, there are those that concern how each of the different parts of the macro-system work—production, labor, money and banking, government—and second, we have questions about how these different parts interact, how they are tied together to make a system that works in a certain way.

Very broadly, we have two forms of macro, and they look at the questions differently: The Keynes-Kalecki approach sees macro as the study of how a *system* works, how the different parts interlock and react on each other, as they carry out their normal operations (whatever these are based on), so as to see whether this pattern of working will tend toward an equilibrium of employment and output, or cycle around it, or exhibit some other dynamic pattern. The focus is always on the whole system, which cannot be explained or understood simply as the aggregate of its parts. We can call this the "macro-macro" approach, or MM. But the neoclassical version of macro is much less concerned with the properties of the system and instead examines the aggregate properties of a group of abstract agents making rational choices over time. The characteristics of the system are assumed to reflect the characteristics of the agents and their optimizing behavior. The focus is on the optimizing of the agents, and the whole exists only as the aggregate of the parts. This, then is the "micro-macro" approach, or mM.

General Purpose Question: Macroeconomics

1. What questions do we expect macroeconomics to answer? For the MM approach, it is

- explaining how the *system* works, how the sectors and classes interact [although some will object to introducing differentiated social groups], and which variables influence which others, indicating the channels of causation;
- (p. 369) showing how this working determines the levels of employment, inflation, productivity, interest rates, investment and consumption, wages and profits, and further showing how this defines a pattern of growth.

For MM, therefore, the whole reflects the *interaction* of the parts; it is more than the sum.

The alternative, mM, will seek to answer the question, "What determines the optimal allocation of the scarce resources (usually capital and labor) of the whole economy?" This effectively makes macro an extension of micro

analysis to the case of the whole economy, often by means of a representative agent or set of agents. Optimizing becomes the main focus; the interactions between the equations, and especially the dynamics, are underplayed. The whole is therefore merely the sum of the parts.

History

2. Does history matter? There are two issues.

The first one is "path dependence." Does the starting point matter, does it set the economy on a course of development that unfolds in a different way than it would have from a different starting point? MM will tend to find this interesting. Or does the economy eventually tend ultimately to the same destination, regardless of the starting point? In general, mM would find this a natural assumption; the optimal position is the same no matter which the direction of approach.

Second, will the basic relationships of the system, and *the way the system works*, as described by basic theory, change in a more or less systematic way over time? The system evolves and changes its adjustment procedures as it does. This suggests we could distinguish "stages," where these will be identified by the way the system adjusts, and the typical outcomes it produces. MM might well be interested in this possibility—but not necessarily. The alternative position is that the economy will always work the same way, so that it is essentially independent of time, with the consequence that economic principles are always the same, like Newton's laws. If economic principles are the result of rational choice, they will not change over time—although the constraints on optimizing may be different at different times—so this approach will appeal to mM. But to the extent that the principles of economics reflect the laws of physics and properties of physical systems, they would not vary over time, so some MM approaches might well also favor the idea that at least some economic principles (and institutions?) are universal and timeless. (Pasinetti's "natural" system comes to mind.)

Production and Distribution

3. How should production and the distribution of income be modeled? Does the model show the existing, actual production system, or does it show the set of production (p. 370) possibilities, from among which a choice will be made? MM will tend to model the actual system, abstracting from all sorts of detail; mM, however, will present an account of production and distribution resting on rational choice, usually some version of marginal productivity theory. This calls for an assumption of some sort of generalized convexity, which is unlikely to be at all plausible.

Should the representation be aggregated, or should the model be detailed? How many classes, how many sectors, categories of spending? If there is only "one sector," how is output aggregated? We might think mM would tend toward disaggregation, but that does not seem to be necessarily the case; "representative agent" models are extreme examples of a micro approach to macro. By contrast, MM shows a wide variety, ranging from different kinds of neo-Ricardian disaggregation (drawing on various interpretations of Leontief, Sraffa, or von Neumann), through Lowe-style three sector models (cf. Halevi, Hagemann, Steedman, Nell), many varieties of two-sector (Hicks, Morishima, Nell) to workhorse macro one-sector models. We may well ask on what grounds we should prefer one level of detail to another.

Other questions come to mind: Are relationships linear or nonlinear? Are they "horizontal," or should models of production be "vertically integrated," or are both needed? Here the issues of returns to scale arise:

- Should models be based on coefficients that are fixed in the short run, or should they be variable, and if variable, will returns to additional employment diminish or increase? What about the long run?
- Even if marginal returns diminish in the short run, as in the agricultural and craft economies, for example of the nineteenth century, returns could be constant in the long run, as optimal size units can be replicated more or less indefinitely.
- But in mass production, in the short run the evidence is overwhelming that variable costs are constant over long stretches. However, there is good evidence also that in quite a lot of manufacturing, there are long-run economies of scale.
- Finally, in some high-tech areas there is evidence that even short-run expansion leads to increasing returns,

raising the specter of "jobless growth."

Effective Demand

4. Does aggregate demand set the level of production in the short run, or putting it another way, is the economy demand-constrained? What effect does distribution have on the level of aggregate demand? What is the chief source of volatility—fluctuations—in the economy? For MM the short-run level of output is demand determined, and demand is likely to be strongly influenced by distribution. Not so for mM, which is likely to consider the economy supply driven, in both the short and long run. As for volatility, MM economists tend to consider it inherent in the economy and to locate its source in uncertainty, particularly uncertainty in regard to both financial and real investment. But mM authors tend to deny that the economy is volatile; outside shocks are responsible—for (p. 371) Monetarists they arise from shocks created by ill-considered monetary policies; for "real business cycle" theorists they come from technology.

There is a lot to consider in modeling the demand side; we need to know types of information:

- The relationship between consumption and real wages. The Old Keynesians appear to have had a good point when they treated wages and salaries as principal determinants of current household spending. Friedman and Modigliani proposed an approach to consumption much more in line with mainstream economics—permanent income, the life cycle—and the evidence appears to be decisively against this so-called advance.
- The relationship between investment and profits. Kalecki, Robinson, and later Minsky, proposed that realized profits depended on investment spending and the government deficit. Many mainstream models—for example, the IS-LM—simply don't look at the determinants of profits. Then there is the question of feedback from profits and wages to investment, as the structuralists point out.
- Whether demand pressure drives the economy only in the short run, as Tobin and others seem to think, with the supply side determining the long run—or whether demand is also the dominating force in the long run.

Or, perhaps Marshall was right after all, and both blades of the scissors are needed? This would give us aggregate demand and supply in both short and long run.

Interaction question set 1. How does the system of production and distribution interact with the forces of aggregate demand? How do they affect each other—does demand pressure on output change distribution? Does a change in distribution affect demand? Is the relationship different for the long run and the short?

For mM, of course, in the long run Say's Law holds, but sometimes it emerges in the short run as well. Supply-siders see supply incentives driving activity, so that demand adjusts to supply. But MM will see demand as the dominating force in the short run; the long-run story is less clear, however.

General Purpose Question: Equilibrium and Expectations

5. What is the definition of equilibrium in regard to production and distribution, in regard to circulation, and in regard to effective demand? Are these all the same?

- Are the equilibrium concepts static or dynamic?
- Do expectations depend on equilibrium, or does equilibrium depend on expectations? Or both?
- Does equilibrium depend on agents making rational choices? Are expectations formed "rationally," that is, by expecting the unique stable equilibrium of (p. 372) the correct or best model? But which model is correct, or best, and will it have a unique stable equilibrium? It can't be the "best" GE model, because Arrow-Debreu has multiple equilibria, some or all of which are unstable.

Money

6. Do production and distribution, on the one hand, or effective demand on the other, drive the monetary system? Or does money drive the rest of the economy—which way does causality flow? Post-Keynesians and Old Keynesians—and neo-Ricardians—tend to argue that the real forces in the economy drive the monetary system.

Monetarists contend the opposite, that changes in money cause changes in the real economy, in the short run, though not in the long, where the classical dichotomy holds sway.

Does the classical dichotomy hold? Is money endogenous or exogenous? In the short run or the long run, or both?

This raises a number of questions about circulation, a classical topic that figures prominently in Nell's Transformational Growth approach:

- Is the role of money in the system chiefly that of an asset, or is it also modeled as a medium of circulation?
- Is it demonstrated that the active money in the system is necessary and sufficient to ensure that all transactions are carried out in money?
- What is the amount of money—and how is it calculated—that is required to circulate all the goods and services in the economy? How can we prove that this amount is necessary and sufficient? Is it W, C + I, or W_k? or some other amount?
- Suppose Y and N are unchanged, but W/P changes: will the quantity of money required for complete circulation still be the same?
- How can we be sure that the value of money does not change as money changes hands successively during the course of circulation?
- Can the quantity equation be derived, with an explicit expression for the velocity of circulation? What is the relation between successive stages in circulation and the interdependence of production? What is the relation to distribution?

Interaction question set 2: How does money interact with production and distribution? Does the system of production and distribution determine or affect the amount of money or how fast it circulates? Does the money affect production or distribution?

Interaction question set 3: Do changes in the amount of money affect aggregate demand, or do changes in aggregate demand affect the amount of money? Or both?

Banking and Interest

7. Does the banking system create money, or does it accept already existing money as deposits? Or both? Does the viability of the banking system depend on the backing of **(p. 373)** government? Minsky holds that the monetary/financial system becomes more "fragile" over time, more likely to break down. "Stability is destabilizing."

- How does a system of "real money"—money based on convertible metal—differ from a system that runs a nominal currency? Is the pattern of circulation the same for the two cases?
- What are the determinants of the rate of interest in the real money system, and how do they differ for the case of nominal money?
- Will advances by banks be made for wages, for investment, or for both? Does the circulation work the same way in each case? What will limit the amount of lending; will the constraints move procyclically?

Labor Market

8. What constrains the system, in the short run, and in the long? More specifically, does the amount of labor available constrain the level of activity, or does the capital structure—the level of capacity and aggregate number of jobs—constrain the system, that is, set a limit to output and employment at a given time?

- Is employment determined together with real wages by supplies and demands for labor as functions of the real wage rate? Or should supply and demand for labor be considered as functions of the money wage?
- Alternatively, employment may be determined primarily by aggregate demand, with the labor market and the real wage playing no role or a minor one.
- Is unemployment due to shortage of demand or to shortage of capital? In the first case, more workers will not be hired on the assembly line, because sales are not strong enough (Keynesian unemployment); in the second

case, there are more available workers than there are places on the assembly line—more factories would have to be built (Marxian unemployment).

Inflation and Phillips Curves

9. Is inflation caused by real pressures of demand against supply, or of increases in real costs, or is it caused by monetary forces? Or by a mix?

- Is inflation "uniform," or is it important to distinguish price inflation from wage inflation?
- Will lowering unemployment reliably increase inflation? Will raising unemployment reliably lower it? Are these relationships symmetrical so that a reliable function can be set out, the same whether the movement is "up" or "down"?
- Is the wage-price spiral an important feature of inflationary processes? Are these processes triggered by conflict over distribution?

Does the Phillips curve depend on marginal productivity theory?

(p. 374) ### Taxation and Government Spending

10. Historically, for example in the nineteenth century, government activity, including transfers, used to be "small" in relation to GNP (5–10 percent); since World War II, and even earlier, governments in advanced economies have become large (30–50 percent). How is this to be explained? Does government activity "interfere" with market adjustment, causing inefficiencies to develop? Or do governments compensate for market failures?

- What is the role of public goods? Do "government goods" support or even increase productivity?
- What is the role of taxation in a modern economy with a nominal money system? Do taxes finance government spending, or do they reduce the money supply?
- What are the effects of government expenditure, and how is it "financed"?
- What are the effects of deficits? Are they stimulative? Are deficits dangerous, and if so, exactly how?
- Is fiscal policy effective? Can it be made timely and focused?
- Is monetary policy effective? Should the central bank be independent?

International Macro: Balance of Payments, Globalization

11. What are the effects of an imbalance on current account? On capital account? Are there forces leading to the automatic self-correction of these imbalances? Do flexible rates restore equilibrium, or can they lead to instability? Is capital mobility stabilizing or destabilizing; does it encourage growth or is it wasteful? Can imbalances on current and capital accounts be offsetting?

The international dimension calls for some discussion, since the issues are a little different.

- Old Keynesians adopted the absorption approach, correctly rejecting the elasticities approach (which presumed that price supply and demand functions would not shift during adjustment). Initially anti-Keynesians stuck with elasticities and then developed into Monetarists.
- The Mundell-Fleming approach is accepted by Old Keynesians, and is compatible with New Keynesians but is rejected by Monetarists and New Classicals in favor of the *monetary approach to the balance of payments.*
- New Keynesians and some who flirt with New Classicals have adopted a Modified Mundell-Fleming, MMF, in Krugman's phrase. MMF does not assume that international arbitrage will equalize interest rates, nor does it simply assume prices are fixed. It takes prices as sticky but introduces an inflation equation. But the approach is similar.

(p. 375) • Post Keynesians don't necessarily find Mundell-Fleming objectionable (too dependent on IS-LM, but that is easily overcome), but not much work has been done fitting the central ideas into PK models. The main interest in PK international analysis lies elsewhere, in understanding the role of international factors in affecting

international inequality and unequal development. Among these factors are the transmission of aggregate demand, monetary forces, international capital movements and instability, the role of transnational corporations, forces acting on the terms of trade, and the international institutions. These vary greatly from country or region to country, and from time to time; in view of the diversity and importance of these factors, PKs seem to be uneasy with general models here.

• As this list shows, the PK approach is varied and ad hoc; there is no general theory or global model. The question is, how does the international economy—and especially globalization—help or hinder the effort to establish full employment, and more generally, how does it help or hinder growth and development? And the answers tend to be varied and particular to the different circumstances of different nations. PK generally rejects optimizing models and general equilibrium approaches to international economics.

• One general model that has been advanced by PKs is the generalization of the Harrod international multiplier by Thirlwall (and McCombie), stating that the growth rate of a particular country is constrained by the ratio of the income elasticities of exports to imports times the growth rate abroad.

• This is surely a good insight—but too much should not be claimed. The constraining power here depends on the nature of national fiat money in an international system. When a country (other than the United States) runs a serious deficit, capital will tend to flee, fearing devaluation. Growth cannot therefore proceed at a pace that would bring in excessive imports. But—to take a more or less realistic example—suppose there is a new influx of "snowbirds" into Arizona (retirees from Chicago and New York, moving to Arizona for half the year) leading to a building and shopping boom. Growth takes off, and the spending boom in Arizona leads to heavy imports from California. But the Arizona dollar is not going to collapse; hence the retirees will not fear to move their savings to Arizona, and investment, both financial and direct, will tend to flow in from California. It's a boom, so business will tend to move to cash in on it. The elasticities of imports and exports between Arizona and California are not relevant, no one even computes them; investment and finance move to where the business is. The Harrod equation has nothing to bite on. Thirlwall's insight is a good one, but it is an insight into one of the many defects of the present international system.

The aim of these notes is to focus on the issues raised by "theory integration"—integrating production and distribution with money and aggregate demand. Neoclassical theory basically applies its general approach to the international economy; it adds very little that is new. Monetarism likewise simply extends its principles to the international scene. Whatever we say about the basic approach will hold. But Keynesian theory old **(p. 376)** and new, and especially post-Keynesian theory, tends to take a skeptical and ad hoc approach in this area. Besides Harrod's international multiplier, not much is agreed upon. But it is not just that there is no agreement how to extend the basic approach; it is that the circumstances to be studied are highly varied (e.g., north-north trade vs. north-south trade), and different approaches may be appropriate to different problems. So we will set to one side the questions raised by the balance of payments and concentrate on closed economy macro models. Let's see how the different approaches answer the ten questions.

3. Comparing the Approaches

So let's run through the different approaches in the order we introduced them.

Old Keynesians, Blending into the Neoclassical Synthesis

Old Keynesians were definitely MM, but while basing their approach on Keynes, they sought to reconcile Keynes with neoclassical price theory (not a project Keynes would have approved.). Hicks and perhaps especially Modigliani set the focus, so that in the textbooks MM drifted toward mM. Taking the questions one by one, the Old Keynesian approach

1. Accepts the macro general purpose, but seeks to reconcile with neoclassicals
2. Sees no special role for history (although Keynes did); economics should provide general laws like any science
3. Offers no detail regarding production or technology. Short-run diminishing returns to are assumed, in a model with one sector, and no classes. Aggregate demand determines supply. There is no direct feedback from production to expenditure. Production and money are unrelated.

4. Holds that investment tends to fluctuate, to be volatile, because it is based on uncertain estimates of the future. Investment drives the system, so realized profits will reflect investment spending. Consumption initially is seen as resting on absolute income; later the life-cycle hypothesis is adopted
5. Evolves on equilibrium. Initially, "hydraulic" Keynesians saw equilibrium as an "expenditure balance" between injections and withdrawals, comparable to inflows and outflows of water reaching a stable level; later Keynesians emphasized rational choice.
6. Sees money as exogenous; the interest rate is determined by supply (exogenous or set by central bank) and demand (liquidity preference) for money as an asset. "Active money"—circulation—is an early theme but drops out in later works.
7. Believes that banks accept deposits; but high-powered money expands through the money multiplier.
(p. 377) **8.** Sees the labor market as governed by supply and demand in terms of real wages, but wages and/or prices are "sticky"—so the neoclassical conclusions don't hold. The classical dichotomy is rejected, but the Pigou or Real Balance effect is widely accepted (Patinkin, but not Tobin).
9. Early considered that inflation could be cost-push or demand-pull; the two factors could interact. Inflation could have distributive consequences, and these could also affect expenditure and therefore employment. But then later the Phillips curve developed, and the question became whether inflation could be controlled by policies that set the level of unemployment. (Very likely Keynes would have rejected the Phillips curve.)
10. Saw that the agenda of government has changed; government is responsible for managing the economy. The economy is generally volatile and sometimes seriously unstable. Fiscal and monetary policy both work; but monetary policy is weak—"you can't push on a string." However, fiscal policy depends too much on politics to be reliable. Direct controls should be considered at times.

New Keynesians

New Keynesians accept the need for "microfoundations"—grounding in rational choice, Optimizing 2—so emphasize demonstrating how rational agents can make optimizing choices that lead to market failures. In other words, the claim is that mM is the "theoretically correct" approach, but in practice, the world being imperfect, we reach MM results. (Cf. Kaldor 1985, chap 1.) New Keynesians

1. Accept macro general purpose but concentrate on developing a catalogue of "imperfections."
2. Have no sense of history; further, there is the peculiarity that in the past—the nineteenth and early twentieth centuries—market imperfections, asymmetries of information, insider-outsider relations, and so on, must have been much greater, but prices and money wages were quite flexible.
3. Offer no detail regarding production or technology. They assume without explanation or justification that there are universal short-run diminishing marginal returns in one-sector models, which are sometimes representative agent models, and certainly have no social classes. Aggregate demand determines output; there is no feedback from production to expenditure; production and money are unrelated.
4. Believe intertemporal optimizing determines C and I, so both should be stable if preferences are stable. Imperfections, however, may lead to volatility in I.
5. View agents as optimizing, but rational choice is limited; information is asymmetrical; there may be risk aversion; markets may not clear, there are suboptimal equilibria and stable disequilibria. Agents may attempt to form rational expectations, but asymmetrical and limited information will prevent this.
(p. 378) **6.** View money as wholly or partly endogenous. Credit rationing may exist; the possibility of bankruptcy creates asymmetrical risk.
7. See interest rates as pegged; banking institutions are important; bankruptcy matters.
8. Formally describe the labor market by marginalist supply and demand curves, but rigid prices and money wages prevent the market from working. Institutional factors explain rational behavior that results in price and wage rigidities. Efficiency wages are widespread.
9. Observe many causes of inflation; distributional factors count. The Phillips curve may be useful.
10. Believe government stabilization policies are important; they work.

Monetarists

Monetarists accept but modify most of the Old Keynesian approach. Oddly enough, in spite of a strong rhetorical commitment to the principles of mM, monetarist models tend to be macro in outlook. Monetarists

1. Agree with macro general purpose
2. Consider history, but see events as the result of policy mistakes
3. Are short on detail: short-run diminishing returns, one sector, no classes. Supply adjusts to demand; there is no direct feedback from production to expenditure; production and money are unrelated.
4. Believe I depends on rational optimizing, so should be stable, if foresight is good and preferences are stable. Permanent income governs C, not real wages, and there is no special connection between I and P.
5. Assume market-clearing and rational choice
6. See money as exogenous (mostly); money is an asset. Classical dichotomy holds in LR; interaction takes place in the short run. There is no account of circulation, no explanation of value of money.
7. See banks as accepting deposits but creating money through the money multiplier; no detailed account of the difference between real and nominal money; interest rates depend on supply of money and on demand for money (Quantity Equation), but also on policy.
8. View the labor market as governed by traditional supply and demand (marginalist) equations, but in the short run systematic errors can be expected, in which money wages are confused with real. This confusion allows monetary factors to have real effects in the short run.
9. Believe inflation is caused by excessive monetary growth; other factors do not matter. The Phillips curve is vertical in the long run.
10. Attribute the growth of government to expansionist bureaucrats. The economy is naturally stable. Government intervention tends to make things worse; free market solutions are best.

(p. 379) **New Classicals**

New Classicals build on (over)simplified Walras, not Keynes, and emphasize rational choice and rational expectations. They are paradigm mM. They

1. Reject the general purpose: macro is a special case of GE; the system works through market-clearing, reflecting rational choice. GE models normally have a unique stable equilibrium, though at times New Classicals will consider multiple equilibria.
2. Have no history; models examine responses to random exogenous shocks
3. Assume diminishing returns for core, sometimes increasing returns for certain sectors; representative agents; continuous optimizing. They offer no technological detail, but some consideration of externalities. There is no feedback from production to expenditure; no relation between production and money. But technology may be the source of unanticipated fluctuations, as in the "real business cycle."
4. Believe intertemporal optimizing determines both C and I; both should be stable.
5. Assume rational choice, seen to imply market-clearing; rational expectations. They assume that it is clear to agents which model is the "best."
6. Assume money is exogenous and neutral when anticipated; monetary policy changes cause no real output or employment changes if they are credible
7. View banks as accepting deposits but creating money through the money multiplier.
8. Believe the labor market is governed by marginalist supply and demand functions; however, "surprises" can lead to short-run real effects; but anticipated changes will have no effects
9. Believe inflation is due to monetary growth; other factors are not important. The Phillips curve is vertical in the short run as well as the long.
10. Assume anticipated fiscal and monetary policy will have no real impacts; they will only affect the price level/inflation

New Consensus

The New Consensus appears to be a blend of New Keynesian and New Classical thinking, in which the theoretical approach of the New Classicals is accepted, in the form of intertemporal optimizing general equilibriums—DSGE—models, but the results of these models are considered subject to the imperfections of the real world. In other words, ideal optimizing behavior would lead us to expect to see price adjustments, but imperfections generate constraints that give rise to price stickiness. Similar problems are shown to arise for wages and labor markets, interest rates and financial markets, and, perhaps especially, for forward markets of all kinds. As a result Keynesian conclusions (p. 380) tend to follow; this is clearly shown in econometric testing. In effect the New Consensus is a

compromise, in which the New Keynesians, already willing to accept the neoclassical framework, abandon the last vestiges of "macro" thinking, in return for a willingness to acknowledge the widespread existence of imperfections and asymmetries—which, in turn, are capable of justifying policy interventions.

Critical Remarks

These five versions of macro seem to share a number of serious defects, centering around an inadequate account of production, acceptance of a discredited theory of distribution, a wrong account of the role of money, and, generally, an unnecessary transformation of the plausible idea that economic agents do as well as they reasonably can in the market into an idealized story of supersophisticated rational choice, extending even to intertemporal decisions.

- All five of these approaches fail to provide any detail in their treatment of production and without explanation simply assume generalized diminishing returns. New Classicals are a minor exception in that they do introduce externalities and increasing returns in selected sectors. But they still provide no technological detail, no structure of interdependence.
- All five assume that some version of marginal productivity theory provides an adequate account of distribution—factor pricing—at the macro level; none deal with the capital theory critique, nor with Keynes's explicit rejection of supply and demand in the labor market.
- Three of the five treat money as exogenous. New Keynesians, and presumably the New Consensus, allow for endogenous money, credit rationing, risk aversion, asymmetrical information, and so on. But they don't explain circulation or relate money to production and distribution.
- All retain the overall neoclassical framework of rational choice resulting in supply and demand functions connecting prices and quantities. All rely on a rational choice concept of equilibrium.
- None of the five provide an adequate account of the growth of government in relation to GNP. (But for an exception, see Stiglitz 2002.)

Assertions of Stylized Facts

Four of these approaches—neoclassical Old Keynesians, New Keynesians, Monetarists, and New Classicals—all appear largely to agree with the following essentially empirical claims, which are also to be found in most mainstream macro textbooks. The New Consensus would also seem to accept most; certainly it does not overtly challenge them. (Many Old Keynesians, however, would disagree on some points: Klein would reject (p. 381) most if not all, and Samuelson many. Many New Keynesians would now reject or at least rewrite the first three.)

1. High-powered money can be controlled by central banks; total money follows from high-powered money via the money multiplier
2. Reserves constrain commercial banks and define the money multiplier.
3. Deficits drive up interest rates and contribute to driving up prices.
4. The complex of interest rates moves together; changes in spreads and term structure are not serious enough or systematic enough to warrant defining additional variables, except for specialized inquiries.
5. Prices are flexible; money prices decline when demand weakens in competitive conditions.
6. Real wages are inversely related to employment.
7. There is an identifiable and stable natural rate of unemployment.
8. Many markets, encompassing a high percentage of GDP, are made up of large numbers of small firms.
9. Equilibrium is often observed in practice in markets.
10. Household saving is a large and important part of total saving.
11. There are widespread, generalized diminishing returns to employment; costs at the margin generally rise as output increases. The relationship between output and employment is stable and well defined.
12. In the long run the economy normally uses its resources fully; resources are scarce.
13. There is a stable, well-defined, and identifiable labor supply function.
14. Capacity output at any time is well defined and measurable; it grows at a steady "normal" rate that can be contrasted with the economy's fluctuating actual output.

These are all general claims about empirical aspects of the economy. None are obviously true, though they tend to be treated as if they were. In every case there are many, many counterexamples, and it can be argued for each that the weight of the evidence is against the claim. Most post-Keynesians would probably reject, or at least strongly qualify, them all.

Post-Keynesians

PKs have no interest in a reconciliation with the neoclassical approach, no interest in developing theories of rational choice, either to justify free markets or to explain market failures. Rational choice models are useful for *prescription*, much less so for description (Hollis and Nell 1975). PK focuses on macro as the study of a system and argues that markets must work under serious uncertainty—the world is nonergodic. Many PK models are dynamic, rather than comparative static.

(p. 382) It is often said, following Harcourt and Hamouda (1988), that there are three versions of PK:

1. The neo-Ricardian, which adopts the long-period perspective and stresses production and distribution as modeled by the classical equations, with effective demand set in this framework often, even normally, falling short of full employment, even though the economy is stable and in some sense in equilibrium. Money, however, does not seem to play a major role.
2. The American (Davidson and Minsky), which takes a short-period perspective and stresses money and uncertainty, seeing the economy as significantly unstable, so that the rate of profit is not a useful concept. Production and distribution are not examined in much detail.
3. The Kaleckian, which takes an intermediate perspective, stressing trend and cycle, seeing them as inseparable, as well as short-period aggregate demand, and interweaving distribution issues with those of activity levels and growth. An important variant of the Kaleckian approach—but which is also strongly Keynesian—is the structuralist viewpoint, associated with Lance Taylor, Amitava Dutt, Jaime Ros, and others, usually focusing on development issues, but also advancing models of growth and distribution. Marglin and Bhaduri advanced the idea that the investment function can interact with the economy in two different ways: growth can be wage-led, or it may be profit-led. Roughly, high wages expand consumer markets; the larger markets generate expectations of still larger markets and thus lead to higher investment. (High wages also generate pressures for higher productivity.) On the other hand high profits make it easier to finance investment from retained earnings, encouraging growth.

Recent work, however, has to some extent blended these three, as regards *macroeconomic* issues. They still differ on the question of "centers of gravitation," which are central to the neo-Ricardian approach but rejected by the other two. Neo-Ricardians hold that the modern classical equations (the Sraffian equations) describe the position toward which the economy is gravitating, which would imply some kind of stability. Because the equations describe what the economy is tending toward, they can be accepted in spite of the fact that they are significantly unrealistic (uniform prices, wages, rates of profit, etc.). But the implication of stability is unacceptable to those who emphasize uncertainty and the likelihood of speculation and fluctuations. On the other hand, both conventional post-Keynesians and structuralists lack a detailed account of production and distribution, which the neo-Ricardian equations provide. (Structuralists do offer accounts of distribution, but they do not model prices and the rate of profits.) Efforts have been made to provide another interpretation for the modern classical equations, and some neo-Ricardians do accept the importance of uncertainty. Today the distinctions between these schools do not appear to be as (p. 383) sharp as they once did. If we treat post-Keynesians as a group, PK takes the following positions:

1. It accepts the general purpose; but makes uncertainty central.
2. History is important; development is path dependent (although PKs say less about history than we might expect).
3. Constant returns and increasing returns are both important; one sector, two sector, and many sectors are studied; social classes and income distribution are considered. Structuralists focus especially on distribution. Neo-Ricardians provide technological detail. PKs and neo-Ricardians both see a direct feedback relationship from production to expenditure through wages.
4. Investment is highly volatile, being dependent on uncertain views of the future. I determines realized P. Real wages and consumption are related; so are P and I. In the aggregate wages are both a cost and

(because spent) an offsetting revenue. Structuralists distinguish wage-led growth from profit-led; others find the distinction ambiguous and find that it is hard to identify a reliable investment function.
5. Hydraulic equilibrium is presented; dynamic equilibrium and disequilibrium are studied, limit cycles are used. Determinate disequilibrium—reflecting uncertainty—is studied.
6. Endogenous money prevails; it is nonneutral; money is both an asset and a medium of circulation. Circuit theorists (French and Italian) study circulation. (Neo-Ricardians do not seem to have an agreed theory of money but do accept that nominal interest rates are set by a monetary authority; cf. Sraffa 1960.)
7. Loans create deposits. Banks ultimately depend on government guarantees.
8. The basic interest rate is pegged; spreads and term structure of interest rates reflect uncertainty.
9. Inflation is chiefly due to conflict between labor and capital; it can be triggered by changes in the exchange rate or primary prices. Some writers distinguish wage inflation from price inflation. The Phillips curve is unreliable, if not misleading, but inflation is certainly related to employment, output, and growth.
10. Historical changes have led to a larger government with an agenda that includes responsibility for stabilizing the economy. By itself the economy is volatile, and sometimes unstable. (Minskyans contend that stability itself is destabilizing.)

Some PKs, however, notably Davidson and to some extent Minsky, take the question of uncertainty to a new level and argue that pervasive uncertainty is simply the reflection in the minds of agents of *nonergodicity* in the economy. The social universe, unlike the natural, is nonergodic, meaning that we cannot assume that relationships are either deterministic or governed by reliable laws of probability. The past is not a reliable guide to the future; completely new patterns of behavior may emerge, and their emergence cannot be reliably predicted.

(p. 384) At a general level it is hard to argue with this; obviously innovations and new patterns of behavior frequently emerge in the economy, but equally obviously we are often able to predict, control, explain, and prescribe behavior. Sometimes we know what is going on, and sometimes we are at sea. Econometricians have done well estimating household consumption-income and employment-output relationships (as long as they have been willing to ditch neoclassical ideas), and they have successfully estimated multipliers and accelerators. Interest rates, bonds, stocks, future profitability, and future prices, however, have proved much harder to handle. This suggests an important distinction; some relations are well grounded and reliable, others are inherently volatile, and though they may look well established for a time, they may suddenly and unpredictably shift (Nell and Errouaki forthcoming). This calls for careful further work.

When it comes to the direction of the economy as a whole, both the manageable and the unmanageable areas have to be estimated and their interaction mapped. The trouble is, we don't know how pervasive the unreliability will be, so that at crucial points we may find ourselves unsure whether the tools and models at hand will prove workable or not. What is needed are some good criteria for distinguishing reliable relationships and reliable estimates of them from volatile or unstable relationships, ones likely to shift or change character. And we need to know how they interact. Davidson provides no guidance. Indeed, Post Keynesians in general have not tried to reconstruct econometrics so as to make it useful for their purposes.

Bielefeld–New School or Flaschel and Semmler and Coauthors

The Bielefeld approach is not concerned with microfoundations; indeed, it does not seem much concerned with foundations of any kind. "Foundations" are usually drawn upon to justify the basic structure of a model; Bielefeld, however, is not primarily interested in basic structure. It is willing to consider many different basic structures—some of course are better or more interesting than others—but it takes the basic models as *starting points for dynamic processes.* The possible or likely dynamic patterns of movement—growth, stability, cycles, development, breakdown—are the subjects of study, rather than the characteristics of the model and its solution. Of course, this means specifying the characteristics of the agents and the dynamic processes more fully, and this is the approach's main object in model-building. In general a realistic approach is chosen; specifications are checked against evidence. Output/employment relations are plausible; wage inflation is distinguished from price inflation; expenditure functions are reasonable and do not involve unrealistic planning horizons or impossible calculations. In general, the Bielefeld approach assumes simple Optimizing 1, but only occasionally draws on Optimizing 2, for example in regard to investment decisions or portfolio decisions; but when it does, realistic "imperfections" are taken into account. The approach (p. 385) commonly starts from "reduced form" equations and examines how

the dynamics will work. A major inspiration is the work of Richard Goodwin and his followers.

Nell's Transformational Growth Approach

This moves the post-Keynesian position several steps ahead, in particular uniting it with a detailed model of production and distribution, drawing on Leontief, Sraffa, Lowe, and Robinson (not that they would agree, either with each other or with the TG model). This is made the basis on which the analysis of aggregate demand and cyclical behavior is constructed, in which both distributional and sectoral variables play roles.

On the empirical front, Nell is skeptical of all the textbook supposed facts and, instead, builds on the stylized facts set out in chapter 2 of General Theory of Transformational Growth (Nell 1998). The most important of these revolve around the historical shift from an economy based on agriculture and crafts to one based on mass production and modern services. Roughly in the late nineteenth century, prices were flexible (deviating from trend), moving up in booms and down in slumps; primary prices were more flexible than manufacturing, which were more flexible than money wages, though these also both rose and fell. By contrast output and employment were less flexible than prices, with employment less flexible than output. Productivity gains were transmitted to the economy through gradually falling prices (over the whole nineteenth century; cf. Sylos-Labini 1984, 1991, 1993) The twentieth century saw the development of mass production, in which constant (even sometimes decreasing) costs prevailed; markups tended to reflect long-run decisions, so were stable, and thus prices tended to be inflexible down, and to rise only when faced with inflationary pressures, usually cost-based. Productivity gains were realized through rising real wages, as money wages increased faster than prices (up to the 1980s). Output responded to demand, and employment varied in the same direction and often in proportion (Rymes 1989, 31). Along with these changes, money evolved from convertible paper to inconvertible paper and bank balances, while banking and financial markets moved from providing security to managing risks. And the size of government increased in ratio to GDP.

The TG approach starts from two sectors, two classes, two categories of spending—all of which can be broken down further—and puts together a simple model showing how such a system reproduces itself and distributes its net product (in the process generating incentives for innovation in certain directions). The approach unites production and distribution with aggregate demand and unites both with money, through showing that money circulates according to multiplier formulae, tracing out the vertically integrated structure of production. Circulation, the formula for velocity, and the multiplier (and some other things!) all depend on the so-called balancing condition, that the wage bill in capital goods equals the gross profits in consumer goods. This makes it possible to derive a version of the quantity equation with a precise expression for velocity, but in which money is endogenous. Money provides the link that connects wages with consumption and investment with profits.

(p. 386) The approach builds macro relations from revenue flows. Price and quantity relations are found by *decomposing* revenue relationships. Revenue relationships reflect the structure of the economy—based on technology, legal and property relationships, and normal socially mandated patterns of behavior. This provides the "reliable core." The classical equations are abstract simplified versions of the structure of the economy, as revealed by the revenue flows, and they are reliable because they are embodied in technology—fixed capital—or written into contracts. Contracts and fixed commitments provide a sound basis for expectations. In addition there are volatile relationships that depend on other expectations of the future, expectations that can't be grounded solidly. These are volatile because there are aspects of the future that we cannot know, as Keynes emphasized again and again. But as practical economic agents, we have to come to a judgment, form expectations, and make plans. These plans and expectations drive the economy; but they are volatile and can change suddenly. The TG approach

1. Accepts general purpose—to explain how the system works at the level of the whole. But it also is concerned with the conditions for the maintenance (reproduction) of the system, finding these essential to understanding how it can expand.
2. Takes history seriously: the craft economy with flexible prices responds differently to fluctuations in demand than the mass production economy with largely constant unit costs. The different responses are due to the different patterns of costs, and the changes can be understood as the result of innovations driven by incentives, where these, in turn, resulted from the way the system adjusted.
3. Provides and draws on technological detail. Models are multisectoral, both horizontal and vertical, and assume constant returns in the short run, with a tendency to increasing returns in the long run. Vertically

integrated analysis is important.

4. Regards investment as volatile and dependent on the expected growth of demand; it is the chief source of fluctuations. Realized profits are determined by investment spending. Real wages tend to govern consumption (for those without large wealth). Wealth effects are important for those households that own capital and/or manage businesses; also in housing.

5. Views equilibrium as something that may be approached but will seldom be reached; different kinds of equilibrium are possible and need to be studied. Reliable relationships must be distinguished from volatile ones.

6. Takes endogenous money to be the rule; real money in endogenous in the long run, and nominal in both the long and the short runs. The quantity of money is the minimum amount needed to monetize all transactions in the shortest sequence. This rests on a fully developed theory of circulation. Historical analysis of development of money shows that it has progressed from coin to convertible paper, to inconvertible and bank deposits. Banks respond to and support effective demand; rentiers develop into portfolio managers as financial markets evolve.

(p. 387) **7.** Assumes that loans create deposits when money is nominal. Banks can be compared to the mint. The minimum rate of interest is set by the requirements of reproduction for the banking system.

8. Regards the basic interest rate as pegged in a modern system; in a "real money" system, supply and demand for reserves will set the banking system interest rate. Uncertainty will be important in settling the term structure and spreads.

9. Treats price inflation as different from wage inflation; so two Phillips-type equations are needed, thereby allowing for distributional effects, which, in turn, affect aggregate demand, and they may also influence productivity. Conflict is important to understanding distribution. Inflation is a dynamic process—it converges, stays steady, or diverges. Triggers and processes must be distinguished.

10. Sees the rise of government as related to increasing urbanization and the consequent changes in class structure, which tend to lead to a shift of household and business demand toward increasing the proportion of collective goods and public goods in expenditure patterns.

11. All of these lead to the emergence of globalization, a new international division of labor, with a shift of jobs, especially in manufacturing to developing countries, notably China, and vast downward pressures on wages worldwide. Also, globalization engenders worldwide growth of finance and financial markets; together these imply a tendency to stagnation.

The TG approach interprets growth as *historical dynamics* and proposes a macro approach to understanding the changing character of industrial costs and prices. These cost changes affect the way markets adjust, and so change the dynamics of the system. This in turn affects institutions, and these changes have feedback effects on markets.

Conclusions

Macro models ought to satisfy realistic criteria and should be consistent with stylized facts, but also should reflect commonsense observations augmented by careful field work. And this material has to be developed through conceptual analysis and then related to the world by proper attention to empirical measurement—and accounting. Otherwise how can they be useful? Why should anyone pay attention to models that are built on unrealistic premises, and reach conclusions as the result of assumed behavior by agents who have impossible powers or knowledge? The mainstream approaches are not well grounded empirically, in short. They also make use of Optimizing 2, which is literally out of this world. By contrast, the heterodox approaches are all broadly realistic and meet these criteria. They are all capable of illuminating the working of capitalism, some better than others, but all on the same page.

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Notes:

(1.) Lucas argues that changes in government policy will change private sector expectations and therefore lead to parameter shifts. So the *ex ante* reasons for a policy change may no longer be valid *ex post*. There seems to be no necessity here; moreover the same argument would surely hold for corporate policy changes, and for other kinds of changes as well, e.g., climate changes, trade changes. Sims argued that there are no valid or general

grounds for distinguishing exogenous from endogenous variables, and that resort should be had to statistical measures—e.g., VARs—to decide what variables to include. This amounts to making a shift from unrealistic or unjustified economic assumptions to unrealistic or unjustified statistical assumptions (Nell and Errouaki forthcoming).

(2.) One way of escaping this dilemma is to note that the theorem only applies in equilibrium. But if the unemployment is widespread and persistent while the real wage is stable, it might be reasonable to argue that such stability must be a good real-world proxy for equilibrium.

(3.) The ISLM model does not distinguish income and expected income—this was Keynes's chief criticism in a letter to Hicks—but the latter is the appropriate variable. Of course under some conditions income and expected income may be very closely related, but the cases where this is not so are likely to be very interesting.

(4.) Some kinds of dynamic responses can end up driving them apart in some conditions; cf. Steedman 1984.

(5.) Infinite present value, truncated present value, internal rate of return, payoff period, maximal growth rate … Cf. Harcourt 1968.

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Long-Run Growth in Open Economies: Export-led Cumulative Causation or a Balance-of-payments Constraint?

Robert Blecker

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[–] Abstract and Keywords

Post-Keynesian economists concerned with long-run growth in open economies have developed two related but fundamentally different theoretical approaches: the export-led cumulative causation model and the balance-of-payments-constrained growth model. The first approach stresses the possibility that some countries can achieve ever-widening "virtuous circles" of faster technological progress, improving competitiveness, rising exports, and rapid output growth (although, in this view, other countries may be doomed to suffer "vicious circles" of slower technological progress, worsening competitiveness, stagnant exports, and sluggish output growth). On the other hand, models of balance-of-payments-constrained growth emphasize the limitations placed upon a nation's growth by the need to finance necessary imports through either export growth or financial inflows. This chapter looks at the key theoretical differences between the two approaches and evaluates how and to what extent they can be reconciled by representing both in a common analytical framework.

Keywords: long-run growth, cumulative causation, balance of payments, virtuous circles, exports, output growth, competitiveness, technological progress, open economies, imports

1. Introduction

Post-Keynesian economists concerned with long-run growth in open economies have developed two related but fundamentally different theoretical approaches. On the one hand, models of export-led cumulative causation (ELCC) stress the possibility that some countries can achieve ever-widening "virtuous circles" of faster technological progress, improving competitiveness, rising exports, and rapid output growth (although, in this view, other countries may be doomed to suffer "vicious circles" of slower technological progress, worsening competitiveness, stagnant exports, and sluggish output growth). Providing that labor supply constraints can be overcome, exports are seen as the key limiting constraint on demand-driven growth in open economies (Cornwall 1977, 163). On the other hand, models of balance-of-payments-constrained growth (BPCG) emphasize the limitations placed upon a nation's growth by the need to finance necessary imports through either export growth or financial inflows (McCombie and Thirlwall 1994, 2004). In this latter view, virtuous circles may be impossible to achieve or sustain because rapid output growth is likely to make imports rise too fast to be compatible with equilibrium in the balance of payments (Thirlwall and Dixon 1979).

These two views do coincide in certain respects. Both maintain the Keynesian belief that aggregate demand constraints are paramount in determining a nation's output, even in the long run, and see those constraints as lying primarily in the international domain rather than the domestic economy.[1] Both theories agree that increasing the growth rate of exports is key to raising a country's long-run growth rate of output. (p. 391) Beyond that, however, the two views disagree strongly on core theoretical assumptions and policy implications. In regard to theory, the BPCG model puts primary emphasis on import demand and the balance of payments, while the ELCC model implicitly assumes that these are not limiting factors in the growth process. The ELCC model focuses on changes in relative cost competitiveness driven by endogenous technological progress as driving export success (or failure), while the BPCG model assumes that such changes either dissipate in the long run (due to relative purchasing power parity holding) or else have small effects on

trade flows (so-called elasticity pessimism).

In terms of policy, perhaps the most radical implication of some ELCC models is that a stimulus to domestic demand can potentially spark a virtuous circle of export-led growth, because of the positive response of technology and productivity to faster domestic expansion. In contrast, the BPCG model implies that a stimulus to domestic demand is unlikely to bring persistent, long-run benefits in an open economy because it is likely to raise import demand without boosting exports. The two models also have different implications for what kinds of policies can be effective for promoting exports in the long run. The ELCC view implies that cost reductions or currency depreciations could provoke self-sustaining increases in both exports and output, while the BPCG view implies that such policies are likely to be ineffective in the long run and that nothing can raise export growth except either faster growth of foreign economies or an increase in the income elasticity of export demand. Thus, qualitative competitiveness matters in both theoretical approaches, but cost competitiveness and real exchange rates matter only in the ELCC version.[2]

This chapter will identify the key theoretical differences between the ELCC and BPCG approaches and evaluate how and to what extent they can be reconciled by representing both in a common analytical framework. In spite of its motivation as a theory of cumulative causation, the export-led approach can be represented by a model that has an equilibrium solution. It will be shown that this solution is not a sustainable long-run equilibrium precisely because it lacks a plausible balance-of-payments constraint. However, in some interpretations the ELCC model was not intended to represent a long-run equilibrium in a conventional sense, but rather a kind of provisional equilibrium that is only a weak attractor for the economy in the medium run, and which is subject to path-dependent displacements due to endogenous negative feedbacks (Setterfield 2002). Also, we will show that the incompatibility of the ELCC model with balance-of-payments equilibrium can be demonstrated without making all the strong assumptions typically made in the simplest BPCG models, particularly the assumptions that rule out relative price (real exchange rate) effects.

Although early versions of the BPCG model assumed that the trade balance (current account) must be zero in the long run, subsequent developments of this approach have incorporated financial (capital) flows and identified the conditions for these to be sustainable in the long run. Similar results were obtained by McCombie and Thirlwall (1997), who analyzed the conditions for the ratio of a country's external debt to gross domestic product (GDP) to stabilize at a constant level, (p. 392) and Moreno-Brid (1998, 1998–99), who analyzed the conditions for the ratio of the current account balance to GDP to stabilize also at a constant level. By allowing for sustainable financial flows in this sense and also incorporating the relative price effects that are assumed away in Thirlwall's (1979) original approach, we find that a broader solution of the BPCG model—one that allows for cumulative causation to have some impact at least in the medium run—reconciles the core contributions of both approaches.

2. Literature Survey

The ELCC concept harks back to Adam Smith's ([1776] 1967, 21) famous dictum that "the division of labour is limited by the extent of the market." Extrapolating from this principle, Smith deduced that one of the "distinct benefits" of international trade was that

> By means of [foreign trade], the narrowness of the home market does not hinder the division of labour in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labour may exceed the home consumption, it encourages them to improve its productive powers, and to augment its annual produce to the utmost, and thereby to increase the real revenue and wealth of the society.
>
> (Smith [1776] 1967, 469)

Smith's emphasis on dynamic feedbacks from exports to productivity growth was largely forgotten after Ricardo (1821 [1951]) shifted the focus of international trade theory to static efficiency gains based on comparative advantage. However, the idea of dynamic feedbacks was revived by some of the early post–World War II development economists, especially Myrdal (1957) in his "principle of circular and cumulative causation." Nicholas Kaldor borrowed this concept in his work on explaining differences in growth rates among the industrialized nations (Kaldor 1966, 1970) and also drew upon the work of Young (1928) in arguing that the pervasiveness of increasing returns invalidates the general equilibrium approach to economics (Kaldor 1972). More specifically, Kaldor came to believe that the analysis of economic growth should be founded on a series of empirical generalizations or "stylized facts," which have come to be known as "Kaldor's Growth Laws." Four of these laws, as summarized by Thirlwall (1983, 345–47, italics in original) are most relevant to the present discussion:

1. The faster the rate of growth of the manufacturing sector, the faster will be the rate of growth of Gross Domestic Product (GDP)….
2. The faster the rate of growth of manufacturing output, the faster will be the rate of growth of labor productivity in manufacturing owing to static and dynamic economies of scale, or increasing returns in the widest sense….

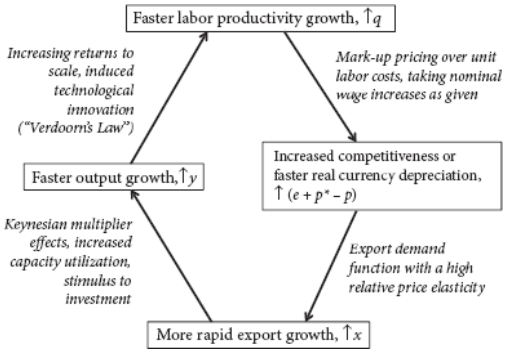

Figure 1.16.1 Basic export-led growth model, schematic form (italics explain causal mechanisms indicated by large arrows; see text for definitions).

6. The growth of manufacturing output is *not* constrained by labor supply but is fundamentally determined by demand from agriculture in the early stage of development and exports in the later stages…. (p. 393)
7. A fast rate of growth of exports and output will tend to set up a cumulative process, or virtuous circle of growth, through the link between output growth and productivity growth.

Of these propositions, number 2 is based on Verdoorn's (1949) empirical finding of a positive correlation between the growth rates of labor productivity and output in manufacturing across countries, and thus is often referred to as "Verdoorn's law."

Several economists developed explicit models of export-led growth that sought to incorporate these ideas of cumulative causation. Early contributions included Beckerman (1962) and Lamfalussy (1963), but the most widely known and accepted version is due to Dixon and Thirlwall (1975) and was further developed by Cornwall (1977), Setterfield and Cornwall (2002), and Setterfield (2002), among many others. Figure 1.16.1 shows the basic logic of a simplified version of the ELCC model, showing the "circular and cumulative causation" between export growth, output growth, productivity growth, and international competitiveness (measured by the rate of increase in the real exchange rate or rate of real currency depreciation). The diagram is drawn to represent a "virtuous circle" of increases in all these factors; a "vicious circle" of decreases in all these factors could be represented simply by reversing the upward direction of the arrows shown next to the variables (inside the text boxes). Unlike some of the earlier models in the literature, the version adopted here abstracts from the special role of the manufacturing sector and focuses only on aggregate output, productivity, and exports.

In terms of empirical support, it is worth remembering that the ELCC model was developed (e.g., by Kaldor 1966) as a generalization of empirical regularities found in early cross-country regression analysis. More recently, León-Ledesma (2002) has estimated an extended version of an ELCC model, in which a fifth endogenous variable (a measure of R&D expenditures) is added, and a number of exogenous variables are (p. 394) included to help identify the structural equations in a simultaneous equations framework.[3] León-Ledesma finds that most of the coefficients representing the key causal relationships in his extended ELCC model have the theoretically expected signs and are statistically significant. However, León-Ledesma does not test the validity of the ELCC model versus any other particular model (such as BPCG) as a predictor of long-run average growth rates.

Almost as soon as it was developed, the ELCC growth model received an important challenge from Thirlwall (1979) and others who, although sympathetic to the Kaldorian approach, believed that the ELCC models erred in ignoring the role of import demand and neglecting to incorporate a balance-of-payments (BP) equilibrium condition. Thirlwall and Dixon (1979, 173) criticized these models (including their own earlier version) because "No consideration is given to the possibility that the rate of growth of income determined by the model may generate a rate of growth of imports in excess of the rate of growth of exports, thereby imposing a constraint on the export-led growth rate if balance of payments equilibrium must be preserved." If import demand is incorporated into the model and a BP constraint is imposed, exports continue to play a key role in determining long-run growth because faster growth of exports allows faster growth of imports without risking a chronic BP (current account) deficit.[4] Nevertheless, Thirlwall and Dixon (1979) showed that, under certain assumptions, the cumulative causation mechanism is thwarted and the growth rate consistent with BP equilibrium is determined solely by the ratio of the growth rate of exports to the income elasticity of import demand,

regardless of whether Verdoorn's law (Kaldor's second law, which incorporates dynamic increasing returns) holds.

This solution for the BP-constrained growth rate, which is also found in Thirlwall (1979), is sometimes referred to (following Davidson 1990–91) as "Thirlwall's law." This simple version of the "law" depends on certain strong assumptions, however. One of these assumptions is that the current account must be balanced in the long run. The BPCG model can easily be modified to allow for a long-run current account imbalance matched by a sustainable level of "capital" (net financial) inflows or outflows.[5] One way of incorporating financial flows was introduced by Thirlwall and Hussain (1982), who assumed a given growth rate of net financial inflows. However, Thirlwall and Hussain's approach potentially allows for perpetually rising ratios of financial inflows (net borrowing) or external debt to GDP, which cannot be sustainable in the long run. In contrast, later models assumed that either a country's net external debt (McCombie and Thirlwall 1997) or its current account balance (Moreno-Brid 1998, 1998–99) must be a constant share of GDP in the long run. These two approaches lead to equivalent solutions for the BP-constrained growth rate, which will be presented below.

A second key assumption in Thirlwall's law is that there are no relative price effects in the long run. This assumption is crucial for ruling out cumulative causation when these effects are modeled as lowering the relative price of a country's exports by raising its productivity growth rate. Thirlwall (1979) argued that it is realistic to assume that relative purchasing power (PPP) holds in the long run, so that relative prices of home and foreign goods (measured in a common currency) do not permanently change. In this (p. 395) case, any competitive gains from more rapid productivity growth must be offset either by exchange rate appreciation or a rise in domestic prices (perhaps, although Thirlwall did not say so, because of increasing nominal wages or raw materials costs; he simply cited the famous "law of one price").[6] Alternatively, Thirlwall and Dixon (1979) point out that the same result is achieved if the price elasticities of export and import demand (in absolute value) sum to approximately unity, so that the Marshall-Lerner condition[7] is not satisfied and changes in international relative prices have no effect on the trade balance (this assumption will be referred to below as "elasticity pessimism").[8] Thirlwall and Hussain (1982) accept that changes in export prices (which, in their model, are the same as domestic prices) may be significant for developing countries, but only insofar as they affect the real value of net financial inflows measured in home currency—not for cumulative causation reasons (which are implicitly ruled out by the assumption of PPP).[9]

It is not so clear, however, that relative price or real exchange rate effects can be completely neglected on either of these grounds. Alonso and Garcimartín (1998–99) find econometric evidence for the elasticity pessimism view in most of the industrialized countries covered in their study (Canada and Japan are two notable exceptions, where they find that Marshall-Lerner holds), but they have an unusual way of modeling lagged price effects, and other studies have found price elasticities of exports and imports that sum to more than unity for most countries (e.g., Cline 1989).[10] In studies of various individual countries, ranging from the United States to India, Marshall-Lerner is often found to hold (e.g., Lawrence 1990; Blecker 1992; Razmi 2005), although one recent study finds that it holds only barely in the US case (Chinn 2004). At best, the evidence on elasticity pessimism is mixed, and elasticity estimates vary widely across different countries, time periods, and econometric methodologies. Moreover, according to standard J-curve logic, we would expect price elasticities to be relatively low and Marshall-Lerner to be violated in the short run (i.e., up to a year or two following a devaluation), but elasticities to increase (in absolute value) and satisfy Marshall-Lerner over longer time periods when (for well-known reasons) it is easier for trade flows to adjust.

The empirical evidence on long-run, relative PPP is also mixed, and highly sensitive to the currencies, price indexes, time periods, and econometric methods used (see Rogoff 1996).[11] One survey summarizes the descriptive evidence from US-UK exchange rates as follows:

> Neither absolute nor relative PPP appear to hold closely in the short run, although both appear to hold reasonably well as a long-run average and when there are large movements in relative prices, and both appear to hold better between producer price indices than between consumer price indices.
>
> (Taylor and Taylor 2004, 139)

An empirical literature from the 1990s that found that real exchange rates were not mean-reverting even in the long run has now been overturned by more powerful econometric methods, but more recent studies also find that the speed of adjustment to PPP can sometimes be slow and mean-reversion may be nonlinear (i.e., faster for larger deviations from PPP) (Taylor and Taylor 2004). Even if relative PPP holds over very long (p. 396) periods of time such as a half-century or longer for certain major currencies, it does not generally hold for shorter time periods (or all currencies).[12]

Furthermore, there is no consensus that long-run equilibrium real exchange rates should be constant over time (and some of the newer studies finding faster rates of adjustment also allow for time-varying equilibrium rates). Many economists have argued that real exchange rates need to change in the long run in response to factors such as

international differences in income elasticities of export and import demand (Houthakker and Magee 1969; Chinn 2004), international differences in relative rates of productivity growth between tradable and nontradable goods (Balassa 1964; Samuelson 1964; Chinn 2000), and changes in international asset or debt positions (Lane and Milesi-Ferretti 2002).

Although it is difficult to summarize the subtle and ever-changing literature on PPP, it does seem safe to conclude that the longer the time period we consider, the more likely it is that relative PPP will hold. It also seems that PPP is more likely to hold between countries that are more structurally similar and hence do not have reasons for their equilibrium real exchange rates to change over long periods of time. Recent empirical studies in the BPCG framework using modern time-series methods have found that the model without relative price effects applies better over very long time periods than over medium-run periods. For example, Razmi (2005) finds that the BPCG model explains Indian growth well for his full sample period of 1950–1999, as well as two subperiods of about thirty years, and concludes that "income was by far the dominant influence in determining the balance of payments constraint in the long run" (682). But for shorter periods (such as decades), he found substantial variations of actual growth rates from BPCG predictions and concluded that relative price effects could not be neglected. This conclusion opens the door to incorporating cumulative causation and relative price effects in BPCG models applied to medium-run time periods, even if those effects are not plausible over very long-run periods.

3. The Export-Led Growth Model

The following model, which is adapted with some modifications from Setterfield and Cornwall (2002), represents the core ideas of the ELCC approach.[13] Although the model is simplified in certain respects compared to earlier ELCC models discussed in the previous section (especially in not treating manufacturing and other sectors separately), the model has been specified in aggregate terms to facilitate comparisons with the BPCG model in later sections. This aggregative approach can also be justified by appeal to Kaldor's first law, which, as stated above, says that faster growth of manufacturing output results in faster growth of aggregate output (i.e., the manufacturing sector is the "engine of growth" for the whole economy).

Starting on the export side, export demand is specified as a conventional, constant-elasticity function of the real exchange rate and foreign income. With all (p. 397) variables measured in instantaneous rate-of-change form (differences in natural logarithms) for convenience, the export function is (1.16.1)

$$x = \varepsilon_x(e + p^\star - p) + \eta_x y^\star,$$

$$x = \varepsilon_x \left(e + p^\star - p\right) + \eta_x y^\star,$$

where x is the growth rate of exports, e is the rate of nominal currency depreciation (with the exchange rate measured in home currency per unit of foreign currency), p and p^* are the rates of change in the home and foreign price indexes, respectively, y^* is the growth rate of foreign (rest-of-world) income, and ε_x and η_x are the price and income elasticities of export demand, respectively (defined so that ε_x, $\eta_x > 0$). Note that $(e + p^* - p)$ represents the rate of real depreciation of the home currency, or rate of increase in the relative price of foreign goods.

Foreign price inflation p^* is taken as exogenously given on the small-country assumption, but domestic price inflation p is determined by changes in unit labor costs and the gross profit markup: (1.16.2)

$$p = \tau + w - q,$$

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where (again with all variables in growth rate form) τ is the rate of change in (one plus) the markup over unit labor cost, w is the rate of wage inflation, and q is the rate of labor productivity growth. Although markups can change due to changes in nonlabor costs or competitive conditions in markets, we abstract from changes in markups here for simplicity and assume $\tau = 0$.[14] Productivity growth is assumed to be endogenous according to an aggregative version of Verdoorn's law: (1.16.3)

$$q = q_0 + \alpha y,$$

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where q_0 is a shift factor representing autonomous technological dynamism (including catch-up possibilities) and technology policies (e.g., R&D subsidies, intellectual property rights, etc.), α represents the Verdoorn effect (dynamic increasing returns or positive feedbacks), and $q_0, \alpha > 0$.

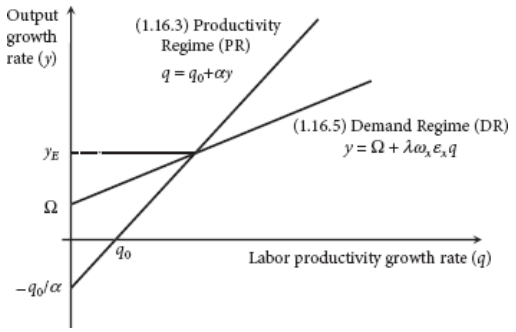

Figure 1.16.2 Solution of export-led growth model with cumulative causation (equation numbers in parentheses).

Finally, aggregate demand (national income) increases at a rate determined by the weighted average of the growth rates of domestic expenditures and export demand multiplied by the Keynesian multiplier λ:[15] (1.16.4)

$$y = \lambda(\omega_a a + \omega_x x),$$

$$y = \lambda\left(\omega_a a + \omega_x x\right),$$

where a is the growth rate of autonomous domestic expenditures and ω_a and ω_x are the shares of domestic expenditures and exports (respectively) in total demand. Equations (p. 398) (1.16.1), (1.16.2), and (1.16.4) can then be combined (assuming $\tau = 0$) to yield what Setterfield and Cornwall (2002) call the "demand regime" (DR) equation,[16] (1.16.5)

$$y = \Omega + \lambda\omega_x\varepsilon_x q,$$

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where $\Omega = \lambda\{\omega_a a + \omega_x[\varepsilon_x(e + p^\star - w) + \eta_x y^\star]\}$ and the variables a, e, p^*, w, and y^* are all treated as exogenously given constants. This means that domestic demand, the nominal exchange rate, foreign prices, domestic wages, and foreign income are all assumed to grow at constant rates. While treating foreign variables as exogenously given can be justified on the "small country" assumption, assuming that the other variables are fixed independently of home country output and productivity growth is more dubious, and the implications of this strong assumption will be discussed below.

Then, defining the Verdoorn equation (1.16.3) as the "productivity regime" (PR), Setterfield and Cornwall note that (1.16.3) and (1.16.5) together constitute a system of two linear equations in two endogenous variables (output growth y and productivity growth q), taking all other variables as exogenously given. Provided that there is not too much cumulative causation, this system then solves for a unique and stable equilibrium. Graphically (see figure 1.16.2), this requires that the PR line be steeper than the DR line in $q \times y$ space, which is equivalent to the slope condition $1/\alpha > \lambda\omega_x\varepsilon_x$ or $\alpha\lambda\omega_x\varepsilon_x < 1$. Thus, the mere existence of cumulative causation is not sufficient to create a disequilibrium situation; only if the forces of cumulative causation are very strong (i.e., $\alpha\lambda\omega_x\varepsilon_x > 1$, or PR is flatter than DR) would an equilibrium not exist. Assuming that the equilibrium exists, the equilibrium ELCC growth rate y_E is determined by the simultaneous solution of equations (1.16.3) and (1.16.5): (1.16.6)

$$y_E = \frac{\Omega + \lambda\omega_x\varepsilon_x q_0}{1 - \alpha\lambda\omega_x\varepsilon_x}.$$

$$y_E = \frac{\Omega + \lambda\omega_x\varepsilon_x q_0}{1 - \alpha\lambda\omega_x\varepsilon_x}$$

(p. 399) Although it may seem contrary to the spirit of Kaldor (1972) to represent his ideas using a model that has an equilibrium solution, it should be noted that this demand-determined growth equilibrium is quite different from a

conventional model of a long-run equilibrium growth path uniquely determined by exogenous increases in factor supplies and factor productivity. Disequilibrium in the ELCC model presented here would imply *ever-rising* or *ever-falling* growth rates, which do not seem plausible in the long run (China may have grown at a 10 percent clip in recent years, but this rate has not continued to increase). Setterfield (2002) has suggested that the ELCC approach does not define a stable long-run equilibrium, but rather defines a sort of temporally punctuated equilibrium in which a country settles for some period of time on a growth path defined by a certain set of demand and productivity conditions (i.e., DR and PR regimes), but then moves along a "traverse" toward a new equilibrium as the underlying parameters of the system endogenously adjust.[17] In this view of the ELCC model, the equilibrium solution of the model is at best a "weak attractor" for the medium run (Setterfield 2002, 227), and negative as well as positive feedbacks are admitted into the long-run evolution of an economy (which is seen as a path-dependent process).

Returning to the logic of the ELCC model as specified above, its comparative dynamic properties are easily analyzed. Any policy that would exogenously stimulate productivity growth (for example, an R&D subsidy or improved technical education) would increase q_0 and shift the PR line down and to the right, thereby having a positive effect on the equilibrium growth rate y_E. Similarly, any event that would stimulate exports to grow faster (such as a faster rate of currency depreciation e, faster foreign income growth y^*, or an opening of foreign markets that raised the income-elasticity of export demand η_x) would shift the DR line upward, also increasing the ELCC growth rate y_E. What is most surprising in this model, however, is that a stimulus to domestic demand (increase in a) would have the same effect as a stimulus to export demand in shifting the DR line up, thereby permanently raising the equilibrium growth rate y_E. In fact, given the logic of this model, the domestic demand stimulus would actually increase export growth by causing productivity to rise faster, thereby making exports more competitive.

This may seem like a strong, if not unbelievable, conclusion. Of course, this strong result stems in part from the oversimplified, aggregative nature of the present model. In a more complete, multisectoral ELCC framework, in which the Verdoorn relationship (endogenous productivity growth) was limited to the manufacturing sector, only the part of increased domestic demand that went toward the purchase of domestically produced manufactures would be able to kick-start the process of cumulative causation; demand increases that were spent on services or imports would not have the same effect. Furthermore, it is possible that exposure to the discipline of international competition induces more innovative effort and quality control than sales in the domestic market, as argued by Amsden (1989) for South Korea.

Even leaving these issues of disaggregation aside, the ELCC model laid out above ignores other economic forces that could limit the cumulative growth gains from any (p. 400) type of demand stimulus, especially a domestic one but also an export-led one. Perhaps most obviously, the assumption that the nominal rates of currency depreciation e and wage inflation w would remain constant irrespective of an increase in domestic growth of output and productivity could be called into question. Much theory and intuition suggest that a country experiencing an export-led boom might be expected to confront pressures toward currency appreciation (lower e) or faster wage increases (higher w). The former can be avoided through currency market intervention, provided that the central bank can sterilize the resulting reserve accumulation. The latter, however, may be harder to avoid.

Advocates of the ELCC approach (e.g., Cornwall 1977) emphasize that the labor supply is not an inelastic constraint on long-run growth, as it appears in neoclassical models founded in the work of Solow (1956) and Swan (1956). Labor supplies can vary elastically in the growth process due to factors such as international migration (including temporary guest workers as well as more permanent forms of migration) and changes in social norms regarding age and gender in the workplace. In multisectoral models, labor can potentially be drawn out of less-productive agricultural or service sectors into manufacturing. In developing countries with dual economies, migration of "surplus labor" from rural or premodern areas may augment "modern sector" labor supplies. But unless the labor supply is *perfectly* elastic at the current wage level, it would seem that *some* upward pressure on wages is unavoidable in a rapidly growing economy (even China has experienced rising real wages in recent years, in spite of the lack of free labor unions). Thus, some of the optimistic aspects of the ELCC model stem from the implicit assumption that improvements in cost competitiveness due to faster productivity growth are not counterbalanced by offsetting currency appreciation or wage increases. While one cannot necessarily assume that these adjustments will fully offset all competitive gains in a process of cumulative causation—exchange rates do not always behave as predicted, and wage increases may lag behind productivity growth—neither should one ignore these types of adjustments altogether.

4. The Balance-of-Payments-Constrained Growth Model

A related but distinct critique of the ELCC approach concerns the fact that the ELCC model lacks an import function and a BP equilibrium condition, and hence "the equilibrium growth rate specified may be inconsistent with the long run

requirement of payments balance" (Thirlwall and Dixon 1979, 173). This section presents the model of Thirlwall and Dixon (1979), who sought to correct this problem, modified to incorporate financial flows.

To enhance comparability with the ELCC model in the preceding section, equations (1.16.1) through (1.16.3) are all retained, including the Verdoorn relation to incorporate (p. 401) cumulative causation. The model is then augmented by adding a conventional import demand function with constant elasticities (1.16.7)

$$m = -\varepsilon_m(\varepsilon + p^\star - p) + \eta_m y,$$

$$m = -\varepsilon_m \left(e + p^\star - p\right) + \eta_m y,$$

where m is the growth rate of imports and ε_m and η_m are the price and income elasticities of import demand, respectively (defined so that ε_m, $\eta_m > 0$).

Next, we define BP equilibrium as implying that the current account balance (surplus or deficit) must equal a constant, sustainable ratio to national income. Following the approach of Moreno-Brid (1998),[18] but converted into our notation, a constant ratio of the current account balance to GDP implies that (1.16.8)

$$\theta(x - y) = e + p^\star - p + m - y,$$

$$\theta\left(x - y\right) = e + p^\star - p + m - y,$$

where θ is the ratio of the value of exports to the value of imports, both measured in domestic currency.[19] Note that (1.16.8) now replaces (1.16.4) as the equation that determines the output growth rate.[20] If we then substitute equations (1.16.1), (1.16.2), (1.16.3), and (1.16.7) into (1.16.8) and solve for y, again assuming $\tau = 0$, we obtain a very general expression for the BP-constrained growth rate, y_B:[21] (1.16.9)

$$y_B = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^\star - w + q_0) + \theta\eta_x y^\star}{\eta_m - 1 + \theta - \alpha(\theta\varepsilon_x + \varepsilon_m - 1)}.$$

$$y_B = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^\star - w + q_0) + \theta\eta_x y^\star}{\eta_m - 1 + \theta - \alpha(\theta\varepsilon_x + \varepsilon_m - 1)}.$$

It is at this point that BPCG theorists typically introduce certain strong assumptions to rule out relative price effects. First, suppose that the price elasticities of import and export demand are too low to satisfy the extended Marshall-Lerner condition with financial flows; more specifically, suppose $\theta\varepsilon_x + \varepsilon_m \approx 1$.[22] Under this assumption, (1.16.9) reduces to[23] (1.16.10)

$$y_B = \frac{\theta\eta_x y^\star}{\eta_m - 1 + \theta}$$

$$y_B = \frac{\theta\eta_x y^\star}{\eta_m - 1 + \theta}$$

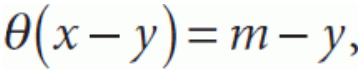
and α (the Verdoorn coefficient representing endogenous feedbacks from income growth to productivity growth) has no effect on the BP-constrained equilibrium growth rate. If we further add the assumption that trade must be balanced in the long run, so that $\theta = 1$, then (1.16.10) becomes (1.16.11)

$$y_B = \frac{\eta_x y^\star}{\eta_m}.$$

$$y_B = \frac{\eta_x y^\star}{\eta_m}.$$

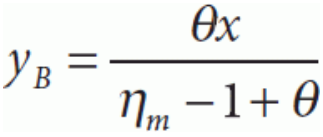
Second, consider what happens if relative PPP is assumed, so that $e + p^* - p = 0$. To see the implications, note that when $e + p^* - p = 0$ is assumed, these relative price change (p. 402) (real depreciation) terms drop out of both the export and import demand functions (equations 1.16.1 and 1.16.7) and also from the equilibrium condition (1.16.8). Since Verdoorn's law (1.16.3) and markup pricing (1.16.2) enter the model only through the relative price effects, these two relationships also disappear from the solution. In this case, $x = \eta_x y^*$ by (1.16.1) and $m = \eta_m y$ by (1.16.7), and substituting these into the equilibrium condition (1.16.8′)

$$\theta(x - y) = m - y,$$



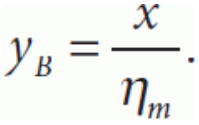
the model again solves for equation (1.16.10)—or (1.16.11) if we also assume $\theta = 1$. Furthermore, in this case (1.16.10) and (1.16.11) respectively simplify to[24] (1.16.10′)

$$y_B = \frac{\theta x}{\eta_m - 1 + \theta}$$



and (assuming $\theta = 1$) (1.16.11′)

$$y_B = \frac{x}{\eta_m}.$$



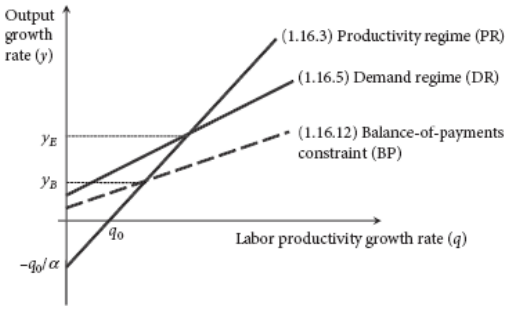


Figure 1.16.3 Comparing the BPCG and ELCC solutions: The case of $y_E > y_B$ (equation numbers in parentheses).

Now, several important points emerge immediately. First, there are a variety of different solutions for the BP-constrained growth rate, depending on what we assume about three factors: price elasticities, real exchange rates, and financial flows. Equation (1.16.11′) states the simplest and perhaps best-known version of Thirlwall's law, but it is a special case that requires both PPP and the absence of financial flows. Second, which of these versions of the BPCG model applies is likely to depend on the time frame considered. As noted earlier, elasticity pessimism is more likely to hold in the short run than in the long run, while PPP (i.e., the absence of real exchange rate changes) is more likely to hold in the long run than in the short or medium run (and the validity of both assumptions can vary across countries). Third, none of these solutions (i.e., equations 1.16.9, 1.16.10, 1.16.10′, 1.16.11, or 1.16.11′) is equivalent to the ELCC growth rate shown in equation (1.16.6). Thus, regardless of what we assume about these factors, the economy is not likely to grow at the ELCC growth rate (1.16.6) if the BP constraint is binding, even if cumulative causation effects are present and relative price effects are significant. Fourth, merely assuming that the BP must be in equilibrium (in the sense that the current account balance is either zero or a sustainable, constant fraction of GDP) does not by itself rule out any impact of cumulative causation effects on the economy's long-run growth rate. As long as PPP does not hold and the extended Marshall-Lerner condition does hold, cumulative causation *can* affect the most general BP-constrained growth rate (1.16.9) even though this is not the same as the ELCC growth rate (1.16.6).[25] For (p. 403) the reasons noted earlier, this is more likely to occur in medium-run time periods (e.g., decades) than over longer ones (e.g., generations or half centuries).

5. Reconciling the Two Growth Rates

To fix ideas, it is helpful to compare the ELCC and BPCG solutions graphically. Here, we use the most general solution for the BP-constrained growth rate, that is, equation (1.16.9), which allows for cumulative causation effects and financial flows, does not assume PPP, and does assume that the extended Marshall-Lerner condition holds. To represent this solution on the same type of diagram as was used for the ELCC model in figure 1.16.2, it is convenient to substitute equations (1.16.1), (1.16.2), and (1.16.7) into (1.16.8)—again assuming $\tau = 0$ and taking e and w as exogenously given—and obtain the following equation for y as a function of q: (1.16.12)

$$y_B = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^\star - w + q) + \theta\eta_x y^\star}{\eta_m - 1 + \theta}.$$

$$y_B = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^\star - w + q) + \theta\eta_x y^\star}{\eta_m - 1 + \theta}.$$

This relationship, which is upward sloping as long as the extended Marshall-Lerner condition holds and PPP does not hold (and horizontal if either Marshall-Lerner is violated or PPP holds),[26] is represented by the dashed BP line in figures 1.16.3 and 1.16.4.

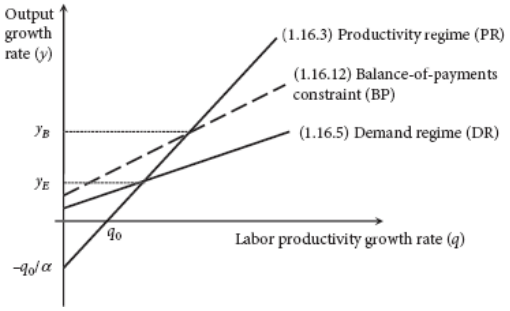


figure 1.16.4 Comparing the BPCG and ELCC solutions: The case of $y_E < y_B$ (equation numbers in parentheses)

In figures 1.16.3 and 1.16.4, the BPCG solution y_B is represented by the point where the BP constraint (1.16.12) intersects the PR relation (1.16.3), while the ELCC solution y_E is represented by the point where DR (1.16.5) intersects PR (1.16.3). In general, the BP relation may lie either above or below the DR relation, as there is no reason (from inspection of equations 1.16.5 and 1.16.12) that one is necessarily higher than the other.[27] Figure 1.16.3 shows the case where $y_E > y_B$, and figure 1.16.4 shows the opposite (p. 404) situation. We shall focus, with no loss of generality, on the case shown in figure 1.16.3, where the ELCC growth rate exceeds the BP-constrained growth rate.

Now, it might be thought that allowing for financial flows to be somewhat elastic might relax the BP constraint, effectively permitting the BP constraint to shift upward until y_B would coincide with y_E. After all, financial flows do not have to be fixed at a given percentage of GDP; some range of current account imbalances can be sustainable as long as the interest rate on the foreign debt is not too high relative to the country's growth rate. Since the BP equation (1.16.12) assumes a given ratio of the current account balance to GDP, can't we just assume that this ratio might fall somewhat (i.e., become more negative, assuming the country has a current account deficit and a financial account surplus), thereby enabling the economy to borrow more and thereby to reach the ELCC growth rate without risking a chronic payments disequilibrium?

The answer, somewhat surprisingly, is no, at least not in the present framework. To see this point, recall that the BP equilibrium condition (1.16.8) is specified in *growth rate* form, and assumes a constant *ratio* of the current account balance to GDP. A decrease in this ratio does *not* change the form of the equilibrium condition (1.16.8). Of course, greater net financial inflows would imply a lower ratio of exports to imports θ, but this has ambiguous effects on the height of the BP relation (1.16.12) and may very well shift it down (away from DR) instead of up (toward DR).[28] Or, to put the point another way, note that at the ELCC equilibrium ($y = y_E$) in figure 1.16.3, the economy is not simply experiencing a current account deficit, but also a current account balance that is *continuously falling* relative to GDP. In other words, it is not possible to grow at the rate y_E with *any* constant ratio of the current account deficit (or external debt) to GDP, and therefore y_E is simply unsustainable in the long run. Similarly, in figure 1.16.4, the economy could not grow at y_E unless it could have a perpetually rising ratio of the current account balance (or net foreign assets) to GDP, which is also not sustainable.

The impossibility of growing at y_E derives from the assumptions that BP equilibrium must be maintained in the long run and financial flows cannot increase or decrease (p. 405) indefinitely as a percentage of GDP (i.e., as long as the ratio of the

current account deficit or external debt to GDP cannot rise or fall continuously). The strong assumptions of either PPP or elasticity pessimism are *not* required for this result. If neither of these assumptions holds, the correctly specified BP-constrained growth rate incorporates cumulative causation effects, as in equation (1.16.9). It is this growth rate, not the ELCC growth rate (1.16.6), that should be considered the long-run equilibrium growth rate in a properly specified post-Keynesian open economy model—though, as noted earlier, many ELCC advocates don't necessarily view (1.16.6) as a truly long-run equilibrium solution. Thirlwall and Dixon (1979) were correct in saying that either PPP or elasticity pessimism rules out cumulative causation effects on the BP-constrained growth rate, but they were incorrect in implying that these assumptions are necessary to show that the ELCC growth rate is not a sustainable long-run equilibrium.

This then raises the question of how an economy that is experiencing a virtuous circle of export-led growth (e.g., at the point where $y = y_E$ in figure 1.16.3) in the short run can adjust to grow instead at the lower BP-constrained growth rate y_B in the long run. Since the BP constraint cannot be expected to rise to intersect DR at y_E, for the reasons discussed above, the DR relation must instead fall to intersect BP at y_B, and the question becomes what adjustment mechanism(s) can be expected to make DR fall toward BP in the long run. The first and most obvious candidate is a decrease in the rate of growth of domestic expenditures a, which lowers the intercept term Ω in equation (1.16.5) and thereby shifts DR downward. This could be accomplished either through deliberate government policy (e.g., contractionary fiscal or monetary policies),[29] or through private sector spending restraint (perhaps induced by rising debt burdens during the period of booming growth). Thus, an "expenditure reducing policy" (or a private sector expenditure reduction) is a plausible way of making the ELCC equilibrium shift to coincide with the BPCG equilibrium.[30]

A second possibility is relative price adjustment. As noted earlier, an export-led boom (such as where $y_E > y_B$ in figure 1.16.3) could be expected to lead to either faster nominal wage growth (a rise in w) or currency appreciation (a fall in e), either of which would also lower Ω and shift DR downward. However, whether this is a stable adjustment process or not depends on whether relative price effects are allowed in the BPCG solution. Consider first the cases assumed by Thirlwall and Dixon (1979), where either PPP or elasticity pessimism holds, so that equation (1.16.12) reduces to (1.16.10) or (1.16.10′). In this situation, the BP curve is horizontal and is not affected by changes in w or e, so the DR relation can shift down toward a fixed BP relation and there can be a stable adjustment to the BPCG equilibrium where $y = y_B$.

Thus, under Thirlwall and Dixon's (1979) assumptions, and even allowing for financial flows, their BP-constrained growth rate is a stable attractor for the long-run equilibrium. Indeed, the rise in w or fall in e in this situation can be seen as a mechanism that brings about the PPP condition assumed by Thirlwall and Dixon for the long run. However, if the adjustments in w and e are not sufficient to establish PPP and Marshall-Lerner holds, then the relative price adjustment process may be unstable. Assuming $\theta\varepsilon_x + \varepsilon_m > 1$ and $e + p^* - p \neq 0$, then $\partial y_B/\partial e > 0$ and $\partial y_B/\partial w < 0$ in (1.16.12), so a fall in e or rise in w (p. 406) would also shift the BP relation downward in figure 1.16.3, and, depending on the other parameters, the downward shift in DR might never catch up with the downward shift in BP so that the BPCG equilibrium would never be reached. The longer the time period considered, however, the more likely it is that PPP would eventually rule, and hence the more likely that the adjustment process will eventually prove to be stable.

Similar considerations would apply in the opposite case depicted in figure 1.16.4. If an economy were growing at the rate $y_E < y_B$ in figure 1.16.4, the country would be experiencing a continuously increasing ratio of current account surplus (or net foreign assets) to GDP, which is not plausible in the long run. Consequently, the country would have to adjust (shift DR upward and raise y_E) through either an expansion of domestic demand (a rise in a, perhaps through "expenditure increasing policies") or else a real depreciation (rise in e or fall in w relative to p^*), assuming that the relative price changes would bring about a stable adjustment process (which is more likely, if the changes in w or e bring the country toward PPP in the very long run). It may seem counterintuitive that a country with a current account surplus would require a real depreciation, but in this situation, where the home country is growing relatively slowly, the BP constraint is not binding and the country could raise its actual growth rate up to the BP-constrained rate by improving its external competitiveness.

There is, however, another way of modeling the BP constraint with financial flows that could make it flexible so that the economy could possibly adjust to grow at the rate y_E (in the situation shown in either figure 1.16.3 or figure 1.16.4). That is, if we model financial flows following the approach of Thirlwall and Hussain (1982), who did not assume constancy of either the current account balance or the ratio of external debt to GDP, the BP equilibrium condition can be written as (1.16.8″)

$$(1-\phi)(x+p)+\phi f = e + p^\star + m,$$

$(1-\phi)(x+p)+\phi f = e + p^\star + m,$

where (using lowercase letters to represent growth rates or ratios and uppercase letters to represent levels of variables) f is the growth rate of financial inflows (F, measured in domestic currency) and $\phi = F/(PX + F)$ is financial inflows as a

percentage of total "receipts" in the balance of payments (if there are net financial outflows, then $F < 0$, and also $\phi < 0$ assuming $-F < PX$). If we then substitute equations (1.16.1), (1.16.2), (1.16.3), and (1.16.7) into (1.16.8″), we obtain the following (modified) version of Thirlwall and Hussain's most general solution for the BP-constrained growth rate as a function of a given rate of increase in financial inflows f:[31] (1.16.13)

$$y_B = \frac{[(1-\phi)\varepsilon_x + \varepsilon_m - 1](e + p^\star - w + q_0) + (1-\phi)\eta_x y^\star + \phi(f - w - q_0)}{\eta_m - \alpha[(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi)]}.$$

$$y_B = \frac{\left[(1-\phi)\varepsilon_x + \varepsilon_m - 1\right](e + p^* - w + q_0) + (1-\phi)\eta_x y^* + \phi(f - w - q_0)}{\eta_m - \alpha\left[(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi)\right]}.$$

Assuming that the denominator of (1.16.13) is positive, as seems necessary for intuitively plausible results, then $\partial y_B/\partial f > 0$. Now the outcome depends on whether f is exogenously fixed or can adjust "elastically" in a situation where $y_B \neq y_E$. Suppose, for example, (p. 407) $y_B < y_E$ as in figure 1.16.3.[32] It is plausible that, in a country experiencing an export-led boom, financial inflows would be attracted into the country's growing economy, thereby increasing f and raising the BP-constrained growth rate y_B toward the higher rate y_E. Similarly, if $y_B > y_E$ as in figure 1.16.4, it is plausible that in a country stuck in a "vicious circle" of slow export growth and slow productivity growth, financial inflows would be reduced or outflows would increase, thereby depressing f and pushing y_B downward toward y_E. On the other hand, if financial markets are relatively closed and financial inflows or outflows are inelastic, then y_B cannot adjust toward y_E and the *BP* constraint will remain in force at a fixed level of f.

However, even if f is flexible, it cannot change too drastically relative to the rate of nominal income growth ($y + p$) or the country may experience a potentially unsustainable explosion of its net foreign debt or asset position. In the case shown in figure 1.16.3, if $f < y + p$ initially and f does not have to increase too much to make $y_B = y_E$, the BP constraint could be relaxed and the country could enjoy its export-led growth boom as long as the financial inflows kept growing at the requisite rate and the current account deficit and external debt did not become unsustainably large. On the other hand, if f would have to rise so much that $f > y + p$ would result, then the ratio of the current account to GDP would begin to fall (and the ratio of external debt to GDP would begin to rise) continuously, which (as noted previously) is implausible in the long run.

Even so, an export-led boom financed by financial inflows could easily persist for a while, perhaps sustained by bubble behavior in financial markets (because it is typical in a bubble that investors suspend disbelief and ignore warning signs of unsustainable financial positions—see Shiller 2008), leading eventually to some kind of financial crash or debt crisis marked by a shift from a bubble to a panic mentality in financial markets. In this case, the financial crisis would be the "enforcement mechanism" that would impose a stricter BP constraint in the long run, but at tremendous cost to the country involved.

6. Conclusions

In spite of their differences, the BPCG and ELCC models share common roots in Kaldor's ideas about the centrality of export markets for facilitating demand-led growth in open economies. Both models have found empirical support in the literature, although upon closer examination it appears that support for the strongest versions of the BPCG model (i.e., the versions that exclude relative price effects) is found mainly in very long-run data, while support for ELCC models is to be found mostly in studies that adopt a more medium-run perspective. If relative price effects are allowed in BPCG-type models—and the evidence suggests that these may be significant for some countries over periods of a decade or longer—then it is possible to incorporate the cumulative causation effects emphasized in the ELCC approach in models that embed a BP constraint. However, the solution of this synthetic model is different from the one that emerges from a pure ELCC model without a BP constraint.

(p. 408) Allowing for financial flows, which is important for considering open economies in an epoch of financial liberalization, adds further insight into the comparison of the two approaches. If we assume, following Thirlwall and Hussain (1982), that countries obtain financial inflows that grow at steady rates, then it is conceivable that a country undergoing rapid export-led growth à la the ELCC model could relax its BP constraint and continue to grow rapidly by increasing the growth rate of its financial inflows within certain limits. However, as pointed out by McCombie and Thirlwall (1997) and Moreno-Brid (1998, 1998–99), financial inflows cannot grow at any arbitrary rate in the long run without potentially causing the current account deficit and external debt to rise without limit as percentages of GDP, which would be unsustainable. If we assume instead that either the current account balance or external debt must be a stable fraction

of GDP in the long run, then it becomes clear that the BP constraint really is binding and the ELCC equilibrium cannot generally be reached. Or, to put it another way, increasing financial inflows can at most be a temporary way of relaxing the BP constraint, but they do not allow a country to grow at the ELCC growth rate in the long run.

The conclusion that the strict BPCG model holds only in the very long run when relative price effects can be ignored (e.g., due to PPP holding) should not, of course, be surprising. Since its earliest formulations (e.g., Thirlwall 1979), the BPCG model without relative price effects has always been intended as a long-run model. But this should not be taken to imply that medium-run models such as ELCC are irrelevant. Even if Thirlwall's law holds in growth rate form in the very long run, we may conjecture that it is possible that the level of income at which a country's BP constraint is satisfied could be permanently affected by its virtuous or vicious circles of cumulative causation over the intervening medium-run periods. Future theoretical research in this framework should address this possibility, while more empirical work is required to identify the conditions and time frames under which different versions of these models operate.

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Notes:

(1.) In this respect, both views are at odds with other post-Keynesian perspectives that put more emphasis on domestic investment demand as constraining profits and growth. See Robinson (1962) and later expositions by Marglin (1984) and Harcourt (2006), among others.

(2.) Some extensions of the BPCG approach allow for relative price or real exchange rate effects (e.g., Blecker 2002; Dutt 2002; Perraton 2003), but I am referring here to the original version of Thirlwall (1979).

(3.) León-Ledesma uses data for seventeen countries averaged over four time periods between 1965 and 1994 and employs two- and three-stage least squares to solve identification problems.

(4.) Although this literature generally refers to "balance of payments" equilibrium, it is clear from the context that what is really meant is balance on current account. Furthermore, the models usually ignore all other components of the current account besides trade in goods and services.

(5.) This chapter will adopt the terminology of modern balance-of-payments accounting (e.g., in the IMF and US

government presentations) in referring to “financial flows” and the “financial account,” rather than “capital flows” and the “capital account,” regardless of the terminology used in earlier studies.

(6.) For an analysis of the stability of the equilibrium in a Thirlwall-type BPCG model focusing mainly on labor markets and wage dynamics, see Pugno (1998).

(7.) The Marshall-Lerner condition states that a real devaluation of a country’s currency will improve its balance of trade if the absolute value of the sum of the price elasticities of export and import demand exceeds unity, under certain assumptions including initially balanced trade. The extended Marshall-Lerner condition with imbalanced trade is stated below.

(8.) There is a subtle difference in the Thirlwall’s law solutions under these two assumptions, i.e., PPP and elasticity pessimism, as discussed below.

(9.) Perraton (2003) finds that including terms of trade (relative price) effects, i.e., not assuming PPP, improves the fit of BPCG models applied to data for developing countries.

(10.) Alonso and Garcimartín (1998–99) estimate desired levels of exports and imports and assume that actual trade flows adjust gradually to these levels, while most other studies use distributed lags of the independent variables to explain actual exports and imports. Alonso and Garcimartín also find evidence supporting the BPCG view that output growth rates, rather than international relative prices (real exchange rates), are the variable that adjusts to restore BP equilibrium when countries have current account imbalances. León-Ledesma (2002) finds that relative prices do change as predicted in the ELCC model, i.e., in response to productivity growth differentials, and have a significant impact on export growth.

(11.) In fairness to Thirlwall (1979), the evidence for PPP was stronger at the time he conceived the BPCG model, based mainly on data from the Bretton Woods period of fixed but adjustable pegs for exchange rates. The behavior of real exchange rates since the collapse of Bretton Woods and the advent of flexible rates has been less kind to the PPP hypothesis.

(12.) For example, Bahmani-Oskoee (1995) found that PPP held for only eight out of twenty-two developing countries studied.

(13.) The first three equations of the model correspond closely to the earlier model of Dixon and Thirlwall (1975); the fourth equation is Setterfield and Cornwall’s innovation. A similar model is discussed in chapter 12 in this volume, by Mark Setterfield.

(14.) See Blecker (1998) for a BPCG model that incorporates flexible markups with partial pass-through of exchange rate changes.

(15.) See Setterfield and Cornwall (2002, 81–82, appendix 5.A) for derivation. Some earlier ELCC models assume that y is an increasing function of x, but do not explicitly include a. The model of Beckerman (1962), as presented in Cornwall (1977, 165–67), assumes that $y = x$ but only for the manufacturing sector.

(16.) This specification differs in certain respects from Setterfield and Cornwall’s DR relation. They ignore exchange rates and wages, effectively assuming that $e = w = 0$. They also assume that p^* is determined by foreign equations for markup pricing and Verdoorn’s law parallel to equations (1.16.2) and (1.16.3) here; in our notation, (2′) $p^* = \tau^* + w^* - q^*$ and (3′) $q^* = q_0{}^* + \alpha^* y^*$, where the *’s indicate foreign variables or parameters (the authors omit the * on $q_0{}^*$, but I presume this was a typographical error). Since Setterfield and Cornwall also assume $w^* = \tau^* = 0$, p^* ultimately depends only on y^*, which is taken as exogenously given. Thus, in their model (but in our notation, and after correcting the typographical error in their published solution), the constant term in their DR relation is $\Omega = \lambda[\omega_a a - \omega_x \varepsilon_x q_0{}^\star + \omega_x(\eta_x - \alpha^\star \varepsilon_x) y^\star]$. We prefer to treat p^* as exogenously given and to allow explicitly for e and w to assume nonzero values, which is not only more general but also facilitates comparisons with the BPCG model below.

(17.) Mark Setterfield also comments (in email correspondence, November 16, 2010) that the ELCC model as specified here has “an innately non-long-run set-up” because equation (1.16.4) allows exports, domestic expenditures, and output to grow at different rates, which would not be possible in a truly long-run steady state (and also the weights ω_a and ω_x would not be expected to remain constant in the long run). See also chapter 12 in this volume on extending the ELCC framework to represent path-dependent growth.

(18.) As observed earlier, equivalent results would be obtained using the approach of McCombie and Thirlwall (1997).

(19.) See Moreno-Brid (1998) for the derivation. The more traditional assumption of balanced trade (i.e., a current

account balance equal to zero) in the long run is the special case in which $\theta = 1$ and (1.16.8) becomes $p + x = e + p^* + m$.

(20.) Since equation (1.16.4) still has to hold—it is, after all, nothing more than a dynamic version of the standard Keynesian multiplier for national income determination—the domestic expenditure growth rate a in equation (1.16.4) must now become endogenous in the long run so that national income will grow at the rate implied by (1.16.9). This conforms with Kaldor's mature view that exports are the only truly exogenous constraint in the long run (Palumbo 2009).

(21.) This equation combines the solution of Thirlwall and Dixon (1979, 183, equation 19) for a BPCG model with cumulative causation with the solution of Moreno-Brid (1998, 418, equation 8) for a model including financial flows, both translated into the present notation. To obtain intuitively plausible results, the denominator of this solution must be assumed to be positive.

(22.) From now on, the term "elasticity pessimism" will be used to represent this assumption in models that allow for financial flows. Note that the extended Marshall-Lerner condition $\theta\varepsilon_x + \varepsilon_m > 1$ is less likely to hold, and the alternative that $\theta\varepsilon_x + \varepsilon_m \approx 1$ is more likely to hold, the lower is θ (i.e., the larger is the country's trade deficit), for any given values of ε_x and ε_m. Thus, elasticity pessimism is more warranted in countries with large initial deficits.

(23.) Again, for intuitively sensible results (a positive growth rate), the denominator must be positive. This is very likely in equation (1.16.10), since the only way it could be negative would be for a country to have a very low income elasticity of import demand η_m and a very large trade deficit ($\theta << 1$), which seems like an unlikely combination. If $\eta_m > 1$, as seems to be empirically true in most countries, then $\eta_m - 1 + \theta > 0$ regardless of the size of θ (since $\theta > 0$).

(24.) Perraton (2003) refers to equation (1.16.11) as the "strong" form of Thirlwall's BPCG hypothesis and (1.16.11′) as the "weak" form.

(25.) Note that, assuming $\theta\varepsilon_x + \varepsilon_m > 1$ and $e + p^* - p \neq 0$, and also assuming that the denominator of (1.16.9) is positive as discussed above, then $\partial y_B/\partial\alpha > 0$ in (1.16.9).

(26.) Note that, if the extended Marshall-Lerner condition does not hold, (1.16.12) becomes (1.16.10), and if PPP does hold, then (1.16.12) becomes (1.16.10′). Either way, the BP relationship then becomes horizontal in figures 1.16.3 and 1.16.4, i.e., y_B is independent of q.

(27.) Since this statement applies to the slopes as well as the intercepts in equations (1.16.5) and (1.16.12), the DR and BP relations could also intersect, thereby creating additional cases not shown in figures 1.16.3 and 1.16.4. These other cases are not considered for reasons of space, and because the key theoretical points can be illustrated with full generality by reference to the simpler cases shown in these two figures.

(28.) Consider, for example, the simple case of a horizontal BP constraint given by equation (1.16.10), which would apply if either elasticity pessimism or PPP holds. In this equation, the shift in BP due to a change in θ is given by

$$\frac{\partial y_B}{\partial \theta} = \frac{(\eta_m - 1)\eta_x y^\star}{(\eta_m - 1 + \theta)^2},$$

$$\frac{\partial y_B}{\partial \theta} = \frac{(\eta_m - 1)\eta_x y^\star}{(\eta_m - 1 + \theta)^2},$$

which has the same sign as $\eta_m - 1$. If $\eta_m > 1$, as is often found empirically, the BP relation would shift down when θ falls. If elasticity pessimism or PPP is violated so that the more general BP equation (1.16.12) applies, this derivative becomes more complex but does not cease to be ambiguous in sign.

(29.) This statement applies to reductions in the growth rate of government spending or increases in interest rates designed to slow the growth of private consumption and investment spending. Tax increases that raise marginal tax rates would instead lower the Keynesian multiplier λ, which would reduce the slope as well as the intercept of the DR relation (1.16.5).

(30.) Several empirical studies have researched to what extent fiscal and monetary policies as well as private sector spending respond endogenously to limit current account imbalances. See, for example, Summers (1988), Bayoumi (1990), Artis and Bayoumi (1990), and Epstein and Gintis (1992).

(31.) Thirlwall and Hussain (1982) assumed PPP, in which case (1.16.13) simplifies to

$$y_B = \frac{(1-\phi)\eta_x y^\star + \phi(f-p)}{\eta_m}.$$

$$y_B = \frac{(1-\phi)\eta_x y^\star + \phi(f-p)}{\eta_m}.$$

(32.) Note that, if (1.16.8″) replaces (1.16.8) as the BP equilibrium condition, then the BP constraint (1.16.12) shown in figures 1.16.3 and 1.16.4 (i.e., y_B written as a function of q) would have to be replaced by the following expression:

$$y_B = \frac{[(1-\phi)\varepsilon_x + \varepsilon_m - 1](e + p^\star - w) + (1-\phi)\eta_x y^\star + \phi(f-w) + [(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi]q}{\eta_m},$$

$$y_B = \frac{\left[(1-\phi)\varepsilon_x + \varepsilon_m - 1\right](e + p^\star - w) + (1-\phi)\eta_x y^\star + \phi(f-w) + \left[(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi\right]q}{\eta_m},$$

which would be upward sloping if $(1 - \phi)\varepsilon_x + \varepsilon_m - 1 + \phi > 0$. Also note that if this BP constraint replaces (1.16.12), then the meaning of being above or below the BP line also changes: points above it represent higher rates of growth of financial inflows (f), and points below it represent lower rates f.

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Postkeynesian Precepts for Nonlinear, Endogenous, Nonstochastic, Business Cycle Theories

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[–] Abstract and Keywords

The age of formal mathematics, proving the existence of nonconstructible, noncomputable, undecidable entities in economics, may, in the fullness of time, come to be seen as having occupied an insignificant, sorry period in the grand development of economic theory that was initiated by the classical economists and nobly preserved and enhanced by the development of macroeconomics at the hands of the Swedes and John Maynard Keynes. This chapter attempts to extract precepts from the rich traditions of the many strands of post-Keynesian economics for the modeling of a post-Keynesian theory of aggregate fluctuations. The approach follows the idea of a "constructive engagement with mainstream economics" suggested in persuasive ways by Giuseppe Fontana in several of his writings. The chapter first summarizes the way the classics of nonlinear, nonstochastic, endogenous theories of the business cycle—incorporating, naturally, also growth—satisfy many of the post-Keynesian precepts. It then looks at Hyman Minsky's approach to modeling economic crisis.

Keywords: business cycle, Giuseppe Fontana, post-Keynesian economics, John Maynard Keynes, Hyman Minsky, economic crisis, aggregate fluctuations, mainstream economics

1. By Way of a Preamble

> All these pretty, polite techniques, made for a well-panelled Board Room and a nicely regulated market, are liable to collapse….
>
> Perhaps the reader feels that this general, philosophical disquisition on the behaviour of mankind is somewhat remote from the economic theory under discussion. But I think not.… I accuse the classical economic theory of being itself one of these pretty, polite techniques which tries to deal with the present by abstracting from the fact that we know very little about the future.
>
> —John Maynard Keynes (1937, 215)

A dynamical system capable of computation universality is subject to the *halting problem for Turing machines.* Hence no future steady state—even if formally provable to "exist"—is calculable, even given all past and present information *exactly.* Unknowability, undecidability, and uncomputability of steady states, transients, or any other dynamic trajectory are the dominant epistemic, epistemological, and methodological issues of what may be called the algorithmic universe that seems to dominate many kinds of mathematical formalisms trying to encapsulate theories of the social sciences and humanities in the (p. 416) form of implementable models. The age of formal mathematics, proving the existence of nonconstructible, noncomputable, undecidable entities in economics, may, in the fullness of time, come to be seen as having occupied an insignificant, sorry period in the grand development of economic theory that was initiated by the classical economists, nobly preserved and enhanced by the

development of macroeconomics at the hands of the Swedes and Keynes, and revived and rejuvenated—after the unfortunate interregnum of the neoclassical synthesis, its replacement by varieties of monetarisms, the brief interlude of neo-Keynesianism and the current, although fading, dominance of New Classical economics—by post Keynesian[1] economics.[2]

My main aim in this essay is to extract possible analytical precepts, from the continuing evolution of Postkeynesian economic theory, to suggest the way I think the rich Keynesian tradition—mostly, though not exclusively, of the multiplier-accelerator variety—of nonlinear, endogenous, nonstochastic theories of the business cycle, should be "fertilized," so that the current dominance of the linear, exogenous, stochastic-shock theory,[3] that is, *Real Business Cycle* (henceforth, referred to as *RBC*) theory, could be challenged and supplanted, eventually. My stance here follows the idea of a "constructive engagement with mainstream economics" suggested in persuasive ways by Fontana in several of his writings (Fontana 2005, 414; Fontana, Gerrard, and Hillard 1998). In another sense, I aim to suggest this "constructive"—although critical—"engagement with mainstream economics" in analogy with the way Postkeynesian economics has contributed to enriching mainstream growth theory.[4]

A "constructive engagement" with the protagonists of RBC, who are often dismissive of any approach to business cycle theory that is not intrinsically mathematical in *their particular sense*, is not easy, unless any alternative is also explicitly mathematical in its formulation. The leading exponent of RBC, Prescott, has even gone as far as enunciating that (Prescott 2004, 2; second set of italics added):[5]

> [T]he meaning of the word *macroeconomics* has changed to refer to *the tools being used* rather than to the study of business cycle fluctuations.

The implicit "tenor and tone" of this chapter is, therefore, also mathematical, but hopefully without too many compromises with "responsibility to the canons of scholarship" (Stigler 1948, 605).

With these aims in mind the chapter is organized as follows. In the next section I attempt to extract precepts from the rich traditions of the many strands of post Keynesian economics for the modeling of a Postkeynesian theory of aggregate fluctuations. In section 3 I try to summarize the way I think the classics of nonlinear, nonstochastic, endogenous theories of the business cycle—incorporating, naturally, also growth—satisfy many of the precepts extracted in section 2. In section 4, a summary of Minsky's approach to modeling "crisis" is outlined, *mostly critically.* I should note that I regard Minsky as a distinguished contributor to the richness of the post Keynesian vision of economic crisis. The concluding section is a brief summary of the broad lessons to be gleaned from the approach taken in trying to understand how to make the precepts (p. 417) of post Keynesian economics become intrinsic to a mathematical modeling of economic dynamics with natural undecidabilities, incompleteness, and uncomputabilities.

There is one nonstandard stance I take in this essay, following the tradition I learned from my own sometimes-Postkeynesian maestro, Richard Goodwin: there is no incongruency or inconsistency in harnessing Schumpeter for Postkeynesian purposes!

2. Postkeynesian Precepts: Beyond "Only Another Box of Tricks"

> What we have tried to show is that within the various strands that we have discerned and described, there *are* coherent frameworks and approaches to be found, though obviously there remain within each unfinished business and unresolved puzzles. The real difficulty arises when attempts are made to synthesize the strands in order to see whether a coherent whole emerges. Our own view is that *this is a misplaced exercise*, that to attempt to do so is mainly to search for…"only another box of tricks" to replace the "complete theory" of mainstream economics which all strands reject. *The important perspective to take away is*, we believe, that *there is no uniform way of tackling all issues in economics* and that the various strands in post Keynesian economics differ from one another, not least because they are concerned with different issues and often different levels of abstraction of analysis.
>
> (Hamouda and Harcourt 1988, 24–25; first italics in the original)

"The various strands in post Keynesian economics" not only "differ from one another…because they are concerned with different issues and often different levels of abstraction of analysis" but also because the

analytical, conceptual, and, above all, methodological and epistemic foundations are wholly underpinned by what that arch non-Keynesian, Schumpeter, would have referred to as a *vision* of dynamic economic development, whether of advanced, emerging, or developing economies. I believe, and agree wholeheartedly with Hamouda and Harcourt (and, thereby, happily also with Joan Robinson), that there is no—cannot ever be, and has never been—a "complete theory," or, more pertinently, a *unified theory* based on acknowledged *closures*,[6] of every aspect of dynamic economic development, as is explicitly and implicitly argued, or at least tacitly accepted, by every kind of orthodox economics.

In the recent comprehensive, almost exhaustive (if such is conceivable), *Elgar Companion to Post Keynesian Economics* (King 2003), the editor's opening characterization of the subject is most instructive for anyone attempting to suggest precepts for constructing a Postkeynesian theory of the business cycle, especially on the groundings of Cambridge or Minskyan theories of aggregate economic fluctuations (xiv):

> Stripped down to the bare essentials, Post Keynesian economics rests on the principle of effective demand: in capitalist economies, output and employment are normally **(p. 418)** constrained by aggregate demand, not by individual supply behaviour.... Moreover, there exists no automatic or even minimally reliable mechanism that will eliminate excess capacity and involuntary unemployment.

At least from the point of view of these "bare essentials," both Cambridge theories of the business cycle and (any) Minskyan crisis theory are, surely, squarely Postkeynesian in their conceptual underpinnings and analytical frameworks. In the above admirably concise characterization, King emphasizes, implicitly and explicitly and correctly in my view, *seven* essential Postkeynesian precepts for any dynamic theory of *aggregate* fluctuations:[7] *aggregate demand*, *the fallacy of composition*, *involuntary unemployment*, (the endemic nature of the persistence of) *excess capacity*, *instability*, the absence of any conceivable *self-adjusting mechanism* toward (any kind of, mythical or not, unique or not) *equilibrium*, and, thereby, *disequilibria* and the existence of *multiple equilibria.*

In addition to these seven Postkeynesian precepts for a macroeconomic (aggregate) theory of fluctuations, I would like to suggest that the following are also among the characterizing features of modeling aggregate fluctuations by one or another strand of Postkeynesian economics: *nonmaximum dynamics*, "time-to-build" production and implementation, *nonergodicty*, *complexity*, and *systemic uncertainty* of the dynamical system encapsulating a Postkeynesian theory of the business cycle. One or another of the post Keynesian strands referring to the latter five concepts do not invoke them, or encapsulate them, in any theory of the business cycle, whether Postkeynesian or not. Moreover, even the "senior" post Keynesian or Keynesian authors (and some of their "derivative" followers) who pioneered their consideration (in particular nonergodicity[8] and complexity[9]) and who refer to and invoke them, for criticizing mainstream economics, do so on the basis of faulty mathematical underpinnings.

Now, by *nonmaximum dynamics* I mean what was first referred to by Paul Samuelson in his Nobel Memorial Prize Lecture as follows:

> I must not be too imperialistic in making claims for the applicability of maximum principles in theoretical economics. There are plenty of areas in which they simply do not apply. Take for example my early paper dealing with the interaction of the accelerator and the multiplier. This is an important topic in macroeconomic analysis....
>
> My point in bringing up the accelerator-multiplier here is that it provides a typical example of *a dynamic system that can in no useful sense be related to a maximum problem*.
>
> (Samuelson [1970] 1972, 12–13; italics added)

In including "time-to-build" as one of the Postkeynesian precepts for (mathematical) modeling of aggregate fluctuations I am only making explicit what is, ostensibly, acknowledged as one of the key building blocks of orthodoxy's core assumptions in developing real business cycle theories, and what was fundamental in Kalecki's classic of 1935, and thereafter remained central to his evolving versions of that classic; it was, as well, a key assumption in the canonical nonlinear equation that summarized the Cambridge theories of the business cycle. In the latter two cases the resulting, **(p. 419)** final-form equation for aggregate fluctuations were linear[10] and

nonlinear deterministic difference-differential equations.

As for "systemic uncertainty," which I consider to be of crucial conceptual importance in the construction of any aggregate, Postkeynesian theory of the business cycle, I shall not follow convention and refer to chapter 12 of the *GT* and the tiresome cliché of an underpinning in the (in)famous "animal spirits" for substantiation.[11] With the notable exception of Robin Matthews ([1984] 1991), very few appear to have tried to link the origins of the use of the phrase "animal spirits" to Keynes's early, undergraduate, essay on Descartes (cf. Matthews [1984] 1991, 105–6).[12] This fact should be coupled to the two coincidences of (*a*) Keynes purchasing Descartes's *Les Passions de l'âme* (translated, unfortunately as, "animal spirits"; see Harrod 1951, 483), just around the time he was drafting the first versions of chapter 12; and (*b*) Richard Kahn's remembrance, reported in Matthews ([1984] 1991, 104 n. 2; italics added), that

> Chapter 12 was apparently written less carefully and in a more light-hearted spirit [*sic*!] than most of the General Theory. It was not subjected to the scrutiny of the group of younger colleagues assembled by Keynes to help him.

I am not sure the significance attached to chapter 12 of the *GT*, by many post Keynesians, is for all the right reasons; indeed, it may well be for misleading reasons. But in this they are not more culpable than *hoi polloi*.

Instead, to encapsulate the notion of *systemic uncertainty* in a Postkeynesian theory of aggregate fluctuations, I shall keep in mind, but not develop the formalism here, the *bounded rationality / bounded uncertainty* nexus, introduced by Herbert Simon (1955) and George Shackle (1966), respectively, within the framework of *decision problems* in the precise sense of metamathematics (cf. Velupillai 2010, chaps. 10 and 11), which leads to the characteristically simple, yet deep observation by the latter (Shackle 1966, p. 74), in his reference to

> a world where there are constraints upon the ways in which events can follow each other, yet where even a complete and perfect knowledge of these constraints would leave us ignorant of "what will happen next."

This idea is precisely formalizable in terms of the famous theorem of the *halting problem for Turing machines*, and if the dynamical system modeling a Postkeynesian theory of aggregate fluctuations can be shown to be equivalent to a Turing machine, then systemic uncertainty in the sense of Shackle above will be exhibited by that system. My strong conjecture is that the nonlinear dynamics of Postkeynesian endogenous, nonstochastic models of aggregate fluctuations can be shown to be capable of computation universality and, thus, formally equivalent to the computing behavior of a Turing machine. The full development of this conjecture must await a different exercise.

In summary, then, I have tried to identify the following fourteen Postkeynesian precepts, *some combination of which* should form the basis for a Postkeynesian theory of (p. 420) aggregate fluctuations: (1) aggregate effective demand; (2) the fallacy of composition; (3) involuntary unemployment; (4) the persistence of excess capacity; (5) functional distribution (of income and wealth); (6) instability; (7) absence of *self-adjusting mechanisms* (i.e., intrinsic or natural negative feedback mechanisms) toward unique (or one or another of a multiple) equilibrium; (8) disequilibrium; (9) *nonmaximum* dynamics; (10) "time-to-build";[13] (11) nonergodicity; (12) systemic uncertainty; (13) complexity; (14) historical time.

Surely, (3) and (4) should be subsumed into one precept.[14] It can be shown that nonmaximum dynamics (9), instability (6), disequilibrium (8), and multiple equilibria (7) form one unified quadruple. Finally, any serious, rigorous, formal dynamics must consider nonergodicity (11), complexity (13), and historical time (14) together in a nonlinear framework, if it is to be seriously Postkeynesian in theorizing about aggregate fluctuation endogenously and nonstochastically.[15] This leaves eight Postkeynesian precepts that a mathematical theory of aggregate fluctuations should be constrained by in its construction. The immediate question would be this: how many of these are satisfied by mainstream economics? The answer is exactly one: "time-to-build"—but this is encapsulated within the standard production function apparatus, which is subject to the strictures of one respectable strand of post Keynesian economics, within a theory constrained by uniquely stable equilibrium configurations generated by ergodic, noncomplex, maximum dynamical systems, without involuntary unemployment or excess capacity, generally insensitive to the fallacy of composition. Furthermore, in the era of a methodology dominated by RBC (cf. Prescott 2004), *calibration* of the mythical aggregate production function, particularly in its much-maligned Cobb-Douglas version, functional income distribution,[16] (1.17.5), is effectively ignored.

And neither money—at least via *liquidity preference* [17] — nor market structure[18] has even been mentioned!

It is in this sense that I think Hamouda and Harcourt were absolutely on the mark with their wise injunction to refrain from trying to find a *uniform way of tackling all issues in economics so that a complete theory to replace orthodoxy can be constructed.* The search for "complete theories" like the doomed pursuit for a "unified theory of knowledge" and other such paranoidal obsessions has been the bane of intellectual integrity for too long. The mainstream misadventures with "complete theories" are themselves "complete" red herrings: it is possible to construct thoroughly trivial complete theories without any correspondence with the elements of ontology or epistemology. Any attempt at constructing a post Keynesian "complete" theory, satisfying all of the above eight precepts (plus liquidity preference) should be resisted in the wise sense in which it is gently discouraged by Hamouda and Harcourt.

Yet the main positive contribution of this chapter is the claim that Cambridge theories of the business cycle, suitably modified and interpreted, encapsulate all of the above core Postkeynesian precepts, but the incorporation of systemic uncertainty in the sense of Shackle, above, requires the dynamical system encapsulating the theory of fluctuations to be interpreted in terms of the (computing) behavior of a Turing machine. This **(p. 421)** interpretation is achieved via the demonstration of an equivalence between the computing behavior of a (universal) Turing machine and a nonlinear dynamical system capable of what I have come to call computation universality.[19]

3. Cambridge Theories of the Business Cycle

> Once progress is admitted on the ground floor of a theory the awkward question arises about the historical validity of the system. The relevance and usefulness of economic theory to economic history has been small. If anything, business cycle theory has done better than some other branches. The situation becomes more serious the moment we restrict ourselves to a theory simple enough to be written down in a few equations. To imagine any connection between such a model and economic history seems grotesque, and yet, if there is no relation, there seems little use in constructing it.
>
> (Goodwin 1955, 207–8)

The canonical "few equations" of Cambridge theories of aggregate fluctuations[20] may have been underpinned by one or another "theory simple enough" to be encapsulated by them; but the "few equations" (indeed the one canonical equation)[21] have defied complete analysis for the more than one hundred years during which they have been studied, analytically, experimentally, computationally, and geometrically, by a galaxy of pure mathematicians, applied mathematicians, physicists, numerical analysts, computer scientists, and metamathematicians. Surely the enigma is that the canonical equation mirrors the riddle that it tries to encapsulate: capitalist economic development—a fact that was known to those who tried to fashion, less and more successfully, Cambridge theories of aggregate fluctuations.

3.1. Background

> Keynes' *General Theory* was exclusively concerned with a monetary economy in which changing beliefs about the future influence the quantity of employment. Yet *money* plays no more than a perfunctory role in the Cambridge theories of *growth*, *capital*, and *distribution* developed after Keynes.
>
> (Kregel 1985; emphasis added)

Does, then, *money* play any role in possible Cambridge theories of the business cycle[22] "developed after Keynes"? Indeed, are there Cambridge theories of the business cycle in the same sense in which there are Cambridge theories of growth, capital, and distribution? One of my aims, not necessarily the main aim, in this chapter is to substantiate the claim that there were, in fact, clear, identifiable, Cambridge theories of the business cycle, incorporating *growth*, (functional) income *distribution*, and *money*.

(p. 422) However, although Kregel's perceptive observation was made more than a quarter of a century ago, I believe there is a central core of truth in it that may appear to be valid, even for Cambridge theories of the

business cycle, at least if one relies on the more comprehensive expository characterizations of the development of Postkeynesian economics since 1936.[23] In the ensuing quarter of a century since Kregel's claim, despite the sometimes stuttering incorporation of Minsky's work on the interaction between the financial system and *aggregate fluctuations*,[24] theories of the business cycle—with and without money, whether of Cambridge origin or not—seem to occupy, at best, a shadowy existence in the characterization of Postkeynesian economics, itself being enacted, thus far, almost as a Japanese Noh drama.

The acknowledged classics of the nonlinear, endogenous, nonstochastic theory of business cycles, in the mathematical mode, are Goodwin (1950, 1951, 1955, 1967)[25], Kaldor (1940), and Hicks (1950). Obviously, even if Kalecki (1935) predates *The General Theory* (Keynes 1936, henceforth, *GT*) and Lundberg's remarkable *Studies* (1937) appeared almost simultaneously with the *GT*, they, too, should be—and often, especially Kalecki, are considered to be—part of the set of "acknowledged classics" in this genre. Of these latter two, Lundberg's classic, in what the neo-Wicksellians referred to as the *sequence analysis tradition*, was squarely in the nonlinear, endogenous, nonstochastic tradition of business cycle theories, despite its fame in the standard business cycle literature in the linear form bestowed on it by Metzler (1941). However, the Kalecki classic, in spite of its intrinsic nonlinear structure, was *linearized* and studied as a *mixed linear difference-differential equation* in the standard literature, and even by the *master* himself.[26]

I would like to add two personal remarks and one additional point to "substantiate" the contents of the previous two paragraphs. When I first attended Goodwin's lectures on economic dynamics at Cambridge University in the Michaelmas term of 1973, he wrote up, on the blackboard, just three references: Schumpeter ([1912] 1934), Kalecki (1935), and Lundberg (1937). Second, Goodwin reminisced about the development of mathematical theories of the business cycle, in the post-Depression 1930s, at the conference in honor of Bjorn Thalberg[27] in the following way:

> The Great Depression of the 1930s appropriately gave rise to the first[28] precise, quantitative cycle models. First came a highly original piece by Michal Kalecki, but it was succeeded by the more famous and successful Hansen-Samuelson multiplier-accelerator model, to be followed by the related Lundberg-Metzler inventory cycle.
>
> (Goodwin 1992, 87).

The "additional point" I wish to emphasize is the following: right from the outset, Goodwin's development of a nonlinear, endogenous, nonstochastic theory of fluctuations was inspired by Keynes of the *GT* and Schumpeter's *theory of innovations* ([1912] 1934). This was reflected in every pioneering aggregate nonlinear, endogenous, nonstochastic, dynamic model developed by Goodwin, all the way from 1946 till his classic paper in the Dobb Festschrift (Goodwin 1967). Ironically, much of the interpretative literature has tended to claim that the first series of contributions by Goodwin, (i.e., up to, but not including Goodwin 1967), all of them representable by some variation **(p. 423)** of the canonical equation (1.17.1), concentrated on a theory of aggregate fluctuations in which either growth was an exogenous trend component or, worse, entirely absent. This is simply untrue. The trilogy that represented the core contributions by Goodwin to a Cambridge theory of aggregate fluctuations in a nonlinear, nonstochastic, endogenous model were produced in the intensive consecutive years of 1950, 1951, and 1952 (Goodwin 1950, 1951, 1955). All of them were models of "growth cycles" in a clear macrodynamic sense, with the cyclical part built on Keynesian elements of aggregate demand, excess capacity, instability, disequilibrium, multiple equilibria, and nonergodic/complex historical time and encapsulating the fallacy of composition; the growth part owed its construction and incorporation in these classic and pioneering models to Schumpeter's theory of innovations and Marx. This is no where better characterized than in Goodwin (1955,[29] 204–6):

> In order to fuse growth and cycle unalterably we may make the following two assumptions: (a) economic progress is not steady but comes in spurts, these spurts occurring primarily in booms; (b) the cycle is not a case of over- and under-shooting of a stationary level, but rather it is dominated by—and possibly would not exist without—economic growth. The source of these two assumptions is Schumpeter and, in my opinion, it is in his work that we shall find the most fruitful ideas for the problem of trend and cycle.… Schumpeter's theory, as he often complained, is difficult to formulate in simple mathematical terms.…[30] Schumpeter's original, pure theory can be put simply: "The recurring period of prosperity of the cyclical movement are the form progress takes in capitalist[31] society." …[32] He thus fused into an organic whole

> the concepts of growth and cycle, and implied that the one could not exist without the other.... It has always seemed to me that the theory of effective demand and liquidity preference could be used to bring greatly enhanced usefulness to Schumpeter's theory, but it is plain that he would have none of it.

Thus, as far as my own interpretation of Cambridge theories of aggregate fluctuations is concerned, as a strand in the post Keynesian economics of growth cycles,[33] the basis in the classics—Marx, in particular—and in Schumpeter has to be acknowledged, and I am happy, privileged, and proud to do so and consider myself a member of that lineage.

It is unfortunate that Kaldor,[34] maverick post Keynesian though he was (at least in my opinion), made thoroughly unwarranted and mathematically unsubstantiable assertions about Cambridge theories of growth cycles[35] (Kaldor 1954, 54):

> [T]he development of trade-cycle theories that followed Keynes' *General Theory* has proved to be positively inimical to the idea that cycle and dynamic growth are inherently connected analytically—to the idea, that is, that the cycle is a mere by-product of, and could not occur in the absence of, "progress." For it has been repeatedly (and in my view, conclusively)[36] shown that a few simple additions to Keynes' own model of a general equilibrium of production in the economy will produce the result that this "equilibrium" will take the form, not of a simple steady rate of production in time, but a rhythmical movement of constant amplitude and period—in other words, a perpetual oscillation around a stationary equilibrium position.

(p. 424) Almost all the analytical assertions in this Kaldorian observation are incorrect. The damage this kind of technically groundless claim does, especially when invoked uncritically by natural post Keynesians like King (2002), to any attempt by nonmathematical post Keynesians to develop a Postkeynesian theory of growth cycles is immeasurable, and appeals only to mathematically able economists, often unsympathetic to Keynesian thought and enthusiastic about the *ad hoc shockeries* approach to business cycle modeling.

3.2. Encapsulating the Postkeynesian Precepts in Nonlinear, Endogenous, Nonstochastic Business Cycle Theories

> [The] purpose [of *An Essay on the Importance of Being Nonlinear* (West 1985)] is to convince the reasonable skeptic that much of what constitutes our body of *theoretical* knowledge in natural philosophy is based on linear mathematical concepts and to suggest how the more encompassing ideas of nonlinear mathematics would be better suited to the understanding of existing data sets.
>
> (West 1985, 3; italics in the original)

There are at least two kinds of Cambridge theories of nonlinear, endogenous, nonstochastic growth cycle theories, each satisfying one set of Postkeynesian precepts, but neither encapsulating all of them (in complete agreement with the caution by Hamouda and Harcourt, to which I referred in the opening lines of the previous section).

3.2.1. The Canonical Nonlinear Difference-Differential Equation of Cambridge Theories of Growth Cycles

The following nonlinear, endogenous, nonstochastic differential-difference equation subsumes every classic equation that characterizes the models of the pioneers of nonlinear, endogenous, nonstochastic business cycle theories—all the way from Kalecki, via Lundberg and Kaldor, to Goodwin and Hicks: (1.17.2)

$$\varepsilon y'(t+\theta)+(1-\alpha)y(t+\theta)=O_A(t+\theta)+\phi[y'(t)],$$

$\varepsilon y'(t+\theta)+(1-\alpha)y(t+\theta)=O_A(t+\theta)+\phi[y'(t)],$

where

y: aggregate income; θ: one half the construction time of new equipment;
ϕ (y'): the flexible accelerator; O_A: the sum of autonomous outlays ($\beta(t)$ and $I(t)$).

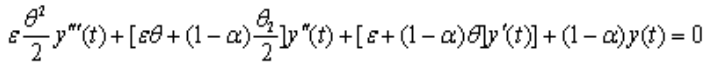
The standard canonical equation (1.17.1), given earlier, is the basis for Yasui's famous formal "equivalence" result (1953), between the classic nonlinear, endogenous, nonstochastic models of aggregate fluctuations developed by

the pioneers: that is, Kaldor, Goodwin, and Hicks. That equation was obtained from (1.17.2) by an approximation that is hard to justify on economic grounds, and assuming technical progress to be an exogenously given constant. It entailed an approximation of the nonlinear differential-difference equation (1.17.2) by a nonlinear differential equation of unforced Rayleigh–van der Pol (p. 425) type, such as (1.17.1). This was obtained simply by expanding the two leading terms of (1.17.2) in a Taylor series and retaining only the relevant first two terms.

The result was an appeal to standard results in planar dynamical systems and the genesis of limit cycles, the existence of which was occasionally proved by an appeal to the celebrated Poincaré-Bendixson theorem or the Levinson-Smith theorem. This became an academic "industry," first pioneered by the Japanese trio of Yasui, Ichimura, and Morishima (cf., for an almost exhaustive story of this episode, Velupillai 2008).

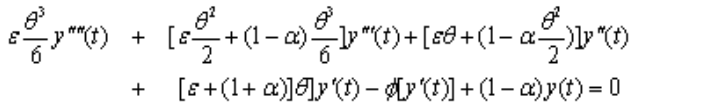
But, unfortunately, this approximation of the economically derived (1.17.2), by a mathematically convenient (1.17.1), implies that the Postkeynesian precepts on historical time and nonergodicity/complexity are not satisfied. Apparently, also, functional income distribution and systemic uncertainty[37] are difficult to demonstrate in such a system. However, these properties can be shown to exist in a more accurate approximation, retaining higher-order terms of the Taylor series, of (1.17.2), say three, four, and five terms, as in the following three equations: (1.17.3)

$$\varepsilon\frac{\theta^2}{2}y'''(t)+[\varepsilon\theta+(1-\alpha)\frac{\theta_2}{2}]y''(t)+[\varepsilon+(1-\alpha)\theta]y'(t)]+(1-\alpha)y(t)=0$$



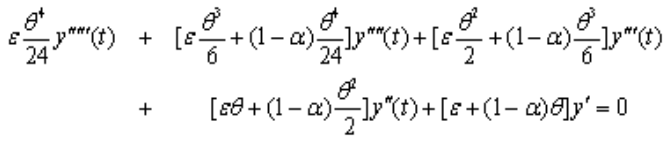
(1.17.4)

$$\begin{aligned}\varepsilon\frac{\theta^3}{6}y''''(t) &+ [\varepsilon\frac{\theta^2}{2}+(1-\alpha)\frac{\theta^3}{6}]y'''(t)+[\varepsilon\theta+(1-\alpha\frac{\theta^2}{2})]y''(t)\\ &+ [\varepsilon+(1+\alpha)]\theta]y'(t)-\phi[y'(t)]+(1-\alpha)y(t)=0\end{aligned}$$



(1.17.5)

$$\begin{aligned}\varepsilon\frac{\theta^4}{24}y''''''(t) &+ [\varepsilon\frac{\theta^3}{6}+(1-\alpha)\frac{\theta^4}{24}]y''''(t)+[\varepsilon\frac{\theta^2}{2}+(1-\alpha)\frac{\theta^3}{6}]y'''(t)\\ &+ [\varepsilon\theta+(1-\alpha)\frac{\theta^2}{2}]y''(t)+[\varepsilon+(1-\alpha)\theta]y'=0\end{aligned}$$



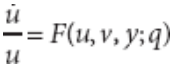
A simulation of these more finessed approximations, with the same values for the parameters as in Goodwin (1951), "restores" the two Postkeynesian precepts of historical time and nonergodicity/complexity, and, in fact, strengthens its possibility of demonstrating the fallacy of composition. For example, the much vaunted property of (1.17.1) to generate a (unique) limit cycle, independent of initial conditions—that is, independent of "history"—is not relevant for the more finessed approximation, where not only is apparent uniqueness lost, but also the appearance of unstable limit cycles can be shown, in addition, of course, to multiple limit cycles, each dependent on initial conditions.[38]

3.2.2. The Canonical Nonlinear System of Differential Equations of Cambridge Theories of Growth Cycles

Starting from Goodwin's celebrated Dobb Festschrift classic, *A Growth Cycle* (Goodwin 1967), it is possible to

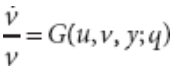
divest it of all its non-Keynesian elements—the assumption of (p. 426) Say's Law, a fixed-coefficient production function, and so on—and also its unattractive mathematical features—primarily structural instability—while preserving its crucial emphasis on functional income distribution as the accommodating, adjusting variable in the disequilibrium path, and generate the following canonical three-variable system of nonlinear differential equations, parametrized by *Tobin's q*, capable of satisfying many of the precepts for a Cambridge theory of growth cycles: (1.17.6)

$$\frac{\dot{u}}{u} = F(u, v, y; q)$$



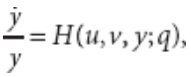
(1.17.7)

$$\frac{\dot{v}}{v} = G(u, v, y; q)$$



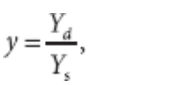
(1.17.8)

$$\frac{\dot{y}}{y} = H(u, v, y; q),$$



where the notation is as in Goodwin's classic, except for the removal of the Say's Law assumption by defining (1.17.9)

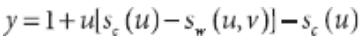
$$y = \frac{Y_d}{Y_s},$$



where Y_d: Demand for output (real); Y_S: Supply of output (real).

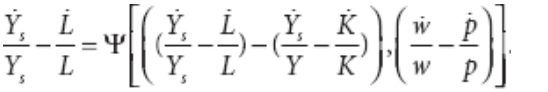
Introducing differential savings propensities in classic Kaldorian fashion, we can get (1.17.10)

$$y = 1 + u[s_c(u) - s_w(u, v)] - s_c(u).$$



The assumption on production is via the technical progress function, along (once again) Kaldorian lines: (1.17.11)

$$\frac{\dot{Y}_s}{Y_s} - \frac{\dot{L}}{L} = \Psi\left[\left((\frac{\dot{Y}_s}{Y_s} - \frac{\dot{L}}{L}) - (\frac{\dot{Y}_s}{Y} - \frac{\dot{K}}{K})\right), \left(\frac{\dot{w}}{w} - \frac{\dot{p}}{p}\right)\right].$$



Under very standard assumptions it can be shown that the dynamical system in the unemployment ratio (v), functional income distribution (u), and disequilibrium in the good market (y), that is, equations (1.17.6) to (1.17.8), parametrized by *Tobin's q*, exhibits a *Hopf bifurcation* from a limit point to a nontrivial periodic orbit (Velupillai 2006). Every Postkeynesian precept, except systemic uncertainty and "time-to-build," can be satisfied by this system, although historical time, nonergodicity/complexity, and the fallacy of composition require that the above building blocks be considered for "subsectors" of the economy (as, for example, in yet another of the Goodwin classics: "Dynamical Coupling with Especial Reference to Markets Having Production Lags," 1947).

(p. 427) **4. Minsky's Theory of Crisis**

> Keynes' General Theory viewed the progress of the economy as a cyclical process; his theory allowed for transitory states of moderate unemployment and minor inflations as well as serious inflations and deep depressions.... In a footnote Keynes noted that "it is in the transition that we actually have our being." This remark succinctly catches the inherently dynamic characteristics of the economy being studied.
>
> (Minsky [1978] 1982, 97)

I shall assume that Minsky's study and modeling of "the inherently dynamic characteristics" of a credit-based capitalist economy is one that is always in "transitory states of being" never "becoming" stable or unstable, but always tending to the one or the other. Technically, from the point of view of dynamical systems theory, this means that the tripartite Minsky-regimes (see below) are always in one or another "basin of attraction" of a dynamical system, without ever reaching (or ever "being" at) the system's attractors.

The conceptual underpinnings of Minsky's desiderata for modeling crises in credit-based capitalist economies seem to have been culled out of selected contributions by Irving Fisher, Maynard Keynes, Michał Kalecki (1942), and Dudley Dillard (1955), although there are also some stray Schumpeterian elements dotting the Minsky vistas.

Papadimitriou and Wray (2008, xii; italics in the original), have provided an admirably succinct encapsulation of the vast canvas that was constructed by Minsky to understand the unstable macroeconomic dynamics of credit-based capitalist economies:

> Minsky borrowed his "investment theory of the cycle" from John Maynard Keynes. Minsky's cycle theory derived from combining two things: the famous exposition found in Keynes's Chapter 12 of the *General Theory*, which focuses on the inherent instability of investment decisions as they are made in conditions of fundamental uncertainty, and the approach taken in Chapter 17 to valuation of financial and capital assets. ... While Minsky credited Keynes for pointing the way toward analyzing the process of financing investment, he found it necessary to go much further. Thus Minsky's contribution was to add the "financial theory of investment" to Keynes' 'investment theory of the cycle'.... Since financing investment is the most important source of the *instability* found in our economy, it must also be the main topic of analysis if one wants to *stabilize the unstable economy*.

In answering the question "why does investment fluctuate" (1982a, 105–6), Minsky postulates his famous "three types of financial postures": *Hedge finance*, *Speculative finance*, and "Ponzi" *finance.* The "path-dependence"—that is, history-dependence—of any current state of the economy, in transition, is characterized by the evolving mix of these three types of financial postures.

The transition from one or another of these ideal types to another is when "Keynesian uncertainty" kicks into action, although it is not clear, in Minsky's voluminous writings—nor in any of those by Minsky scholars—how this is played out by the interaction (p. 428) between individual and systemic reactions: in other words, how an individual's or an institution's decision processes leave the domain of pure risk analysis—and, hence, perhaps in the world of orthodoxy, expected utility maximization (EUM) and the efficient market hypothesis (EMH)—and enter the domain of "Keynesian uncertainty." Neither the transition from one pure regime to another, nor the evolution of the dynamics in the Speculative or "Ponzi" regimes, underpinned by behavior (of individuals and institutions) based on "Keynesian uncertainty," has, to the best of my knowledge, ever been formalized.

Now, the economic reason for the transition "from an initial financial tautness," say in the Hedge finance regime, is that financial flows signal a tightness in the intertemporal flows of the income-generating process. This signal of a tautness "is transformed into a financial crisis," and the transition to the next regime is initiated. At this point Minsky's interpretation of the Kaleckian macroeconomic pricing process plays its crucial role.

But long before Kalecki, Wicksell's immediate Swedish followers—particularly Lindahl (1929a) and Myrdal (1931)—had devised a similar scheme, under the forces of "non-probabilistic uncertainty," to generate unstable, disequilibrium monetary economic trajectories. More importantly, it was this development that inspired George Shackle's pioneering work on nonprobabilistic decision theory in the face of incompleteness of knowledge, a situation far more coherent and amenable to precise formalization with the tools of modern, nonorthodox, mathematical analysis.

Finally, to the tripartite financial regimes and the Kalecki-type pricing rule was added the methodological precept of "*stability…is destabilizing*" in every transition regime. It is understood that every economy is always in a transition regime, and every transition regime is a mix of the pure regimes, even when the "Ponzi" financial regime rules.

Some critical caveats need to be mentioned, at least cursorily, at this point. First, there is the question of nonlinear dynamics in Minsky's work and in the attempts by many of his followers and admirers to model "Minsky crises" nonlinearly. Second, there is the question of policy for "stabilizing an unstable economy." Third, there is the thorny issue of "equilibrium." Fourth, there is the crucial question of the correct domain and range for the economic variables in any version of Minsky-type models.

There is no evidence whatsoever, at least to this writer, that Minsky ever understood the mathematics of the nonlinear macrodynamic models that emerged from what is generally acknowledged to be the pioneering works of Kaldor, Hicks, and Goodwin (see the previous section). At a most banal level, there is the repeated reference to the "ceiling-floor" models of Hicks and Goodwin and the absurd claim that the Hicksian trade cycle model is "linear." There are no exogenous "ceiling" and "floors" in any of Goodwin's many nonlinear macrodynamic models. Hicks has two regimes, one with an entirely endogenously determined, unstable equilibrium; and in the other, also an unstable equilibrium, only one of the exogenous constraints is, in fact, active; in the second one, usually the "ceiling" is endogenous. All the way from Minsky (1957, 1959) to Minsky ([1965] 1982), Ferri and Minsky (1992), and Delli Gatti, Gallegati, and Minsky (1994), there is a series of misrepresentations of the structure, mathematics, and economics of the pioneering nonlinear macrodynamic models.[39]

(p. 429) Thus he—like his followers—was, unfortunately, unable to realize that the identical endogenous mechanisms generating the unstable, disequilibrium, nonlinear dynamics could have been harnessed to model, endogenously and nonlinearly, a Minsky model of a three-regime crisis, with the Kaleckian pricing rule and transition regimes that encapsulate the idea of "stability…is destabilizing."

Where such models remain inadequate is where every formal attempt—again, to the best of my knowledge—to model *Minsky Crises* as formal (ad hoc, nonlinear) dynamical systems has failed: to endogenize "Keynesian uncertainty." Not even the admirably concise, nonlinear attempt by Taylor and O'Connell (1985) or its more pedagogical and clearer version in Taylor (2004, chap. 9, sec. 7, pp. 298–305; see also Taylor 2011, chap. 5), succeed in this difficult task adequately.

Second, on policy for "stabilizing an unstable economy" there was the noble "Swedish tradition" emanating from Wicksell, but most comprehensively developed by Lindahl and Myrdal. Apart from a curiously unerudite, passing footnote, in Ferri-Minsky (1992),[40] there is no evidence at all that Minsky took the trouble to familiarize himself with the classic framework of an unstable credit economy that Wicksell developed, and Lindahl and Myrdal completed in the form of a dynamic, disequilibrium macroeconomy with an unstable monetary equilibrium that is in no way related to the real equilibrium of orthodox theory.

Third, there is the issue of equilibrium. Minsky's economies are, in their transition configurations, within the "basin of attraction" of some attractor—whether stable or not does not matter. Thus, when approached from the point of view of global, endogenous, capitalist dynamics, a Minsky model must naturally encapsulate multiple equilibria. Are the destabilizing financial forces generated during the transition to a stable equilibrium—that is, the genesis of a pure Speculative regime is an endogenously evolving dynamic process during the time the economy is in the basin of attraction of the Hedge regime? This is formally impossible within the framework of dynamical systems theory, without a plethora of unattractive *ad hockeries*.[41] Why not simply give up on "equilibrium"? My conjecture is that Minsky's reading of chapter 17 of the *GT* was heavily indebted to Dillard's interesting, but incomplete, interpretation. Minsky, therefore, was not able to discern the Sraffian point in that important chapter: that every configuration of the economy is some equilibrium, making the notion vacuous (Keynes 1936, especially 242).[42] If every configuration of the economy is equilibrium, there are no transition paths; nor is there any sense in the distinction between stable and unstable equilibria!

I now come to an issue that may have the air of an exotic "objection": the relevance of real variables and real analysis in formalizing the dynamics implicit, say, in a balance-sheet constructed for an abstract Minsky-type economy, say as in table 9.3 in Taylor 2004, 299). The numbers that enter such balance-sheets can, at best, be rational values (both positive and negative). But the dynamical system that is supposed to reflect the evolution of

the economy represented in the balance sheet—say, as depicted in figure 9.8 (Taylor 2004, 302)—"resides" in the unrestricted two-dimensional Euclidean space. Any facile response that the answer to this conundrum is to work with difference (p. 430) equations, or a discrete dynamical system, misses the point. Of course, this is an objection to all "unrestricted" dynamical system modeling in economics.

Finally, to what extent does a Minsky crisis model satisfy the Postkeynesian precepts? I am in the unfortunate position of being completely baffled how to answer this question!

5. Concluding Notes

Postkeynesian economics is nothing if it is not endogenously dynamic and policy oriented. This was the natural domain in which the Cambridge theories of growth cycles were developed. It is, ostensibly, also the domain of analysis of Minsky, although here the nonlinear dimension is too slippery to locate.

If we are to take the Minsky vision of the dynamics of credit-based capitalist economic dynamics seriously, and try to solve its policy dilemmas, then it seems to me that the best analogy—as pointed out above, in note 41—is the policymaker as poor Hercules and the Hedge-Speculative-Ponzi being as Hydra. In other words, every time Hercules slays one of the heads of the Hydra, two more sprout from the source of the slain one! Is this to be a Sisyphean task for the poor policymaker—or can she emulate Hercules and find the equivalent of Iolaus to conquer, once and for all, the seemingly eternal repetition of "manias and panics" in credit-based capitalist economic dynamics?

Formally at least—and actually, of course, in Greek mythology—there is a solution to the problem of Hercules versus Hydra, meaning by this there may well be a policy resolution to the eternal dilemma of recurrent manias and panics (Kirby and Paris 1982).

If we are to go beyond conventional nonlinear dynamics and broach new analytic frontiers to formalize the Postkeynesian insights of the pioneers, my conjecture is that we must respect the natural domain of economic data: that is, the natural or rational numbers, both positive and negative. This implies analytical, epistemological, and methodological conventions and constraints that will entail less closed, less determined mathematical models, encapsulating the richness of undecidable propositions in incomplete formal systems, facing uncomputable functions in the natural domain of economic data, economic institutions, and history.

In other words, economic formalism, to be faithful to the rich Postkeynesian tradition, based on historical time and natural data and institutions, must embark on a Diophantine revolution in economics.[43]

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Notes:

(*) I shall use the unhyphenated term *Postkeynesian* to refer to the noble tradition of endogenous macroeconomic, nonorthodox dynamics that emerged in the 1930s. I believe it is common practice in macroeconomic theory, these days, to refer to New Classical, neoclassical, etc., theories of business cycles, growth, and so on. I cannot see any reason for a Postkeynesian underpinning of a theory of macroeconomic dynamics to be referred to in any different way. On the other hand, it is also common practice to use terms—unhyphenated and hyphenated—like *New Keynesian* (Mankiw and Romer (1991a, 1991b), nonmonetary, and supply-side (Phelps 1990) in current discussions and expositions of varieties of macroeconomic theories. I have come to prefer the unhyphenated terms for reasons of simple aesthetics. However, I shall, occasionally, also use *post Keynesian* when referring to secondary references.

(**) This chapter is dedicated to the noble memory of one of the most original and courageous Post Keynesian economists I have known, personally and professionally, Wynne Godley. I cannot think of anyone more naturally and intrinsically encapsulating the honest and fierce spirit of Maynard Keynes at his intellectual best than Wynne Godley. I first met Wynne Godley at a wonderful lunch at Mario Nuti's home, in Cambridge, in 1977. Subsequently, I have had the pleasure and privilege of knowing him, professionally and personally, for over thirty years—hosting him in Denmark, Italy, Ireland, and even in Cambridge. The high point of my brief tenure as a Fellow of Girton College, Cambridge, was when I had the opportunity to invite Wynne Godley to give the annual lecture at the College's Joan Robinson Society, in spring 2007. His last book, coauthored with Marc Lavoie (2007), is, in my opinion, one of the best, most pedagogical books on monetary macrodynamics in the grand tradition of Wicksell, Lindahl, Keynes, and Myrdal. I hope the precepts I am trying to fashion in this chapter are, in some way, a reflection of some of what I have learned from Wynne Godley. I am immensely indebted to my colleague and friend, Professor Anwar Shaikh, for frank and critical comments on this paper. He is definitely NOT responsible for the many remaining infelicities in the paper, both analytical and doctrine historical.

(1.) On the whole, I shall not enter into the continuing debates on who or what characterizes Postkeynesian economics, except for one issue: the place that should be occupied by the neo-Wicksellians, by whom I mean the second-generation Swedish Wicksellians, Lindahl, Myrdal, Hammarskjöld, and Lundberg (but *not* Ohlin). I leave these debates—perhaps they ought to be referred to as "controversies" in the warm glow left behind by Johnson (1951–52) and Harcourt (1972)—to the specialist scholars. Suffice it to acknowledge that I have been pleasurably enlightened by Hamouda and Harcourt (1988), King (2002), Harcourt (2006), Lavoie (2006), and some of the ensuing reviews (particularly Fontana 2005 and Tymoigne and Lee 2003–4). I would be dishonest if I did not also confess that I was both mystified and saddened—from a purely intellectual point of view—by the review of King (2002) by Davidson (2003–4).

(2.) As always, Hicks with characteristic prescience, acknowledged the obvious (1973, 13):

> Marshall and Pigou are called "neo-classics"; but they were anti-classics. It is the post-Keynesians who would better be called neo-classics; for it is they who, to their honour, have wrought a Classical Revival.

(3.) Or, the theory of *ad hoc shockeries*, Richard Day's felicitous phrase to describe the modeling methodology of the New Classicals in general and the Real Business Cycle theorists in particular (cf. Day 1992, 180).

(4.) See, for example, the excellent discussion in chapter 7 of Harcourt (2006).

(5.) Obviously, Prescott did not pay attention to Stigler's (1948, 605) admonishment of Samuelson's methodology in the *Foundations of Economic Analysis* (1947):

> Some of the infinities of mathematical possibilities are discussed, but only in the most formal terms; there is no instance of the enlargement of our knowledge of economic processes in our society. Samuelson may reply that he is only providing tools, but who can know what tools we need unless he knows the material on which they will be used?

(6.) The official *neoclassical closure*—which is what unifies New Classical, New Keynesian, and even core aspects of Austrian economics—is the triptych of *preferences*, *endowments*, and *technology*, on which the maximization-equilibrium edifice stands. Variations on the triptych, like the much-hyped notion of information as a supplement to

them, adds no further insight to the sterile basis, nor its infertile superstructure. I have spent most of the last quarter of a century showing, with "officially" sanctioned mathematical rigor, that neither the neoclassical closure, nor the edifice that stands on it, is capable of handling anything remotely interesting from any formally interesting dynamic point of view (cf., for example, Velupillai 2010 and 2011). By "formally interesting dynamic point of view" I mean computation, formal dynamical systems theory (particularly nonlinear dynamics), rationality, reproducibility, evolution, and so on—issues that lie at the heart of ostensibly fractured strands of Postkeynesian economics. I take this opportunity to acknowledge Lance Taylor's priority in using the notion of "closure," although I did not know, till a few months ago, that he had been using it since at least 1979 (in joint work with Frank Lysy). I began using the word in the above sense from around 1983. I used it in the "Taylor sense of closure," still without explicit knowledge of Lance Taylor's priority, most consistently in my paper on Sen (Velupillai 2000).

(7.) King does not suggest that these are Postkeynesian precepts for an *aggregate*—i.e., *macroeconomic*—theory of fluctuations, i.e., business cycle theory. This is my extraction from King's perceptive summary. Regrettably, however, King's own various remarks, thoughts, and comments on business cycle theory in King (2002) including the entry on business cycles in King (2003) leave much to be desired. For example, in the latter (39), we are informed that "Michal Kalecki (along with Ragnar Frisch and Eugene Slutsky) was a pioneer of the external shock approach." In the former we are assured, referring to Kalecki's classic (1935, 38), that "The mathematical foundations of Kalecki's model were…assessed by Ragnar Frisch and Jan Tinbergen…. Frisch confirmed the integrity of the analysis [in Kalecki 1935]."

Unfortunately in the latter case, and fortunately in the former case, these claims are not even remotely correct.

(8.) I have in mind here, primarily, Davidson (1982–83), among the "senior" authors and, for example, Dunn (2004), among the "derivative" younger followers. Paul Davidson's paper has some technical infelicities, and, even in 1983, it was known that there were mean ergodic theorems for many realistic classes of nonstationary stochastic processes. Moreover, Davidson's paper has also some conceptual and philosophical infelicities, in addition to the technical ones. The typos are also unfortunate (LaPlace, Wald instead of Wold, etc.). The strangest assertion in Davidson's paper has to do with a serious "accusation" against Keynes: "Unfortunately, in his day, Keynes did not have access to the meticulous work of the Moscow School of Probability which developed in exacting detail the now standard theory of stochastic processes. In retrospect, therefore, we can only seek to reinterpret Keynes' fine intuition of the distinction between uncertain and probable events in terms of such processes" (188). This is false, for many reasons. First of all, the "Moscow School of Probability" underpinned their theory of stochastic processes on precisely the kind of theories of probability that Keynes rejected. Second, it is simply not true that "we can *only* seek to reinterpret Keynes' fine intuition in terms of such processes" (italics added). Neither Davidson, nor indeed Pasinetti, seems to be aware of the massive developments in algorithmic probability theory at the hands of Kolmogorov, Solomonoff, and Chaitin and that Solomonoff's starting point was the Keynesian theory of probability, as applied to statistical inference. Dunn's entry on nonergodicity in King (2003) is equally replete with technical and conceptual infelicities. For example, what is one to make of the thoroughly muddled and technically senseless following claim (King 2003, 281):

> However, as some stationary stochastic processes are non-ergodic, that is, limit cycles, non-stationarity is not a necessary condition for the existence for [*sic*!] non-ergodic processes. But all non-stationary processes are non-ergodic. Non-stationarity is thus a sufficient condition for non-ergodicity and provides an empirical foundation for Post Keynesian claims about the relevance of history and uncertainty.

What is the status, for example, of the limit cycle (expressed in polar coordinates) $\dot{r} = r(r^2 - 1)$; $\dot{\theta}$ at that value of r which makes it *unstable*?

(9.) Pasinetti, in referring to the "Walrasian behavioural model" (2007, 229) claims: "It could very simply be rejected even on the basis of the well-known principle of the possibility of emerging characteristics in the analysis of any complex system." This sentence is simply false. First, it is not true that so-called "emerging characteristics"—frankly, I am not sure what the author actually means by "emerging characteristics," but I assume, provisionally, he is referring to what has become fashionable in much of the Santa Fe–inspired agent-based economic literature—can be generated by "any complex system." Second, there is no rigorous definition of "emerging characteristic"—i.e., "emergent phenomenon"—such that it is possible to impute the phenomenon to the laws of dynamics under which "any complex system" generate such phenomena. I can generate any number

of "complex systems" that are provably incapable of generating so-called "emergent phenomena"; conversely, I can show how to generate so-called "emergent phenomena" by extremely simple systems. The evolution of the concept of "emergents," first at the hands of George Henry Lewes, inspired by John Stuart Mill and, then, intensively developed by the British emergentists (McLaughlin 1992), to resurface via von Neumann and Ulam in the modern versions, is itself a complex phenomenon that deserves more serious thought than such flippant allusions.

(10.) Kalecki, alas, always linearized, even when it was highly dubious to do so from any economic point of view. In a recent essay I have discussed, in some detail, the "time-to-build" tradition in business cycle theory (cf. Velupillai and Dharmaraj 2011). This is a tradition that goes back to volume 2 of *Das Kapital* and comes down through Böhm-Bawerk, to the "modern" era of mathematical modeling of business cycles, initiated by Tinbergen in 1931. Böhm-Bawerk's assumption, and the Austrian and, later, the neo-Austrian traditions, as well, was not linked explicitly to aggregate fluctuations. Some purists may be able to refer to the neo-Austrian notion of *traverse* as a manifestation of growth cycles. Thoughts along such lines are discussed in Velupillai and Dharmaraj (2011).

(11.) Nor do I wish to refer to Knight (1921) and his much "maligned" use of the distinction between risk and uncertainty. Most scholars are, of course, aware that both Keynes (1921) and Knight (1921) were published the same year. But few post Keynesian scholars are aware that between Lindahl's first lectures on monetary macroeconomics in 1921 (published in 1924) and his subsequent pioneering neo-Wicksellian contributions (beginning with Lindahl 1929a) to what came to be called the economics of the Stockholm School, there was Myrdal's doctoral dissertation (1927), deeply influenced by both Keynes (1921) and Knight (1921). It was this that was instrumental in the way that Wicksell's immediate Swedish macroeconomic followers, Lindahl, Myrdal, Hammarskjöld, and Lundberg, incorporated expectations and anticipations—now fashionably referred to as nonprobabilistic uncertainty—into their monetary macroeconomics, and thereby, via Brinley Thomas's London School of Economics lectures, influenced the pioneering contributions of George Shackle. But this is a story that is not central to the main theme considered in this chapter and must be left for another occasion. To complete this potted, capsule history, there are those, like Frydman and Goldberg (2007), who would also include Hayek in the Keynes-Knight nexus, at least on this issue of the risk-uncertainty divide.

(12.) Matthews, acknowledging his indebtedness to Gay Meeks, suggests that Keynes, most plausibly, may have been inspired by Hume, to use this phrase in the sense in which it was meant to be interpreted in chapter 12. However, my own—admittedly less than exhaustive "Keynes scholarship" view- is that Keynes first came across the term in Descartes, but had it strengthened in his mind when writing *A Treatise on Probability* (Keynes 1921), where Hume plays an important role. I believe it is time these connections are studied more deeply and the tangled origins sorted out more clearly.

(13.) My friend, sometime colleague, and former mentor, Mario Nuti, when he looked at Velupillai and Dharmaraj (2011), where I emphasized the crucial role of "time-to-build" in Kalecki's theories of the business cycle, wrote back as follows (email, January 21, 2011):

> I could only browse, it would take ages for me to get through it and do it full justice, but thanks for keeping me posted.
>
> The "gestation period" always had a great importance both in Kalecki's theory of capitalist macroeconomics and for his work on investment planning under socialism. All due to his own experience as the son of a manufacturer who went bankrupt, I am not sure in what cycle.

(14.) Involuntary unemployment is a concept defined at the individual level, and, therefore, mainstream economics has concentrated on "debunking" it. This is because the notion of a decision variable which is not underpinned by a "voluntary" act makes it impossible to implement it within an optimization framework, driven by "Olympian rationality" (Simon 1983, 12). For the reason that it is a concept defined at the individual level, I subsume it within the general notion of the persistence of excess capacity, as in standard Cambridge theories of the business cycle.

(15.) For example, in the canonical equation encapsulating Cambridge theories of aggregate fluctuations in nonlinear, endogenous, nonstochastic modes, this means, at the minimum, that the "initial conditions" must play a significant part in the determination of the dynamics—whether of the short-period or long-period variety, whether leading to one or another kind of attractor or remaining unclassifiable and in transition.

(16.) This is one important issue that dominates at least one strand of post Keynesian economics with links to the noble tradition of classical economics.

(17.) I have quite deliberately refrained from introducing liquidity preference as a precept in the above context for a very special reason: money, especially in the form of finance or (bank) credit, enters the Cambridge theory of aggregate fluctuations via balance sheet, national accounting, and social accounting rules that are themselves dynamic. This is particularly clear in Minsky's work, as made especially explicit in Lance Taylor's elegant formalizations (Taylor 2004, 2011; Taylor and O'Connell 1985).

(18.) Both Kalecki and Harrod (Harrod 1936a, 1936b) emphasize imperfect market structures in their theories of aggregate fluctuations; the former in pricing, especially. However, it is not clear to me that imperfect market structures are among the fundamental precepts for a Postkeynesian theory of aggregate fluctuations.

(19.) It may be apposite and necessary to point out that I am not referring to so-called "deterministic chaos" in the construction of such an equivalence.

(20.) I consider Kurihara (1955b) a repository of some of the true classics of post Keynesian economics, contrary to the obviously uninformed opinion expressed in King (2002, 9). Thus, for example, Dillard (1955), Ichimura (1955), and Kurihara (1955a) have come to play important parts in the development of various strands of post Keynesian economics, both explicitly and implicitly. Contrariwise, I do not consider Blatt (1983) of any relevance to either post Keynesian economics or as making any contribution to a Postkeynesian theory of endogenous, nonlinear, nonstochastic theory of aggregate fluctuations. Both books have "Post-Keynesian" in their titles. Incidentally, Davidson's reference to an example in Blatt (Davidson 1982–83, 186 n. 1; 1983, 204–16) is simply wrong. Blatt is not computing anything for a *limit cycle*, but for a "center" type dynamics, which is, by the way, *structurally unstable.*

(21.) I am referring to the forced Rayleigh–van der Pol equation (in the form given it in Goodwin's defining classic of Postkeynesian business cycle theory, the *Nonlinear Accelerator and the Persistence of the Business Cycle* (1951, 12): ((1.17.1))

$$\varepsilon\theta\ddot{y} + [\varepsilon + (1-a)\theta]\dot{y} - \varphi(\dot{y}) + (1-a)y = \Theta(t)$$

$\varepsilon\theta\ddot{y} + [\varepsilon + (1-a)\theta]\dot{y} - \varphi(\dot{y}) + (1-a)y = \Theta(t)$

(22.) The older, more vintage, term used for this phenomenon was trade cycle theory—although in the classics by Goodwin and Kalecki the more modern phrase was used. I shall adhere to the "more modern phrase" in this chapter, purely for simplicity, but also with the hope of engaging some variants of orthodoxy in my case for taking seriously some, at least, of the Postkeynesian analytical precepts for modeling business cycles.

(23.) In other words, since the publication of Keynes (1936), to which I shall henceforth refer simply as *GT*. However, my own understanding of Postkeynesian economics is heavily and deeply informed and influenced by the pre-Keynesian writings of Lindahl (1929a, 1929b), Myrdal (1927, 1931), Hammarskjöld (1933), and Lundberg (1937), all of whom emphasized the monetary basis of aggregate economic fluctuations. In this sense, then, I do not think of Postkeynesian economics as a vision that is confined strictly to the post-*GT* period. I cannot imagine any Postkeynesian—perhaps with the possible exception of Paul Davidson (2003–4), particularly those interested in business cycle theories—*not including* Kalecki's pioneering writings that *preceded* the *GT* (for example, Kalecki 1935) in any sensible characterization of Postkeynesian economics. Although Lundberg was published in 1937, I subscribe to Schumpeter's view (1954, 1173–74) on this classic, "But no work of this range and depth can, within a single year, be formed by an outside influence unless its author has arrived at somewhat similar conclusions by himself."

(24.) See below, section 4.

(25.) In this remarkable review of Hicks's classic, *A Contribution to the Theory of the Trade Cycle*, Goodwin unshackled the endogenous, nonlinear, nonstochastic theory from relying on the accelerator as the economy approaches the "floor." This meant the construction of a planar dynamical system generating a stable limit cycle, that was, for the first time, independent of the Rayleigh–van der Pol "cubic characteristic." This construction also provided the impetus for the *uniqueness* proof of the existence of a limit cycle, the latter routinely proved by an

appeal to the Poincaré-Bendixson theorem (see Velupillai 2008 and 2009 for complete details and references). In the standard "story" of nonlinear, nonstochastic, endogenous theories of the business cycle, the pioneering role of Goodwin (1950 and 1955) is, to the best of my knowledge, never acknowledged.

(26.) This aspect is highlighted in my essay in volume 2 of the Harcourt Festschrift (Velupillai 1997).

(27.) Thalberg was my first teacher of economics and, indeed, introduced and initiated me into the weird and wonderful world of nonlinear, endogenous, nonstochastic theories of the business cycle of the Kaldor-Goodwin-Hicks variety before I came under the magical spell of Cambridge theories of aggregate fluctuations at the feet of Goodwin himself. All this happened during an intensive, unforgettable, three-year period, 1971–73.

(28.) He had forgotten that his own references to the "first precise, quantitative cycle model" in lectures was to Tinbergen's famous *Ein Schiffbauzycklus* (1931).

(29.) Remembering that it was first presented at the celebrated Oxford IEA Conference on the "Business-Cycle in the Post-War World," in September 1952 (where Kaldor was also present and presented his contribution to the same part of the book in which Goodwin's paper was published). The relevance of the observation within parenthesis will become clear shortly.

(30.) Compare this measured reflection, on the "difficulty" of formulating Schumpeter's theory of innovation "in simple mathematical terms" to Kaldor's lofty dictum (1954, 53; italics added):

> [I]t is *not possible* to make the [Schumpeter] story as a whole into a "model" (meaning by a model the sum total of assumptions which are just sufficient—no more no less—together to provide the necessary and sufficient conditions for the generation of a recurrent cycle with a clear periodicity) without incorporating into it elements which would suffice by themselves to explain the cycle—without recourse to Schumpeter's own stage army of initiators and imitators, or even the very concept of technical progress.

Two comments are in order: one, how does Kaldor know that "it is *not possible* to make the [Schumpeter] story as a whole into a model"? Is this an "impossibility theorem" within some mathematical formalism of theories and models? Second, it is precisely the construction of a "model" to encapsulate the "Schumpeter story" that was attempted and achieved in Goodwin (1946)—but, of course, not with a clear periodicity, which was not a criterion in the "Schumpeter story."

(31.) Observe that Schumpeter uses the word "capitalistic," not "capitalist."

(32.) The original statement by Schumpeter was followed by a characteristically honest caveat (1927, 295; second set of italics added):

> *The recurring periods of prosperity of the cyclical movement are the form progress takes in capitalistic society*…. By saying this we mean to state a fact requiring both proof and explanation. Whilst we hope to be able to contribute…something towards the latter, *it is impossible here* to satisfy the reader as to the former.

Perhaps it was this last italicized phrase that prompted Kaldor to make his characteristically rash "impossibility" assertion—without the careful Schumpeterian caveat: "*here*"!

(33.) I shall, thus, from now on refer to Cambridge theories of aggregate *growth cycles*.

(34.) I should state very explicitly that Kaldor was my first Cambridge PhD supervisor, and this "privilege" of being one of his last formal doctoral students was entirely due to Geoff Harcourt's felicitous—at least as far as Geoff's intentions were concerned—intervention. Personally, the (mercifully) brief period I was Kaldor's formal pupil came to an end with the welcome return to power of the Labour government in February 1974 and I was able to sit at the feet of Goodwin for the rest of *his* life, in Cambridge and Siena.

(35.) Claims and assertions unfortunately approvingly referred to by King in his very readable, but with respect to doctrine historically multiply flawed (particularly from the point of view of Postkeynesian theories of growth cycles) book (King 2002, 63–64). Indeed, King is completely "off base" in his thoroughly unscholarly remarks on Kaldor and his early allegiance to Austrian capital theory. Kaldor came to acknowledge his errors against Frank Knight's

acute criticisms of Austrian capital theory only over twenty years after the famous *Econometrica* debates of 1937, in fact at the celebrated Corfu Conference on Capital Theory (Kaldor 1961, 294).

(36.) At this point Kaldor adds a footnote and refers to the classics of Kalecki, Goodwin, and Hicks, and to his own pioneering 1940 article on Cambridge theories of growth cycles.

(37.) To show systemic uncertainty in this kind of dynamics, as mentioned earlier, it is necessary to show that these more finessed approximate systems are capable of computation universality. For now, I am not able to offer a convincing proof, although I am fairly certain that it is possible with some concentrated work on the construction of the equivalence between the trajectory of a coupled, forced Rayleigh–van der Pol system and the computing trajectory of a Turing machine, initialized consistently with the dynamical system.

(38.) As a matter of fact this kind of behavior was shown by Chang and Smyth (1971) for the original Kaldor model, so making nonsense of Kaldor's unscholarly remarks on the pioneering works of Kalecki, Goodwin, Hicks, and Kaldor himself (as quoted and pointed out above).

(39.) There is the untenable assertion, in Minsky ([1965] 1982, 258), that "Various ceiling models of cycles or cyclical growth have appeared. In all except one, Kurihara's model, the rate of growth of the ceiling is exogenous." So far as I can see, this is just a blind paraphrasing of the incorrect claim—incorrect as to technical accuracy—in Kurihara (1960, 8 and 8 n. 5). Had they understood the difference between an autonomous planar nonlinear differential equation and its forced version, it would have been impossible for Kurihara and, hence, Minsky to make such absurd claims. This is a pity—at least for someone like me, who is fundamentally in sympathy with a Minskyan vision of credit-based capitalist economic dynamics.

(40.) "Sweden, which had a particularly sophisticated group of economists in the 1930s and a knowledgeable political leadership in their Social Democratic Party, may have knowingly introduced the welfare state" (Minsky 1992, 89 n. 23). Surely, one would have expected a sustained advocate of active policy to "stabilize an unstable (monetary) economy" to be more scholarly in studying the one actual example of theory and policy meshing admirably in the precise sense of Minsky? There is ample literature, even by the Swedes themselves, of this rich interaction (see Myrdal 1982, Lundberg 1996, and the many references therein).

(41.) The most imaginative metaphor I can think of, for this situation, is the second of the twelve labors of Hercules, the one against the Lernaen Hydra. It will not do to simply cut off head after head, when Hydra sprouts two new heads for each one cut off. Hercules had to devise an innovative strategy, of the kind that Lindahl and Myrdal devised, disciplined by the theory of economic policy, to maintain an inherently unstable monetary economy in place.

(42.) Minsky's indebtedness to Dillard's reading of chapter 17 of the *GT is* most clearly expressed in Minsky (1985, especially 7–8). No reading of chapter 17 of the *GT* can be complete without placing it in the context of Sraffa's masterly critique of Hayek, where the concept of the "own rate of interest" was first developed (Sraffa 1932). It is this notion that formed the fulcrum around which the whole of the argument of chapter 17 was formed. No wonder, then, that distinguished Keynes scholars, from Dillard and Lerner (for example, Lerner 1952), to Patinkin and Leijonhufvud, have not made much sense of this important chapter. None of these so-called Keynes scholars have ever taken the time and trouble to understand Austrian capital theory and its deep critique by Sraffa (1932) and, therefore, missed the essential monetary point in chapter 17. I am eternally grateful to Stefano Zambelli for drilling this crucial point into my obdurate mind.

(43.) As I have argued in a series of contributions, a synthesis of which can be found in Velupillai (2011).

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Post-Keynesian Approaches to Industrial Pricing: A Survey and Critique

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[–] Abstract and Keywords

This is a critical guide and commentary concerning post-Keynesian approaches toward the making of industrial prices. It focuses mainly on product or industry prices, though these pricing approaches have significant implications for the behavior of the economy overall, and in many applications within theoretical and applied economics. This field is a diverse range of contributions, many of which are in disagreement with each other. A note on how to recognize a good post-Keynesian economist or a clear post-Keynesian contribution is found as an addendum to the editors' introduction to this volume and forms the basis for our presentation in section 2 below.

Keywords: post-Keynesian economics, industrial prices, product prices, pricing approaches, pricing methods

This is a critical guide and commentary concerning post-Keynesian (PK hereafter)[1] approaches toward the making of industrial prices. We focus mainly on product or industry prices, though these pricing approaches have significant implications for the behavior of the economy overall, and in many applications within theoretical and applied economics. Our field is a diverse range of contributions, many of which are in disagreement with each other. Neville Norman has written a note on how to recognize a good PK economist or a clear PK contribution[2]. It forms the basis for the presentation in section 2 below.

There are extensive book-length surveys devoted to PK pricing approaches, as in Lee (1998) and Downward (1999). These surveys also provide very comprehensive lists of references to which we refer here to shorten our bibliography. Our approach in this chapter is to (*a*) provide a compact, contemporary insight into PK pricing approaches; (*b*) display clearly some of the properties and the variety of these approaches; (*c*) articulate the manner in which the PK pricing approaches align with, or depart from, the flavor of PK philosophy; (*d*) demonstrate the consequences of following PK rather than conventional pricing approaches; (*e*) focus on a global and not simply a closed-economy environment; and (*f*) survey and comment on the empirical verification of pricing theories, to test and demonstrate the explanatory power of PK pricing theories and approaches.

In "realistic" circumstances, there is a complex structure of prices, discounts, rebates, options, add-ons, servicing, and financing charges that make the proverbial "P" (price) extremely complex and ambiguous. We take "P" to be measured at a point in time; it may be part of a statistical series arranged on a time scale, having both a history and a (p. 444) prospect. A distinguishing feature of *PK economics* is that any observation of the economy or of any part of it is a strict selection in historical time that undergoes evolutionary change, within which the decisions about "P" (which we call "pric*ing*") are at least partially caused by, and then impact upon, these dynamic processes.

1. Post-Keynesian Pricing Approaches: The Underlying Story

1.1. Features Common to All Post-Keynesian Pricing Hypotheses

In the overall PK approach to pricing there is a complex and imperfectly understood economy in the background: its legal system, regulations, spending, taxes, factor markets, foreign entities, governments, and potential rival producers interact with the domain of PK price-setting firms. Mistakes are commonly made, equilibrium conditions are seldom met, distortions and corrections abound, and forward momentum and change are evident to all. Decision makers that are part of our PK pricing story are conscious of the lessons of history, which they do not necessarily or fully heed, and of the future, for which they plan, if imperfectly. There is slackness most of the time, including unemployment and underutilization of capital. Many attempts to explain or justify sticky prices do not capture all or most of the features of this PK decision-making environment.

The prices we are mainly concerned with are set by business firms, and sometimes even by an individual firm. The firms can be variously sole traders, companies, or large conglomerates; they will frequently market many products, often subject to quality and product changes. Product differentiation is almost universal, though the knowledge by firms and buyers of exact product characteristics can often be limited. This means that optimizing procedures invoking demand curves and parameters derived from them, such as demand elasticities, are *not* part of this PK setup.

On the production or provision side, costs and technology are subject to change, and firms need to be aware of their options. One of the features of the PK pricing environment is the close connection between the pricing and investment decision, recalling that investment is the means of changing the capital base or of embodying new technology. Firms in the PK setup are conscious of all these things, but most importantly they are *conscious* that their information is deficient, especially in relation to possible shifts in demand conditions, or even in relation to demand aspects beyond the current price and rates of sales volumes that they observe.

Most pricing analyses in economics, and not just in the PK domain, have tended to neglect the retail or services sector, including the value-added stage beyond manufacturing or in relation to the services linked to manufactured products, such as accounting, (p. 445) consulting, and maintenance. We, too, will mostly be involved with wholesale or industrial price formation in this survey.

This PK environment is already so different from the non-post-Keynesian (NPK) setup that we need briefly and by way of contrast to record how the NPK pricing approach proceeds. In the NPK approach there is either (*a*) *perfect competition*, with price determined by supply and demand in an extreme form of market, where individual firms choose how much to supply at the market-determined price; or (*b*) *imperfect competition*, where the firms set prices to maximize profits using full information about their revenue and cost conditions. The former is typically applied to commodity and financial markets. In case (b) the business goal is nearly always single-period profit maximization. (Some notable exceptions to the profit-only goal include [1] sales maximization, commonly within a minimum-profit constraint; [2] future considerations embodied in limit pricing models; and [3] risk-aversion approaches.) The price is set by the usual marginal conditions and is adjusted whenever demand and/or cost conditions undergo any change.

PK firms are either fledglings with limited start-up information, or experienced firms with good information about their costs and only partial information about what NPK economists call a firm's demand or "average revenue" curve. As existing operators they know a starting price and volume of sales. They are uncertain about the demand schedule, beyond the current trading range, or whether it might remain there. They can form expectations of a reliable or normal range for their output volume and compute unit costs relevant to that normal range. This is the "normal unit cost" that is central to most PK pricing explanations.

1.2. The Notion of Normal(ized) Unit Costs

It is reasonable to assume that earning profits is firmly among the goals of PK firms, though not necessarily profit maximization in any single-period or continuous sense. The motivation of seeking some security about profits, rather than striving for their maxima without regard for risk, fits well with most PK pricing approaches. Such an approach was clearly expressed in Rothschild (1947), as cited in Lee (1998). Firms that neglect profits are likely to fail or to be taken over. PK firms have the power to set and adjust prices and are always conscious of making mistakes. PK firms require the price to cover their operating unit costs and provide a margin for profit, overheads,

and internal financing of business investment. Such a price can be called the PK price and can be represented by a markup equation that in plain words simply states: PK Price *equals* Normal unit cost *plus* a PK (costing)[3] margin.

Normal unit costs (NUC) do not vary as the firm's own output changes and shift only when factor prices like wage rates, materials prices, or technology move them. We can also count indirect taxes as a cost. Some of the forces generating these factor price and (p. 446) technology changes are longer term and can be assumed to be constant in short periods; some may reflect movements in economic policy, such as taxes, tariffs, and regulation. Short-term movements in the rate of demand for product in the context considered here do not by definition affect NUC. Nor do they affect the costing margin, which is arrived at through experience. This margin is stable, perhaps in percentage terms, reflecting the competitive situation and market power of the enterprises involved. In our view a central feature of PK pricing approaches implies that short-term fluctuations in demand reflected in sales volumes of the PK firms do *not* require the need for them to make price revisions.

Cost movements, meaning *shifts* in NUC, *always* lead to price adjustment in the same direction. In the most rigid form of the PK pricing models, the percentage markup model, the percentage change in the PK price equals the percentage change in NUC, preserving proportionality between the two at all times.

Customer-oriented firms will wish to keep prices stable for their buyers to maintain goodwill and encourage repeat sales. If rivals change their prices, this will not necessarily cause firms to match the price change. However, if unit costs themselves shift, the implicit understanding among rivals is that all have similar cost conditions and little risk is attached to moving prices when costs move. This can be called "implicit collusion" or "conscious parallelism"; each concept, used commonly in applied antitrust economics, captures the essence of PK pricing. There is a degree of asymmetrical information here, not in the usual sense, but because PK economists suppose, with strong evidence, that firms have good information about their costs and cost relationships with output volumes, but poor information about demand relationships.

In the global pricing domain, the same PK explanations for pricing responses prevail: home firms gear their prices to their own NUCs, which are largely unaffected by tariff and exchange rate changes impacting on rival products; however, (materials input) tariff and exchange rate changes *do* affect NUCs, in which case, consistently, prices *do* move, in proportion to the cost shift. This approach has been developed in Norman (1996).

1.3. The Normal Price Hypothesis

One specific version of the PK pricing approach is the *normal price hypothesis* (NPH).[4] Godley ([1959] 1976) used national accounts data on costs, profits, and the value of output to show that the price-to-unit-cost ratio was procyclical, but when unit costs were adjusted using normal rather than actual output, the price-cost ratio was invariant to the business cycle. The NPH gave a clear explanation as to why profits are a strongly procyclical component of national income as shown in Godley ([1959] 1976) and Coutts (1978). The essential behavioral elements of the NPH can be illustrated in two diagrams.

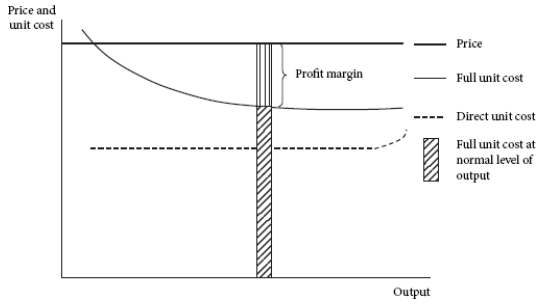
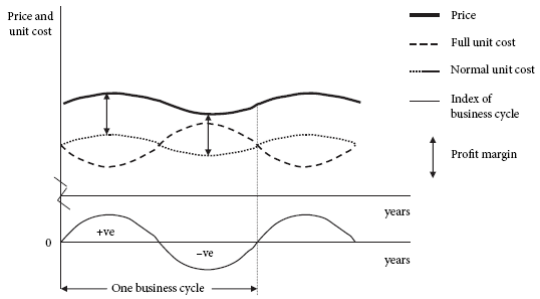


Figure 1.18.1 Normal price hypothesis—static setting.

In figure 1.18.1, a static description *only* of price-setting, direct average costs are approximately constant for most of the variation in the firm's output range consistent with existing installed capacity. Indirect costs per unit of output are added to direct costs to give full unit cost of production. Many of the indirect costs are akin to overheads and are not likely to vary much with output, so unit costs will fall with increased output. The (p. 447) shape of this curve is largely determined by variation in costs associated with overtime and bonus payments for labor and with the variation of productivity at varying levels of capacity utilization. Productivity is likely to be procyclical and

dominate any procyclical variation in labor costs.

The NPH firm calculates its unit costs when operating at a conventional or normal level of output. These costs depend on existing rates of pay for its labor, including overtime rates and bonuses, on current contracts for materials purchases and energy, and on the degree of capacity utilization chosen for the costing. This normal level of unit cost is shown as the striped rectangle. The firm adds a profit markup to normal unit cost to arrive at the price. As the firm's short-run demand volume varies, it will attempt to meet the sales by varying its production, using its inventories, or lengthening order books at the current price. The vertical gap between price and full unit cost indicates the profit per unit of output achieved as output varies. This clearly shows that profit per unit of output increases with increased output.



Click to view larger

Figure 1.18.2 Normal price hypothesis-dynamic behavoir.

Figure 1.18.2 illustrates the dynamic behavior of prices over the course of a business cycle. The lower half shows an index of the business cycle. This is an *ex post* (and highly stylized) representation of the business cycle. The NPH firm has no strong information on the path of the business cycle, just as it has no strong information on the price-elasticity demand for its product. The dashed line indicates how actual unit costs might vary over the cycle. They vary for two sets of reasons: the first because of changes in costs that are external to the firm; the second from costs that reflect the variation in the firm's capacity utilization and hence its output over the business cycle. The dotted line shows the same unit costs measured at normal output over the cycle. These costs are shown to be mildly procyclical, while actual unit costs are shown as countercyclical. The reason for this important distinction is to show that over the course of the business cycle, wage rates may increase as the labor market tightens at a higher level of activity. Also, **(p. 448)** the general increase in demand across the economy may put upward pressure on materials prices that are traded on markets where prices move significantly with demand. These mildly procyclical elements in the firm's unit costs are likely to be dominated by the increase in productivity that occurs when the firm is operating at a higher level of capacity utilization.

The NPH states that the profit markup that firms add to normal unit costs does not vary significantly within the business cycle. If normal unit costs are procyclical, then the NPH predicts that prices will also be procyclical. Econometric tests of industrial prices and demand would show that price varies positively with demand, but the NPH implies that it varies only to the extent that normal unit costs vary with demand. The diagram also illustrates the implied cyclical behavior of profits over the business cycle.

In section 3 we outline some of the many important variants of PK pricing approaches, where the various authors attribute importance to key concepts such as full-cost, normal-cost, markup, and other variants of PK pricing. We have deferred discussion of these differences in this section, in the interest of focusing on the central unifying features of PK pricing.

2. How and in What Respects Do PK Pricing Approaches Differ from Conventional Approaches?

We provide here some specific comparisons between PK pricing models and those models of price-output determination derived from the mainstream literature that aim to **(p. 449)**

Table 1.18.1

Characteristic[a]	Non-Post-Keynesian approach to pricing	Post-Keynesian approach to pricing

	to pricing	
1. Purpose of the pricing hypothesis.	Explain price determination and the causes and effects of price movements.	Explain price determination and the causes and effects of price movements.
2. Treatment of time.	Usually one-period models; some advanced approaches use dynamic optimization techniques.	Historical time with past and future consciousness of decision makers; any single period is a selection from explicit history.
3. Supposed business motivation goal.	Single-period profit maximization, mostly. Can be sales maximization. In advanced models, the present-value of a profit stream will be commonly assumed.	Can include profit maximization, always with past learning and future consciousness; risk consciousness is paramount, especially in relation to uncertainties surrounding demand factors.
4. Information base for pricing decisions, as presumed by the price-setting firms involved.	Full and complete information about all relevant causative factors (usually demand and cost functions) and their connections to the business goal.	Imperfect knowledge, especially about demand function positions and shifts, competitive strategies and their consequences for own-firm demand conditions; good knowledge about costs at the normal rate of output, which thus become a reliable base for pricing decisions.
5. Economy-wide relevance.	No explicit connection to the macro economy; the broader economy is presumed to be irrelevant or neutral in relation to business pricing decisions. Macroeconomic implications tend to depend on representative agent aggregation.	Inherent potential macroeconomic instability; distorted determination of prices and wages through the economy. Decision makers are conscious that prospective future demand movements in the overall economy and their own product sectors are difficult to predict.
6. Industry conditions and link to competitors/rivals.	Neoclassical imperfect competition models presume the firms are aware of their own market power and have explicit consciousness of any rivals and the risks of entry (where permitted) in setting prices. Capital equipment is fine-tuned to its uses and fully utilized.	Imperfect competition and information is clearly recognized by price-making firms, as are distortions about product and factor markets; there is significant rival consciousness. Demand uncertainty causes all firms deliberately to create significant excess capacity to avoid the penalties of not being able to meet unexpected surges in demand.
7. Sensitivity of price to demand shifts.	Positive and significant link from any demand movements to price adjustments is typical.	Markup models imply zero response of prices in relation to movements in industry and macro demand pressure. More general PK approaches have a very limited and insignificant connection to at least short-term movements in demand volumes.
8. Sensitivity of price to (foreign) rival prices as affected by exchange rates, tariffs and world price movements.	Home producers match duty/exchange corrected rival import prices and price movements; the law of “one price” or (the inverse form of) purchasing-power parity prevails everywhere.	Domestic producers set prices according to costs with little or no reference to rival (imperfectly substitutable) import prices. Cost changing working through import prices will be reflected in (finished-goods or more fully processed) product prices.

9. Sensitivity of price in relation to sustained unit cost shifts.	Partial positive shifting of indirect taxes (costs) into prices. In linear demand models with constant marginal cost, the pass-through coefficient is less than 50 percent.	Full (100 percent) shifting of any and all (normal) cost changes into prices in markup models, and close to 100 percent in more general PK pricing approaches.
10. Sensitivity of prices in relation to indirect tax shifts.	Partial positive shifting of indirect taxes (costs) into prices: never anywhere near 100 percent shifting of taxes.	Full (100 percent) shifting of indirect taxes (seen as costs) into product prices in markup models.[b]

([a]) These characteristics are those found in the note cited at note 2 above, with some specific additions here that are relevant only to pricing hypotheses.

([b]) Much work associated with Douglas Mair gives a PK approach to the incidence of taxation, as in his joint chapter with Damania in Arestis and Chick (1992) cited in Lee (1998), though the emphasis is on distribution and macroeconomic policy rather than price effects.

explain pricing under conditions of imperfect competition. We summarize the central features and differences in tabular form. Close inspection of the table will reveal clearly the main distinctions and differences between the PK and NPK approaches to pricing.

Close study of table 1.18.1 reveals significant differences in these variants of pricing hypotheses. We have thus highlighted important and (mostly) irreconcilable differences (p. 450) between PK pricing theory and the marginalist theory derived from standard imperfect competition analysis. PK theory implies that costs of production, including overhead costs, indirect taxes, tariffs, and so on, are passed into price changes, directly in proportion to their contribution to unit cost. The *degree* to which such costs are passed on in the marginalist theory varies from zero to a fractional proportion (only to the extent that such costs alter marginal cost and in general a 1 percent increase in marginal cost leads to less than 0.5 percent increase in price). Similarly, PK theory implies that demand changes have a much smaller influence on price than cost changes, in the short run. The marginalist theory *always* implies that demand has some significant effect (otherwise firms would not be profit-maximizing).[5] These different predictions from the PK and conventional theory are directly testable hypotheses. Our survey of tests is found in section 5 below.

(p. 451) **3. Some Specific PK Pricing Approaches**

3.1. Hall, Hitch, and the Oxford Research Group

The first and clearest statement of the normal-cost-pricing doctrine is found in the work arising from Hall, Hitch, and the Oxford Research Group in the 1930s, which was continued and elaborated by Philip Andrews. The surveys found limited regard for demand factors and a propensity of nearly all firms to relate their prices to (normalized, unit) costs by applying a fairly stable margin to them to make the demand-insensitive price. Fuller details of the setup of the Oxford Research Group, the interviews with business firms and records and meetings from 1934 to 1939 are found in Lee (1998). It is worth recalling Shackle's remarks noted in Lee (1998, 87) that "businessmen were describing how they set prices in the face of constant and unforeknowable shifts in market conditions, changes in technological knowledge, financial conditions, and politics (in contrast to theories where full knowledge of all market conditions was presumed)." It is noted also in Lee (1998, 89) that all but two members of the group came initially to the project as "confirmed marginalists" who surprisingly then "failed to uncover *any* evidence that the businessmen paid *any* attention to marginal revenue or (derivatives like) price elasticities of demand. The Oxford economists were shocked, to say the least." It is intriguing that Hall and Hitch developed the kinked-demand curve explanation without noticing that it presumed the same degree of commitment to marginalism, of a different form, as in the imperfect competition theory they chose to repudiate. (See Lee (1998), 89–99).

The Oxford group findings are *not* consistent with Machlup's attempted reconciliation of the group's findings with

marginalism, asserting that business firms setting prices might still act "as if" they knew and understood the marginalist concepts. The great advantage of the Oxford studies is that the matter was pursued very fully and directly with the respondents. Not only did they *not know* the marginal curves, *they did not act consistently with them*. This can be shown in the two ways, which are described in the previous section: (1) cost-based firms do not move prices in response to short-term reversible changes in product demand; imperfect competition firms always do; (2) cost-based pricing firms shift sustained (normal) cost changes fully into prices (that is, 100 percent shifting occurs), whereas marginalist imperfect competition firms never shift more than a fraction of the cost increases into prices.[6]

3.2. The Contribution of P. W. S. Andrews to PK Pricing

Andrews's contribution has been documented most closely and impressively by Fred Lee (1998) and in Lee and Irving-Lessmann (LIL) (1992), as cited in Lee (1998).

He sought to explain his approach in *Manufacturing Business* (Andrews 1949, also cited in Lee 1998). This approach was strongly criticized by Machlup and others. Andrews gave no effective reply for academic and personal reasons, at least until **(p. 452)** Andrews (1964), cited in Lee (1998). There is mention of Andrews's time treatment as "the current planning period" (47); Downward notes that Andrews is far from clear about the business motives of the firms (49) and attributes to Andrews "a perfectly-elastic long-run demand curve" (49). Carefully and consistently with strict PK principles, Lee (1998) (e.g., 110) draws cost but *not demand diagrams*, when explaining Andrews and other PK pricing theories.

Andrews complicated his message by emphasizing distinctions between full-cost and normal-cost pricing that were not apparently or clearly different from each other. (LIL 1992, 289). LIL (1992, 288) describes Andrews's pricing explanation as being based on normalized indirect (overheads) but uncorrected (actual) direct or variable costs. Such an inference can reasonably be gleaned from Andrews (1949, 157). However, in two earlier references in his 1949 book, Andrews makes it plain that (*a*) average direct costs are "constant" over large ranges of output (103), but in any event, for "pricing, then, it is the *normal* level of average direct costs that will be the important thing" (110). Read in context, the earlier references are clearer and that on page 157 is deficient and needs to be replaced by the earlier, clearer descriptions.

Andrews understood the importance of internal financing, but he "never made a formal connection between the financing of investment and the costing margin" (Lee (1998), 124). Andrews is thus rightly criticized for failing to see and postulate theoretical links between the pricing and investment decision (Lee, 124), but he understood clearly the motivation of creating deliberate excess capacity, or "reserves," as a contingency against unforeseen surges in business demand. Andrews writes that demand uncertainty, machine failure risks and the threat of losing the reputation to supply "simply make for reserve capacity" (93), especially the need to cover "peak levels of capacity" (97). Reserves are thus "deliberate and planned for" (117). This clear vision of the connection between excess capacity, capacity creation, and pricing has won much support in later years and was the inspiration for Wood, Harcourt and Kenyon, and Eichner (as cited in Downward 1999, 49) for their own pricing approaches connecting pricing to investment (that is, capacity-creation) behavior.

Andrews is at his best and is fully consistent with the PK pricing approaches by proposing the notion of extraordinary costs, being driven by unforeseen movements in demand and which are ignored when setting prices (1949, 109–10, also 174). Short-term demand movements are thus not manifested in price movements, as firms have a notion of a "right" price that can only be disturbed when (normal) unit costs change (157–58). Andrews makes persistent reference to business firms being conscious that they can and will make "mistakes," which captures exactly the PK environment for decision making (e.g., 167–69). Like Kalecki, Andrews agrees that in markets for *primary* product sales, demand impacts significantly on prices (207–15). These are all strong pro-PK pricing features emphasized in Andrews's work.

Andrews in many places departs from a fully consistent notion of PK pricing. The most prominent departure comes with diagrams 3 and 4 on pages 255–56, which show revenue functions yielding break-even rates of output, where profits are at zero. It does seem that Andrews failed to clarify that such demonstrations were inconsistent with the **(p. 453)** central tenets of the pricing hypothesis he was seeking to advance, which was based on the contrary premise of unknown demand conditions.

In the places where Andrews does seek to make some connection with mainstream economics he implicitly slips into a static, one-period framework, which at the end of his book he seems to realize is unacceptably "static" (282). Lee (1998) correctly states that Andrews did not effectively offer an alternative theory to mainstream pricing theory, even though he sketched vestiges of such a theory, including the role of entry-deterrence in determining the markup factor. (See Lee 1998, 109–16.)

Philip Andrews arguably missed the chance to develop a fully consistent PK pricing approach, either because (*a*) he could not remain consistent to a demand-uncertain dynamic world; or (*b*) he did not see that the many attempts he made to reconcile his approach with marginalist approaches were untenable. He leaves a valuable legacy that has had a great influence on PK pricing theory, not least through the enduring influence on and of his student, Wynne Godley.

3.3. Kalecki's Pricing Approach

A comprehensive account of Michał Kalecki's pricing approach is given in Kriesler's seminal 1987 work cited in Lee (1998). The advantage of this careful exposition is that it illustrates Kalecki's struggle to handle the relationship between firms within a group in the way in which they set and adjusted their prices, and how Kalecki changed his own mind on this central subject over time. It is easy to cite Kalecki's renowned pricing equation (below) as a piece of simple algebra, without seeing the background and the dynamics in Kalecki's thought processes.[7]

First, Kalecki used pricing more as an adjunct to his concerns about business cycles and income distribution than as an end in itself. Second, Kalecki swung between an apparent sympathy with marginalist reasoning and at other times a clear rejection of the marginalist approach, as documented in Kriesler's (1987) account, cited in Lee (1998), in which the core chapters are divided into three epochs in the development of Kalecki's thought. With the rider that Kalecki left materials and primary-product pricing in the market-determined area, Kalecki asserted that *industrial* prices were set according to a formula:

$$p = mu + np*.$$

p=mu+np*.

[8]

Here, p is the price chosen by price-making firms, u is their unit costs, akin to average variable costs, and p* is an average of prices of other firms in the group. Kalecki made no use of normalized cost concepts to which the Oxford group, Andrews, and later Godley and his team were so attached.

Conveniently, there are some neat special cases found by limiting the important parameters m and n in Kalecki's pricing equation: (*a*) with m = 0 and n = 1, we have p = p*, the price-to-market perfect competition case where firms have no market power (p. 454) to practice pricing independence from their rivals; and (*b*) with m > 0, n = 0, we have the strict markup case, p = mu, with which many PK economists can identify. However, many PK adherents, and almost certainly Andrews and the Oxford group, would not say it needed the extreme monopoly case to justify case (b): it would be enough for firms with *any* market power to be fearful of the consequences of relying on signals from market demand to work closely to a relationship like p = mu, which implies that industrial prices are proportional to unit costs.

In the general Kaleckian case of both *m* and *n* greater than zero, the greater the ratio of m/n, the greater is the firm's market power, a point that Kalecki needed to establish the link back to his concerns with factor income distribution and to the macroeconomic effects of market power. The computable markup needs an explanation in terms of the size of both *m* and *n*, which when questioned, led Kalecki to resort to marginalist terms that if applicable and understood by the firms would have played right into neoclassical hands and obviated the need for Kalecki's equation. This point is identified in Lee (1998).[9]

Kalecki's pricing hypotheses evolved and changed over a long period from about 1926 to after 1960. They extended further into the economics of business cycles and income distribution than most of the other PK approaches surveyed here. By contrast, Kalecki gave less attention than the others to the factors determining the markup, to business surveys, and to resolving formal difficulties without resort to marginalist explanations. This left his pricing equation open to contrary interpretations by marginalist and heterodox economists alike, as clearly

observed in Lee (1998, 172–78). While Kalecki achieved so much by taking pricing into economy-wide and distributional applications, it would be harsh but not inaccurate to say these are best seen as adopting a simple p = mu version of markup pricing without any of the additional insights that Kalecki sought, with difficulty, to add through his augmented and controversial term np*.

3.4. Alfred Eichner and Pricing in the Megacorp

The notion that the business markup so simplified by Kalecki may be associated with the expanding capital-equipment needs of the enterprise was taken up in the 1960s by Ball ([1964] 1973). Set in a medium-run of sales growth with a trade-off between current and future profit objectives, the theory was a modified form of administered pricing in which price, output, and investment decisions were jointly determined. These ideas were more fully developed in the 1970s by a number of PK economists, led especially by Harcourt (1972), Harcourt and Kenyon (1976), Wood (1975), and Eichner (1973 and 1976), as cited in Lee (1998).[10] The broad idea is that business firms see expansion through real investment and pricing decisions as closely related, and in a world of imperfect capital markets, pricing assists in providing internal finance, subject to constraints recognized by the firms in attracting reaction from potential entrants, customers, and regulators, if prices are adjusted too far upward.

The most explicit approach is in Eichner (1973), cited in Lee (1998). Firms have known investment needs, which can be depicted on an investment-demand schedule similar to **(p. 455)** Keynes's marginal-efficiency of capital construction.[11] Eichner's firms can finance their investment demands at a known external (exogenous) interest rate or by using internal funds available from their business margins. There is no explicit mention of the option to raise funds by issuing equity capital. Higher interest rates force the financing mix more toward internal funds and lead to higher than otherwise unit margins, and prices. The great advantage of this construction by Eichner is that, based on his observations from industry directly and his independence from conventional approaches, he establishes a link between business investment activity, prices, and the business markup. Cost changes dominate demand effects in explaining price changes, making Eichner's pricing in his "Megacorp model" a genuine if different member of the PK pricing school.

We have thus a wide range of PK pricing approaches to use, which have differences and conflicts with each other. Our view is that all PK pricing approaches contain important elements that depart far more substantially from textbook-conventional marginalist approaches than they do from each other.

4. Global Pricing and Links to International Economic Policy

Prices are influenced by, and influence, many cross-border features of modern economies, such as tariffs, exchange rates, international economic conditions, exports, imports, and capital flows. PK economists have made many significant contributions in this area, especially in relation to balance-of-payments-constrained models of economic development. However, in the absence of much attention by PK economists to *pricing at the firm and industry level associated with global events and policies*, conventional, marginalist approaches dominate the teaching and policy discussions of tariffs, exchange rates, and trade policy. For example, there is very little that is "micro, international and price-based" in the significant *Journal of Post Keynesian Economics*, published continuously since 1978. Again, in Fred Lee's otherwise comprehensive and masterful survey and extension of PK pricing, there is but one brief mention of international aspects, on his penultimate page (Lee (1998, 230). Similarly, international aspects are almost totally absent in Paul Downward's book-length survey of PK pricing and related economics (Downward (1999)).

It is understandable that the Oxford Research Group and Andrews gave no specific attention to international factors in their study of British industrial firms of the 1930s and 1940s; the neglect of more recent PK economists is more difficult to explain. We emphasize that we are here concerned with pricing at the industry or firm level, not economy-wide or balance-of-payments approaches in PK economics, which are quite fully developed. A central issue in the minds of those more conscious of the foreign dimension centers on the flexibility of the markup in the face of foreign competition. Here we can identity three possible approaches.

(p. 456) The first method, which is dominant in mainstream economics, is to suppose that any domestic firms are totally constrained in their pricing by the (import-duty-corrected) prices of rival imported products, or by foreign firms operating abroad, in relation to export markets. The underlying premises are normally perfect substitutability

(homogenous products) between items produced either at "home" or abroad and that home production takes place always in markets characterized by perfect competition. (Lying further behind this structure is the fixed-technology, full-employment stationary state.) The consequences are that there is effectively no pricing decision to be made by home producers or suppliers in any active sense: home producers slavishly follow import prices, meaning that exchange rate and tariff changes are fully reflected in the domestic prices of both home and foreign goods. We will examine this extreme proposition in our empirical section to follow.

A second approach is widely embraced by some PK economists, especially in the spirit of Michał Kalecki. The approach takes the markup as flexible and dependent on foreign influences. In this approach both unit production costs and rival prices are relevant in explaining prices, just as in Kalecki's most prominent pricing equation, where these variables are the *only* explanatory variables. An exploration of this middle course is given in Blecker (1999, 124–26). One problem here is that the theory connecting the markup to competitor price reactions cannot normally be specified without reverting to marginalist analysis that is potentially in conflict with PK principles. Blecker writes that "Kalecki himself never explicitly considered international competition as a factor influencing mark-ups" (124). Blecker justifies this by mentioning how insulated were most economies in Kalecki's time, a not unreasonable observation. He then sketches a general account of how opening domestic markets to foreign competition might lower the markup, consistent with this second approach, but there is nothing specific or testable in this account.

An extreme third approach takes the markup as *fixed* in the face of foreign competition and in the face of changes in world product prices, tariffs, and exchange rates. This approach is most fully developed in Norman (1996). This procedure is at the opposite end of the spectrum of markup flexibility assumptions made by assertion in nearly all conventional trade theory. This approach is also completely faithful to the Oxford Research Group findings adopting the postulate of rigidity of the markup in the face of product demand variations observed by price-setting firms.[12] In this sense the third approach is most closely aligned to strict PK pricing approaches in the context of global competition. That point is affirmed by Brinkman (1999, 96–104), who cites it as the classic means of analyzing the effects of tariff policy in a manner that follows strict PK principles.

In many PK pricing approaches there is no explicit or conscious recognition of the world economy, foreign competitors, tariffs, exchange rates, or any of the standard components of open-economy economics. Yet we have identified the core of a genuine PK pricing approach in a global setting with both the flexible markup (mainly neo-Kaleckian) variants, documented as the second approach above, and the rigid markup (more strictly Andrewsian) variants, identified as the third approach above. The **(p. 457)** choice between the three approaches is significant for the prediction of price effects that arise from trade policy, exchange rate changes, and foreign price variations. Suppose, for example, that the domestic prices of imported products were to rise sustainably by 10 percent. The conventional models that dominate the literature would predict a similar 10 percent price response from domestically produced competitive products. The Norman-Oxonian fixed markup approach will steadfastly predict a zero or close to zero domestic product price response. The flex-price, neo-Kaleckian approaches will have something in between these extremes as a domestic-product-price response. We think it important to keep these predicted outcomes firmly in mind as a prelude to our empirical surveys and results provided here. The results are very encouraging to the further development of PK pricing approaches in a global setting and cast considerable doubt on the value and credibility of the conventional models in policy advice and prediction.

We thus identify the further development of PK pricing models in a global setting as one of the real and pressing opportunities for economists in the years ahead.

5. The Validation and Testing of Pricing Approaches

We have established that the setting, business motivation, information base, and price responses of PK pricing approaches are both different from, and mostly irreconcilable with, mainstream pricing hypotheses. It is important now to confront the different approaches with the evidence. There are two main verification methods available: (*a*) asking firms through direct surveys, and (*b*) statistical/econometric analysis of price and related data. The prominent recent interest of central banks in many countries in price surveys and modern statistical analysis have facilitated advances in both methods, which we report here.

5.1. The Survey Evidence

Our focus here is upon large-scale professional surveys conducted mainly and recently by central banks, whose interests are driven by understanding the effectiveness of monetary policy. In previous times, the survey methods were more limited in scope. As a vital preliminary to considering the recent large-scale surveys, it is useful to recall the reports from the intensive questioning of a small number of British Midlands firms by Hall and Hitch, which became the inspiration for the normal price hypothesis doctrine described in this chapter.

The most accessible report of their industrial pricing surveys is found in Wilson and Andrews's book *Oxford Studies in the Price Mechanism* (114–16; cited here as "W&A") which is cited in Lee (1998). It reports the interviews with thirty-eight firms, mainly **(p. 458)** manufacturing (and also two retailers and two builders) around Oxford and the Midlands of the UK. The findings are as Hall and Hitch report them, in italics here. We integrate our own commentary from a PK pricing perspective.

(1) *Producers cannot know their demand or marginal revenue curves (because): (a) they do not know consumers' preferences; (b) most producers are oligopolists, and do not know what the reactions of their competitors would be to a change in price.* This is perhaps the clearest statement of pure PK pricing in the literature. Hall and Hitch, however, later descended into marginalist territory by seeking to explain their results with a kinked demand curve (W&A 117, 118), the use of which directly contradicts this powerful main finding.
(2) *Although producers do not know what their competitors would do if they cut prices, they fear that they would also cut.* This is a classic reflection of the imperfect *information* doctrine that standard "imperfect *competition*" approaches fail to capture.
(3) *Although they do not know what their competitors would do if they raised prices, they fear that they would not raise them much at all or as much.* We would in recent years describe points (2) and (3), together, as the pessimistic psychology feature of the kinked-demand curve approach.
(4) *Prices are not lowered by actual or tacit agreement among producers because of the conviction that the elasticity of demand for the group of products is insufficient to make this course pay*. This point strays into the marginalism that Hall and Hitch otherwise believe is not consistent with the pricing behavior they observed.
(5) *If prices are in the neighborhood of full cost, they are not raised (because of the likelihood of) new entrants in the long run.* In modern parlance, this is an early description of strategic "limit-pricing" behavior developed by Sylos-Labini (1962) as cited in Lee (1998).
(6) *Changes in price are frequently very costly, a nuisance to salesmen, and are disliked by merchants and consumers.* We would describe this observation as a transactions-cost argument for relative price stability and as giving some support for the theory of customer markets developed in Okun (1981). It reinforces the reluctance of firms to depart from a fairly rigid cost-price relationship.

Hall and Hitch's finding that "pure competition, pure oligopoly and pure monopoly are rarely found in the real business world" (W&A 122) is probably even truer today than in was in 1930s. Their attempt to explain why many of their respondents are structurally but not operationally like Chamberlin's monopolistic competition (W&A 124) is open territory for Machlup's assault on cost-based pricing (that ignorance by firms of their marginal revenue curve does not stop them behaving "as if" they knew it).

Close study of the specific pages on which Hall and Hitch report their findings (W&A 125–38) will repay the costs of doing it. There is a wide range of responses and limited support for some demand influences in the depth of the 1930s depression and when specific competitive factors arose. Hall and Hitch's findings and interpretation of the **(p. 459)** pricing forces at work are closer to a pure form of PK pricing than we find in almost any price theory developed by other writers in the PK tradition.

A comprehensive survey of pricing theory and evidence up to 1970 is found in Silberston (1970). There is a further survey of costing approaches and price behavior in chapter 11 of Lee (1998). This is a collection of twenty-five accounting/costing studies and seventy-one empirical pricing studies all cited at sections A and B of Lee (1998, 232–40). Lee finds a predominance of sticky or administered prices and close attention to unit cost computations at a normal or budgeted output, just as Andrews and the Oxford Research Group found decades earlier. While the degree of competition influences the extent to which firms take account of competitors' prices, markup pricing is still prevalent in most industrial markets.

Since about 1990 there has been a surge of large-scale studies of price behavior undertaken by economists

working in and with central banks, especially in the UK, Europe, and Australia. Central banks have the means, the motivation, and the respect to gain in-depth credible responses where private firms and independent academics are unlikely to succeed. The most useful direct account of these studies is found in Bunn and Ellis (2010) and Greenslade and Parker (2010). The former is confined to industrial prices, using a disaggregation of official producer price index data, while the latter has only 22 percent of the nearly seven hundred respondents from manufacturing itself. (By contrast, the previous 1995 Bank of England survey had 70 percent oof its respondents drawn from UK industry.) Both studies give much attention to the frequency of price adjustment, which is only indirectly our focus here. Greenslade and Parker do not report their most important findings classified by manufacturing and other sectors, which limits the usefulness of their results for our purposes. But both investigations find the dominance of cost as a basis for price movements, except in relation to demand downturns, where rival prices and demand exert some influence. Similar results are found for Australia, as reported in Park, Rayner, and D'Arcy (2010, 11): any demand-focused pricing was confined to the commodity, agricultural, and resources sector, or to tourism.

A recent large survey of more than 11,000 firms in nine European countries, carried out by euro area central banks and reported in Álvarez et al. (2006), found that "mark-up pricing is the dominant strategy," "prices respond more strongly to cost increases rather than decreases." More than 60 percent of responding firms changed prices less frequently than annually, precautionary motives in the face of incomplete information dominated the choice of cost as the preferred pricing strategy (as Andrews and the Oxford Group found sixty years previously), and seeking to establish customer loyalty was a major concern detected in the face-to-face surveys. Another large study by Fabiani et al. (2007) reports similar findings on the dominance of markup pricing.

In all these cited bank surveys since 1990, none of the simple theories purporting to explain price stickiness (menu costs, transaction costs, and customer markets) got much support, though *not one* of the researchers reporting *any* of these bank findings cites any of the PK theories surveyed in this chapter as a possible explanation, despite the close concurrence of the PK approaches documented in this chapter with the facts. In one sense, the investigators are being faithful to conventional textbook accounts, and **(p. 460)** perhaps to their own training. This reflection fortifies our finding that PK economists have much more to do to communicate their hypotheses and findings.

So what do these intensive, recent, mainly-central-bank-sponsored surveys tell us?

- Firms typically meet changes in demand within the business cycle by some combination of altering production levels from existing capacity, inventory changes, and lengthening or shortening of order books—price changes are relatively unimportant.
- Increases in the cost of wages, materials, energy, and so on appear to be more important in causing price increases than short-run demand fluctuations.
- There is some evidence for asymmetry in price increases compared with price reductions, with demand factors tending to influence price reductions more than price increases.
- The degree of competition does appear to influence the extent to which firms take into account the prices of rivals, but even in markets with a high degree of competition, markup price-setting appears to be a common practice.
- Although the details of the operational measures used to set prices differ across industries and time periods, the prevalence of markup pricing based on costs is high, in both services and manufacturing.
- While PK pricing approaches provide a conceptual support for the empirical findings, which ipso facto confirm the PK theories, the researchers appear to be unaware of the PK approaches.

We turn now to report a series of econometric approaches to testing the pricing hypotheses.

5.2. Econometric Evidence on the Prevalence of Markup Pricing

Over the last sixty years, economists have used a large body of econometric evidence to test various hypotheses about the behavior of prices. We shall focus on the evidence for manufacturing industries in relation to three main factors: (1) the cyclical properties of the price-to-cost markup; (2) the degree to which price changes move in proportion to cost changes (including the incidence of taxes such as corporate taxes); and (3) the influence of

international competition on the pricing behavior of firms operating in domestic markets.

Summarizing the evidence up to the end of the 1970s, Okun (1981, 165) noted: "The empirical evidence for the United States suggests that cost-oriented pricing is the dominant mode of behavior. Econometrically, demand is found to have little, if any, influence on prices outside the auction market for materials." Similarly, Nordhaus (1974, 183) reported: "Considerable evidence has accumulated that industrial firms tend to set prices as a mark-up on *normal* unit costs (his emphasis)…. Faced with temporary changes in demand, firms generally alter production and employment rather than price."

(p. 461) For a summary of data-based studies in this period, see the extensive references cited in Lee (1998). Coutts, Godley, and Nordhaus (1978, 72) investigated pricing equations for a number of industries, specifications of the test statistics, and lag structures, reporting that "the response to increases in demand are predominantly quantity responses, that is, the fraction of the increased demand which ends up in prices is somewhere between 22 per cent and minus 32 per cent, with a mean unconstrained estimate of 0 per cent."

Chatterji (1989) found that demand effects were relatively unimportant in the Indian manufacturing sectors, but that manufacturing prices responded strongly to supply effects in the agricultural sector. A later study by Balakrishnan (1992) found evidence for countercyclical movements of markups in India.

In what follows we give some examples of industrial-pricing econometric work published since the 1990s.

Surveying a sample of about 1,200 German firms, Stahl (2005) reported that markup pricing and price stickiness is a common finding. For Romania, another survey by Copaciu et al. (2010) found that small firms tended to adopt the market price, while medium and large firms used markup pricing. In US manufacturing at industry level, Nekarda et al. (2010) showed that markups were acyclical in response to demand changes. An OECD study by Oliveira et al. (1996) for the manufacturing sectors of fourteen countries again found evidence for counter- (rather than pro-) cyclical markups. Using data for manufacturing in the Netherlands, van Dalen et al. (1998) investigated the extent to which firms deviated from short-run profit maximization. They found that firms applied pricing rules consistent with markup pricing. Fedderke (1992) and Fedderke et al. (1997) provide evidence for South African manufacturing industry. The evidence is far more consistent with markup pricing than with the excess-demand (marginalist) model.

For the UK, Downward (2001) found that markup pricing was prevalent in manufacturing sectors and that price stickiness is a normal feature of business activity. He argued that the price-setting behavior is consistent with firms pursuing long-term objectives. Coutts and Norman (2007) found similar results for a study of aggregate and two-digit disaggregation of manufacturing for the period 1970–2000, a period that overlaps with the earlier study by Coutts, Godley, and Nordhaus (1978). From their econometric evidence, Coutts and Norman concluded that "demand pressure effects had relatively little quantitative influence on domestic manufacturing pricing" (2007).

This synoptic review of recent work, combined with the earlier studies reported in Lee (1998), gives strong evidence that manufacturing prices tend to be relatively stable in relation to unit costs, and that the main response of demand changes in the business cycles is to change output, with demand playing a minor role. The controversy is not so much about the evidence as about its interpretation.

Brinkman (1999) performed some econometric tests in relation to industrial pricing in Japan and Korea as being potentially influenced by many variables, including significant changes in trade barriers and other global-pricing influences. Brinkman found, consistently with the Norman-Oxonian hypothesis described in our section 4 above, that "tariffs and non-tariff barriers were mostly insignificant (as determinants of domestic prices) and appeared with positive as well as negative signs. These results challenge (p. 462) the conventional emphasis on policy-induced trade barriers as an explanation for high price levels and its corollary of trade liberalization as the solution to high price levels" (Brinkman 1999, 162).

The authors of this chapter have provided a more contemporary survey of interview and econometric tests of pricing in the face of international competition in Coutts and Norman (2007) and conducted more recent and detailed tests for the UK for the period 1974–2000.

The main results in Coutts and Norman (2007) are

Considerable heterogeneity in price responses to global competition between sectors within manufacturing was found. They identified three broad categories of price adjustment for the later 1990s and early 2000s:

1. Sectors that produce mainly homogeneous products traded at international prices. The chemicals and base metals sectors largely belong to this group. In both sectors, the sterling prices of imported goods fell in line with exchange rate appreciation between 1996 and 2000, and domestic prices fell substantially.
2. Sectors in which international competitor prices fell in line with the exchange rate rise, but in which domestic prices increased, or fell by modest amounts.
3. Sectors whose competitor prices fell by only about 8 percent or less, while domestic prices increased, or fell by only modest amounts.

An implication of these results is relevant to the transmission of inflation and (via the terms of trade) to swings in aggregate demand. Although a floating exchange rate will directly influence the prices of finished goods imported into domestic markets, the impact on the prices of directly competing domestic goods was rather small. Explanations of the pricing decisions of manufacturing firms will remain defective until trade and tariff theory incorporates partial price adjustment (pass-through) rather than import-price dominance as the typical outcome.

Many of these findings produce a coefficient on the import price term explaining domestic price movements in the range 15–30 percent, which would be zero in an extreme markup model (as in Norman (1996)), but 100 percent in the conventional trade-tariff-exchange model that still dominates undergraduate economics textbooks. Unpublished research by the authors using Australian data found similar results. This is a useful test because the Australian currency appreciated markedly in the years 2005–11 while domestic-product prices did *not* fall much, if at all, thus maintaining quite fully their relationship to unit costs as PK pricing approaches would have predicted.

6. Conclusions and Implications

The survey and econometric evidence strongly supports the theory that firms base their pricing decisions on a markup applied to unit costs, as PK economists consistently (p. 463) maintain. Mainstream economists accept that (apart from a few cases) the evidence does not support competitive pricing in the sense that firms take the market price and produce until price equals marginal cost. They interpret the results as consistent with imperfect competition in which price is a markup on marginal cost, where the markup depends on the ordinary price elasticity of demand.

Although our survey is about PK approaches to price behavior, we conclude by addressing how the survey and econometric evidence is interpreted in the framework that now dominates the economics literature: New Keynesian pricing in the business cycle. A substantial and influential paper by Rotemberg and Woodford (2003) sets out the framework and examines a number of models. It is based on the imperfect competition, representative-agent model with marginal costs increasing over the range of output typically experienced in the business cycle. Procyclical marginal costs are derived from Bils (1987), which arise from overtime hourly payments to workers that are only partly offset by cyclical increases in output per worker-hour worked.

Under imperfect competition, an increase in nominal demand (shifting the demand curve to the right) would normally increase the markup over marginal cost. But rising marginal costs and a markup that increases with demand would cause only a small proportion of a nominal demand increase to raise real output. Since this is at odds with all the evidence about the behavior of the business cycle and demand, and is also inconsistent with the survey and econometric evidence on the "stickiness" of prices, New Keynesian pricing models have to explain why the markup *declines* with an increase in nominal demand associated with the business cycle, that is, the implied price elasticity of demand increases when incomes expand in the upswing of the business cycle.

We have two criticisms of the New Keynesian interpretation of the evidence on price behavior. The first is to revive a critique made by Eiteman (1947) of the notion that short-run marginal costs will generally be rising in manufacturing activity.[13] Production processes in practice are likely to be designed by engineers so that the variable factor, labor, is used in the most efficient way when the plant is operating at close to its normal capacity. Rising marginal costs throughout the range of variation in output are likely to be the exception, rather than the rule for manufacturing processes.

Second, the New Keynesian approach ignores an earlier literature that investigated the shape of short-run costs in manufacturing industry. The full-cost surveys by Hall and Hitch (1939) and Andrews (1946) reported evidence for relatively flat direct unit costs of production. Early statistical estimates of cost functions by Dean (1941) and Johnston (1953, 1958) found that marginal costs were approximately constant for much of the range of short-run production.

In a later survey by Blinder et al. (1998, 102), they conclude: "The overwhelmingly bad news here (for economic theory) is that, apparently, only 11 percent of GDP is produced under conditions of rising marginal cost." A recent working paper by Nekarda and Ramey (2010) also casts doubt on the New Keynesian proposition that markups over marginal cost are generally countercyclical.

Our conclusion is therefore that reconciling the survey and other evidence with New Keynesian price theory requires, as Solow (2000) has put it in another context, "even more in the way of late-Ptolemaic epicycles."

(p. 464) We are left with two central questions. For mainstream economists: Why keep teaching and propounding pricing theory that has so little support in evidence drawn from modern economies and which is likely to mislead policymakers and students alike? For PK economists: Why have you/we failed to get (PK) evidence-confirmed pricing hypotheses into the common domain of teaching, research, and policy advice?

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Pricing Principles or Hypotheses

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Notes:

(*) We warmly acknowledge encouragement and suggestions from Geoff Harcourt and Marc Lavoie.

(1.) Throughout this chapter we use the acronym PK for *post-Keynesian* and NPK for *non-post-Keynesian*.

(2.) http://www.economics.unimelb.edu.au/who/profile.cfm?sid=41.

(3.) This term was used first by renowned PK pricing economist P. W. S. Andrews, prominently in his book cited as Andrews (1948), *Manufacturing Business*, in Lee (1998). We use Lee (1998) as a means of shortening our reference list by connecting directly to any reference found in his comprehensive list.

(4.) Early statistical tests of the normal price hypothesis for UK manufacturing are found in Godley ([1959] 1976), Neild (1963), Godley and Nordhaus (1972), and in Coutts, Godley, and Nordhaus (1978).

(5.) This position is not necessarily the case with New Keynesian pricing models. See the comments on this matter in section 6 below.

(6.) Indeed with constant marginal costs plotted against output and with linear marginal revenues curves, the profit-maximizing firms will never shift more than 50 percent of such a cost change into prices.

(7.) A succinct account of the evolving phases in Kalecki’s thinking is given by Osiatynski in Arestis and Chick (1992), as cited in Lee (1998).

(8.) We have adhered to Kalecki’s notation by using all lowercase letters and by interpreting p* as the arithmetic mean value of the prices of all other firms in the “group.”

(9.) This is most evident in chapter 9, which proceeds from Kalecki to the investment-linked pricing approaches of Wood, Harcourt, and Eichner. The relationship between these approaches is explored cogently in Harcourt (2006).

(10.) Wood’s theory of the profit margin was set explicitly in a steady-state growth framework, while the others were, at least in principle, concerned with pricing in historical time.

(11.) The limitations of so relying on Keynes’s m.e.c. construction are already noted in Harcourt (2006). The most important of these is that many PKs are already, consistently, and explicitly focused on historical time, unlike Keynes in relation to his renowned investment function.

(12.) This proposition is close to the standard PK pricing description given in Brinkman (1999, 36): “Firms use the concept of normal costs and a mark-up rule of thumb. They … prefer stability in the face of uncertainty about rivals’ behaviour … oligopolists like to avoid price wars and keep prices constant.” This implied business goal directly accords with Rothschild (1947), as cited in Lee (1998).

(13.) We are grateful to Elmar Nubbemeyer (2010) for drawing this point to our attention and to the quotation from Blinder et al. (1998). Lee (1984; cited in Lee 1998) sets out the details of Eiteman’s critique.

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Post-Keynesian Price Theory: From Pricing to Market Governance to the Economy as a Whole

Frederic S. Lee

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[–] Abstract and Keywords

In this chapter, post-Keynesian price theory will be delineated. Because prices do not, from a post-Keynesian perspective, coordinate economic activity nor make economic activity happen, their theoretical role in a going economy has to be located elsewhere. In particular, prices are the primary mechanism through which business enterprises obtain their income to continue as a going enterprise. Therefore post-Keynesian price theory is concerned with explaining how the prices set by enterprises are going concern prices; how going concern prices are established at the level of the market where enterprises have to engage in competition; and what is the role of the price system in the economy.

Keywords: post-Keynesian economics, economic theory, social provisioning process, business enterprise, going concern market prices, pricing

Post-Keynesians see economics as the science of the social provisioning process. The provisioning process is a continuous, nonaccidental series of production-based, production-derived economic activities through historical time that provide households with the private and state goods and services necessary to carry out their sequential, reoccurring, and changing social activities through time. As such, the continuous provisioning process implies that the economy is something akin to a going concern whose core processes provide the material foundation for social provisioning and are similar to those of a going plant and going business. This means, in part, that the social provisioning process is embedded in the social surplus approach. It also suggests that social provisioning is affected by historically situated social norms and cultural values, by the social activities to be supported, and by the decisions of acting persons (Lee and Jo 2011; Lee 2011b).

Central to the provisioning process is the business enterprise, whose decisions about prices, investment, and production are thought to affect the provisioning process. In particular, it is often argued that the system of prices and effective demand are codeterminants of the social provisioning process. However, this is a mistake, since it is the demand for the social surplus or effective demand that drives the provisioning process. Because prices neither coordinate nor make economic activity happen (that is done by the decisions to produce the surplus), their theoretical role in a going economy has to be located elsewhere. In a capitalist going economy, it is necessary that enterprises generate sufficient revenue through the prices they set to cover their costs and generate profits. Thus, prices of goods and services are the primary mechanism through which business enterprises obtain their revenue to continue as a going enterprise. So post-Keynesian price theory (p. 468) differs from a price theory associated with mainstream economics. The former is concerned with explaining, in the first instance, how the prices set by the business enterprise are going concern prices and then, second, the establishment of going concern prices at the level of the market where enterprises have to engage in competition; and with providing an understanding of what a price system of the economy actually does.

Business Enterprise

The concept of the going concern refers to business enterprises with continuity of economic activity and an indefinite life span. It consists of a going plant or productive capabilities and a going business that embraces managerial activities, such as decisions about investment, research and development, and pricing, that affect the enterprise's market transactions over time. For the going plant and the going business to work together to ensure a flow of actual and expected transactions, there must be working rules (institutions) within the going concern that make it happen; and also an external array of working rules that ensure that the flow of transactions in the marketplace occur in a manner that enables the going business enterprise to continue indefinitely. Moreover, the going enterprise needs to reckon its costs, revenues, and income (profits) in a manner that does not disrupt its productive capabilities; and this requires the implementation of appropriate working rules known as pricing procedures. Thus, a going business enterprise has the productive capabilities, managerial capabilities, and the working rules including pricing procedures that enable it to have expectations of a future that is in some degree of its own making. This means that the going enterprise has the capabilities qua power to effect market transactions.[1]

The theoretical significance of the going enterprise is that it is the organizational mechanism by which the capitalist class gains ongoing access to the state-monetized social provisioning process through the continuous flow of profit-derived dividends and salary income. Thus the motivation of the business leaders of a going enterprise is to maintain and augment this cash flow, and this is accomplished through a hierarchical set of goals, the most basic being survival qua reproduction and continuation of the business enterprise (Rothschild 1947). This requires a positive business income, that is, profits; but seeking profits is not an end in itself. Rather, profits are needed to maintain the going enterprise and for the capitalist class to have access to the social provisioning process. Consequently, business leaders are not seeking to maximize profits but to generate a flow of business income needed to meet their goals and access to social provisioning—in this sense, profits are not the end goal of business leaders, but rather an intermediate objective.[2] Therefore, the going enterprise adopts a variety of subgoals or particular business strategies with different temporal dimensions, such as increasing market share or sales, increasing the profit markup through raising it or reducing costs, investing in new plant and equipment, developing new products, entering new markets, engaging in collective price-determination, and seeking government support **(p. 469)** or attaining political power, to meet the profits objective. Hence business leaders qua management view price-setting, or pricing, as strategic decisions designed to meet these goals (Rothschild 1947; Galbraith 1967; Eichner 1976; Lee 1998; Downward 1999).[3]

Accounting Practices

The business enterprise adopts and develops cost and financial or, more generally, managerial accounting practices that are necessary for it to be a going concern. So long as the enterprise remains a going concern, its accounting practices remain relatively enduring, although changing in minor ways in light of changes in technology, inputs used in production, and the information needs of management. As for the going enterprise, the accounting practices must ensure an accurate delineation of costs that must be recovered if the enterprise is to be a going concern. More specifically, because a going enterprise engages in continuous sequential acts of production, its income or profits have to be calculated periodically, which is denoted as the *accounting period* and is generally taken to be a calendar year, and in a manner that permits distributing part of it as dividends without impairing the enterprise's productive capabilities. This means it is necessary to treat inputs (which are producible and reproducible) that contribute to the production of the output as reoccurring costs as opposed to one-time expenses against total revenue to arrive at profits. In this manner, the expenses of resources, goods, services, labor power skills, depreciation of fixed investment goods used directly and/or indirectly in production are costs that are recouped so that the enterprise can repeat production. In particular accounting practices deal with (1) the tracing of the direct and overhead material, services, resources, and labor skills inputs relevant to the production of a unit of output, (2) the categorization of costs into direct (variable) and overhead (fixed) costs, (3) the determination of the cost of producing a unit of output, (4) depreciation, and (5) the determination of profits associated with a particular product and the business income for the enterprise as a whole. The first four practices generate the cost data that determine the product's average direct costs (ADC) and average overhead costs (AOHC), which together are the product's average total costs (ATC). In addition to identifying and calculating product costs, accounting practices are used to determine the product's sales revenue. With product costs and revenue determined, the accounting practices measure the profits associated with the product (Lee and Jo 2010).

Production and Costs

The business enterprise produces an array of outputs, that is, goods and services or product lines. A product line may consist of a single main product with numerous derivatives but secondary and/or by-products; or it may consist of a conceptually distinct product that is a differentiated array of products. In either case, the structure of production of a (p. 470) single product in a product line is hard to isolate because fixed investment goods and labor power skills may be used to produce more than one product; and the costing of the product is difficult because of the problem of allocating various common overhead costs. To overcome this, the *product line* is defined in terms of its core or main product—that is, a product line consists of a single homogeneous product. As a going concern, when producing any product line, the business enterprise engages in sequential acts of production through historical time and as a result incurs sequential costs of production also through time. The structure of production consists of the plant and managerial technique of production. The plant houses or encompasses the activities immediately involved in the production of the product line. Given the plant, production can be further delineated in that more than one plant may be used to produce the product line. The managerial technique of production deals with the overseeing and managing of production within a plant and across all plants. Thus, the corresponding cost structure of the product line consist of direct costs and overhead costs. Given the possibility that different plants have different more or less vintage technology and hence different costs, the movement of ADC as the degree of capacity utilization increases can either be increasing or constant if all plants have the same technology. Moreover, as capacity utilization increases, AOHC declines, resulting in either declining or U-shaped ATC; however, the empirical evidence clearly suggests a declining ATC (Lee 1986; Blinder et al. 1998; Lee and Jo 2010).

Business Enterprise and Pricing

Costing and Pricing

When setting or changing a price for a product line, the business enterprise engages in a two-step process: the first is costing the product and the second is pricing it. Drawing upon its accounting practices, the enterprise determines the product's average direct costs, average overhead costs, and average total costs at budgeted output or capacity utilization. The relevance of budgeted output is that it enables the pricing administrators to determine the product's budgeted costs. That is, since ADC, AOHC, and ATC vary as output changes, it is necessary to select a particular level of output if costs for pricing are to be determined before production takes place and the actual costs of production are known.[4] With the budgeted costs administratively determined, the enterprise selects a profit markup to be applied to the budgeted costs to set the price. This pricing procedure means that the price of the good is set before the good is produced and exchange takes place. The enterprise then takes the internally administratively determined price (which is determined outside the market) and administers it to (or imposes it on) the market, thus making the price an administered price.[5]

Since prices are determined through costing procedures and the profit markup, pricing procedures can be distinguished by the emphasis they place on costing relative to (p. 471) the markup. In other words, one group of the pricing procedures is predicated on different costing procedures, taking the markup simply as given (or customary), whereas a second group is defined according to the profit markup processes, taking the relevant cost base as given whatever the costing procedure is. Thus, it is necessary to differentiate between the two pricing procedures and identify them as *costing-oriented pricing* and the *markup-oriented pricing* respectively (Gu and Lee 2012).[6]

Costing-Oriented Pricing

Costing-oriented pricing is predicated primarily on various costing procedures. The basic foundation, which has been in existence since the early 1700s, is the calculation of budgeted ADC_B; but the determination of AOHC is another matter. The traditional costing system uses a volume-based driver such as direct labor hours for overhead cost allocation. The main problem with it is that a product's consumption of overhead resources may not be strictly related to units produced. Given that the portion of overhead costs has increased significantly in recent decades while direct labor cost has decreased gradually, the traditional cost management system has become less and less

efficient in providing accurate cost information to the business entrepreneurs. Activity-based costing (ABC), which emerged in the 1980s, is a method of assigning indirect or overhead costs according to the factors that cause the costs. The traditional costing procedure is easy and inexpensive to implement, but the information obtained can be too raw to be accurate, whereas the ABC procedure solves the problem but is expensive and time-consuming to implement. Given the strengths and weaknesses of the two costing systems, business enterprises rely on both of them with varying degrees of the scope and sophistication (Stratton, Lawson, and Hatch 2009).

There are three general types of costing-oriented pricing: direct cost pricing, total cost pricing, and ABC cost pricing. Direct cost pricing consists of marking up ADC_B to set the price, with the markup being sufficient to cover overhead costs and produce profits: (1.19.1)

$$\text{direct cost pricing}: \ \text{price} = (\text{ADC}_\text{B})(1 + \text{k}),$$

direct cost pricing: price = $(\text{ADC}_\text{B})(1 + \text{k})$,

where ADC_B is normal average direct cost, and k is the markup for overhead costs and profits.

Total cost pricing has two forms: one is to mark up ADC_B to cover overhead costs, which gives ATC_B, and then apply a profit markup to ATC_B to set a price; the other applies the profit markup directly to ATC_B to set the price: total cost pricing: price = $(ADC_B)(1 + g)(1 + r)$ or(1.19.2)

$$\text{total cost pricing}: \ \text{price} = (\text{ADC}_\text{B})(1 + \text{g})(1 + \text{r}) \ \text{or price} = (\text{ATC}_\text{B})(1 + \text{r})$$

total cost pricing: price = $(\text{ADC}_\text{B})(1 + \text{g})(1 + \text{r})$ or price = $(\text{ATC}_\text{B})(1 + \text{r})$

where g is the markup for overhead costs based on budgeted output and r is the markup for profits.

(p. 472) Finally, ABC cost pricing is formulated in the following manner: (1.19.3)

$$\text{ABC cost pricing}: \ \text{price} = (\text{ADC}_\text{B})(1 + \sum_{i=1}^{n} x_i)(1 + \text{r})$$

ABC cost pricing: price = $(\text{ADC}_\text{B})(1 + \sum_{i=1}^{n} x_i)(1 + \text{r})$

where x_i is the markup to cover an allocated part of *i*th overhead cost according to the product's consumption of the activity that causes the overhead cost.

It should be noted that the difference between total cost pricing and ABC cost pricing consists in the specific method by which to determine the markup for the overhead costs. With more than one product line that a business enterprise produces, total cost pricing allocates the total amount of the overhead costs to each product based on each product's budgeted volume, which may be irrelevant to the causes of the overhead costs, whereas ABC cost pricing utilizes each product's relative consumption of each overhead cost to allocate the total amount of the overhead costs among its products.

Markup-Oriented Pricing

Markup-oriented pricing procedures are differentiated according to a variety of profit markup processes after presupposing a cost base such as ADC_B or ATC_B, and regardless of what the enterprise's costing procedure is. The best-known pricing procedures are fair-rate-of-return pricing and target-rate-of-return pricing. In addition, there is also a refined pricing procedure, which is divided into three subgroups: product-based markup pricing, competitor-motivated markup pricing, and class-induced markup pricing.

First, fair-rate-of-return pricing is a pricing procedure in which the markup is predetermined by convention or a fair rate of profit, based on the industry norms, which are customs and practices established within an industry and with which enterprises comply. These customs and practices are known by the industry, and the industry will expect that all business and trading conform to these customs and practices. In the context of pricing, these customs and practices are manifested as "acceptable" and "expected" markups.

Second, target-rate-of-return pricing is a pricing procedure in which the markup is determined exclusively by

organizational conditions. Suppose that a business enterprise installs plant equipment to produce a product and aims to generate a desired flow of funds from that investment for whatever goals or objectives it wants to achieve. A possible target-rate-of-return pricing consists of marking up ATC_B by a certain percentage to generate a volume of profits at budgeted output that will produce a specific rate of return with respect to the value of the enterprise's capital assets connected with the production of the product. That is, given the value of the capital assets (VCA) associated with the production of the product, the enterprise wants to obtain a specific target rate of return (TRR) on those assets. Therefore, the profits required to meet the target rate of return is TRR × VCA = target profits, P_t. To incorporate the target profit figure into the (p. 473) price, P_t is first divided by budgeted output (bo) to get the targeted costing margin, and then divided by ATC_B to get the targeted profit markup (t):target rate of return pricing: price = $(ATC_B)(1 + P_t/(bo)(ATC_B)$ (1.19.4)

$$\text{target rate of return pricing}: \text{price} = (\text{ATC}_\text{B})(1 + \text{P}_\text{t}/(\text{bo})(\text{ATC}_\text{B}) = (\text{ATC}_\text{B})(1 + \text{t}).$$

target rate of return pricing: price = $(ATC_B)(1 + P_t/(bo)(ATC_B) = (ATC_B)(1 + t)$.

Given the targeted profit markup, if the business enterprise produces at budgeted output, enough profits will be generated to attain the desired target rate of return on the capital assets. Because actual output can differ from budgeted output, the enterprise will not always achieve its target rate of return or desired profits, sometimes being above it and other times being below it over the business cycle.[7]

Third, product-based markup pricing is a pricing procedure in which the markup is adjusted to reflect characteristics or life cycles of products. Product characteristics have much to do with complementarity and supplementarity between the enterprise's products; thus enterprises sometimes use a joint markup rate for a group of complementary products. Product life cycles are mostly determined by technological changes and market growth; hence the markup rates of unfashionable products are occasionally curtailed. This procedure is closely related to specific pricing practices or tactics such as price bundling and skimming pricing.

Fourth, competitor-motivated markup pricing is a pricing procedure in which the markup is set mainly to be responsive to the strategies of competitors in the same industry. Depending on the price leader-follower relations, business enterprises position themselves in setting markup rates and thus prices. Practically, there are four possible tactics: leader pricing, parity pricing, low-price supplier, and opportunistic pricing. In the majority of industries, large business enterprises set the rules of the game, leaving smaller ones with limited price discretion and no option other than to follow the leader's (or leaders') pricing initiatives, since the price leader tends to maintain its superiority in technology.

Last, class-induced markup pricing is a pricing procedure in which the markup differs primarily according to its primary target class. Frequently, business enterprises aim to create markets for their products and set desirable markup rates by manipulating the purchasing habits of their consumers—for example, developing conspicuous consumption by the upper class—by means of pricing practices such as perceived-value pricing, price signaling, and image pricing. They sometimes try to increase their total profits by providing discounts for the lower class—that is, expanding their customer group—in the case of reference pricing and second-market discounting (Rothschild 1947; Eichner 1976; Lee 1998; Downward 1999; Hall, Walsh, and Yates 2000; Forman and Lancioni 2002; Indounas 2009; Rao and Kartono 2009).

Going Concern Prices

The administered prices set by enterprises have properties that are quite different from prices determined in the market. The first is that the administered price is not based on or related to actual costs, and immediate or current market forces do not affect the profit (p. 474) markup. That is, irrespective of the pricing procedures used by enterprises, the shape of the product's average direct cost curve or its average total cost curve is immaterial for pricing purposes. This is because the costs used for pricing are determined prior to production and are based on budgeted output. Consequently, the price is based on budgeted costs, while actual costs vary inversely around it as actual output varies around budgeted output. The second property is that administered prices are stable within the pricing period in that they remain unchanged for extended periods of time, many transactions, and for short-term or momentary variations in sales. This "intrinsic" stability is based on the pricing procedures used by the enterprise, where costs are based on budgeted rather than actual costs and the profit markup is given for the

pricing period and relatively stable over a number of pricing periods. Consequently, administered prices are neither exchange-specific prices nor prices that reflect the impact of immediate variations in sales. This implies that markets that have stable, budgeted, cost-based prices are not organized like auction markets or oriental bazaars, where the retailer engages in individual price negotiation for each transaction. Rather, an enterprise that desires to enter these unorganized markets must first announce a price for its product and then enter into direct buyer-seller interaction to obtain sales. Since buyer-seller interactions take place both simultaneously and through time, business enterprises find that stable prices are cost efficient in terms of selling costs, reduce the threat of price wars, and facilitate the establishment of goodwill relationships with customers.

Following from the stability property, the third property of administered prices is that they are not related to any specific quantity of sales and hence are not set to achieve a specific volume of sales. In studies of price determination, business enterprises have stated that variations of their prices within practical limits, given the prices of their competitors, produced virtually no change in their sales and that variations in the market price, especially downward, produced little if any changes in market sales in the short term. Moreover, when the price change is significant enough to result in a significant change in sales, the decline in profits has been enough to persuade enterprises not to try the experiment again. Consequently, there is a disjuncture between price and actual output. The fourth property is that they can change over time, that is, over a sequence of pricing periods. The empirical evidence shows that enterprises maintain pricing periods of three months to a year in which their administered prices remained unchanged; and then, at the end of the period, they decide on whether to alter them. The factors that are most important to enterprises in this regard are changes in labor and material costs, changes in the markup for profit, and changes in budgeted output. Factors prompting the enterprises to alter their profit markups include short-term and long-term competitive pressures, the stage that the product has reached in its life cycle, and the need for profits. Moreover, since budgeted output is administratively determined, it is possible for the enterprise to alter it cyclically over the business cycle, resulting in the ATC_B increasing in the downturn and decreasing in the upturn. If the markups for profit remain constant, then the enterprise is setting countercyclical prices. Consequently, administered prices can change from one pricing period to the next in any direction, irrespective of the state of the business cycle. Prior to 1980, the evidence suggested that within short periods of

(p. 475)

Table 1.19.1 Reproduction of the Business Enterprise

Pricing Period 1: $M_{wc} \rightarrow TC_B \rightarrow P_B \rightarrow TR_B$
Pricing Period 2: $M_{wc} \rightarrow TC_B \rightarrow P_B \rightarrow TR_B$
etc.

where M_{wc} is the cash advanced in the form of working capital,

TC_B is total costs at budgeted output,

P_B is production at budgeted output, and

TR_B is the total revenue at budgeted output.

time (such as two-year intervals), change in costs dominated price changes, whereas over longer periods of time changes in the markup were more important. However, since 1980, it appears that when costs decline, assuming no change in budgeted output, enterprises increase their profit markups, with the result that prices are quite stable across a number of pricing periods (Lee 1998; Blinder et al. 1998; Alvarez et al. 2006; Fabiani et al. 2007).

The stability of administered prices within the pricing period (due to the intrinsic nature of administered pricing procedures) and across a number of pricing periods (due to the extrinsic nature of enterprises' capabilities to simultaneously adjust in opposite directions budgeted costs and profit markups) is a pervasive feature of capitalist economies and a fundamental property of administered prices as they relate to the going nature of the business enterprise. So, the fifth and final property of administered prices is their role in the reproduction of the business enterprise, that is, prices that enable the enterprise to engage in sequential acts of production over time and thereby reproduce itself and grow. This property can be illustrated using a very simple model. First assume that the

enterprise has its complement of plant and equipment and that it produces a single product line at budgeted output for the pricing period. Now for production to occur, the enterprise must have enough working capital on hand to procure the necessary amount of direct and overhead material and labor power inputs. Once they are obtained, production occurs, the output is sold, and the revenue is collected. If the amount of total revenue received at the end of the pricing period equals the initial expenditure of working capital for the inputs, the enterprise can repeat the process for each succeeding production period, thus "reproducing" the enterprise on an ongoing basis as long as the original sum of money advanced is returned—see table 1.19.1 Thus, the enterprise can only engage in sequential acts of production at the budgeted output if total costs equal total revenue, or, more specifically, the enterprise sets its price equal to its budgeted average total costs: $p = ATC_B$.[8] The model can be extended beyond the simple reproduction of the enterprise by postulating that total revenue is greater than total costs at the budgeted flow rate of output. That is, if $TR_B > TC_B$, then $(ATC_B)(1 + r)$ = price that will produce a profit at budgeted output that can be used to expand the enterprise's scale of production.

One implication of the model is that for a enterprise to grow and expand over pricing periods, it must mark up its costs when determining its price, where the markup becomes, as noted above, a strategic variable for reproduction and growth. A second implication (p. 476) is that if price declines are not tied to declines in budgeted costs, the targeted or desired markup is not attained and hence the going nature of the enterprise is threatened. In particular, if a price decline fell below ATC_B, the enterprise would cease to be a going concern.

Together, the five properties transform the administered price into a going concern price. A going concern price is one that embodies the enterprise's multitemporal, open-ended strategies, collectively known as the enterprise's pricing policy, that will allow it to continue as a going concern. But if price instability emerged via competition with other enterprises resulting in price declines without commensurate cost declines, the enterprise would be pushed toward bankruptcy. Consequently, going enterprises within a market are driven to establish market institutions that eliminate the problem of destructive price competition and establish a stable market price and an orderly market (Wood 1975; Harcourt and Kenyon 1976; Eichner 1976; Capoglu 1991; Sawyer 1995; Lee 1998; Downward 1999).

Market Governance and Going Concern Prices

Because the going enterprise exists in markets with other competing enterprises, competitive conditions may generate market prices that seriously affect the going enterprise's ability to reproduce and expand. That is, since they have capabilities of setting their own prices and engage in other competitive activities, going enterprises have the ability to inflict unacceptable consequences upon competitors. In particular, they have the ability to eliminate positive net cash flows, insofar as the cash flows are derived from, or depend upon, activities in the markets in which they participate. Competition between enterprises in the production and the sale of goods involves the use of these capabilities in the attempt to make a profitable volume of sales in the face of the offers of other enterprises selling identical or closely similar products. Aspects of competition include advertising, service, product development, and price. The combination of capabilities to affect market transactions and competition creates the all too real possibility of price wars and destructive competition. So, given the immediate impact a price war has on the enterprise's profit markups and hence cash flow, enterprises are driven to establish market governance organizations that attempt to eliminate the problem of destructive price competition and establish a stable market price: going enterprises are always in search of orderly markets through collective, cooperative action.

Organizations that engage in market governance and regulate competition include trade associations, cartels, open price associations, price leadership, and government regulatory commissions; in addition, governments enact legislation that also regulates competition.[9] Their primary remit is to set a market price that will be a going concern price for at least most of the enterprises in the market. In virtually all instances, the market governance organization use the same costing and pricing procedures as do business (p. 477) enterprises to set the market price, but with the caveat that some, most, or all of them will have to adjust their profit markups in order to set the same price.[10] Hence, the pricing equation for a market is not significantly different from an enterprise pricing equation (Lee 1998): (1.19.5)

$$(\mathrm{ATC_B})(1+\mathrm{r}) = \mathrm{p_m},$$

$(\mathrm{ATC_B})(1+\mathrm{r}) = \mathrm{p_m},$

where p_m is the going concern market price.

Going Concern Prices and the Economy as a Whole

In the previous sections, we have gone from the business enterprise and its use of pricing procedures to set going concern prices to market governance and the setting of going concern market prices. The final step is to go from the individual going concern market prices to the economy as a whole and its system of going concern market prices. This is accomplished by using a circular production, multisector price model of the economy. The model consists of a basic good sector of n markets and a surplus goods sector of $m-n$ markets ($m > n$), where the entire output of the former is absorbed in the production of the output of both sectors, and the output of the latter constitutes the surplus of the economy and consists of consumption, fixed investment, and state goods and services (Lee 1998, 2011a, 2011b). Assuming v different types of labor power (where $v > 1$), and wage rates and depreciation are denominated in state money, the model of the price system economy is the following: (1.19.6)

$$\text{Prices-Basic Goods Sector } (\mathrm{R_{d1}})(\mathrm{Z_{d1}})(\mathrm{M_{11}P_{1t}} + l^{\star}{}_1\mathrm{w} + \mathrm{d_1}) = \mathrm{P_{1t+1}}$$
$$\text{Prices-Surplus Goods Sector } (\mathrm{R_{d2}})(\mathrm{Z_{d2}})(\mathrm{M_{21}P_{1t}} + l^{\star}{}_2\mathrm{w} + \mathrm{d_2}) = \mathrm{P_{2t+1}},$$

$$\text{Prices-Basic Goods Sector } (\mathrm{R_{d1}})(\mathrm{Z_{d1}})(\mathrm{M_{11}p_{1t}} + l^{\star}{}_1\mathrm{w} + \mathrm{d_1}) = \mathrm{p_{1t+1}}$$

$$\text{Prices-Surplus Goods Sector } (\mathrm{R_{d2}})(\mathrm{Z_{d2}})(\mathrm{M_{21}p_{1t}} + l^{\star}{}_2\mathrm{w} + \mathrm{d_2}) = \mathrm{p_{2t+1}},$$

where

$\mathrm{R_{d1}}$ is a $n \times n$ diagonal matrix of profit markups and the ith element is $(1 + r_i)$
$\mathrm{R_{d2}}$ is a $(m-n) \times (m-n)$ diagonal matrix of profit markups and the ith element is $(1 + r_i)$
$\mathrm{Z_{d1}}$ is a $n \times n$ diagonal matrix of overhead markups and the ith element is $(1 + z_i)$
$\mathrm{Z_{d2}}$ is a $(m-n) \times (m-n)$ diagonal matrix of overhead markups and the ith element is $(1 + z_i)$
$\mathrm{M_{11}}$ is a $n \times n$ matrix of material pricing coefficients that are based on budgeted output
$\mathrm{M_{21}}$ is a $(m-n) \times n$ matrix of material pricing coefficients that are based on budgeted output
(p. 478) $l^{\star}{}_1$ is a $n \times v$ of labor pricing coefficients that are based on budgeted output
$l^{\star}{}_2$ is a $(m-n) \times v$ of labor pricing coefficients that are based on budgeted output
$\mathbf{d_1}$ is a $n \times 1$ vector of depreciation pricing coefficients that are based on budgeted output
$\mathbf{d_2}$ is a $(m-n) \times 1$ vector of depreciation pricing coefficients that are based on budgeted output
$\mathbf{w}$ is a $v \times 1$ vector of wage rates
$\mathbf{p_{1t}}$ is a $n \times 1$ vector of basic goods market prices at time t
$\mathbf{p_{1t+1}}$ is a $n \times 1$ vector of basic goods market prices at time $t + 1$
$\mathbf{p_{2t+1}}$ is a $(m-n) \times 1$ vector of surplus goods market prices at time $t + 1$.

Since each row vector of $(\mathrm{Z_{d1}})(\mathrm{M_{11}}\mathbf{p_{1t}} + l^{\star}{}_1\mathbf{w} + \mathbf{d_1})$ and $(\mathrm{Z_{d2}})(\mathrm{M_{21}}\mathbf{p_{1t}} + l^{\star}{}_2\mathbf{w} + \mathbf{d_2})$ is equal to $\mathrm{ATC_B}$ (equation 1.19.6), the price model simplifies to (1.19.7)

$$\text{Prices-Basic Goods Sector} \quad (\mathrm{R_{d1}})(\mathrm{ATC_{B1}}) = \mathrm{p_{1t+1}}$$
$$\text{Prices-Surplus Goods Sector} \quad (\mathrm{R_{d2}})(\mathrm{ATC_{B2}}) = \mathrm{p_{2t+1}},$$

$$\text{Prices-Basic Goods Sector} \quad (\mathrm{R_{d1}})(\mathrm{ATC_{B1}}) = \mathrm{p_{1t+1}}$$
$$\text{Prices-Surplus Goods Sector} \quad (\mathrm{R_{d2}})(\mathrm{ATC_{B2}}) = \mathrm{p_{2t+1}},$$

where $\mathrm{ATC_{B1}}$ is a $n \times 1$ column vector and $\mathrm{ATC_{B2}}$ is a $(m-n) \times 1$ column vector.

The *structural properties* of the price system model and its going concern market prices are well known and so can be briefly stated.

1. That, given "reasonable" values for $\mathrm{R_d}$, $\mathrm{Z_d}$, w and the material, labor, and deprecation pricing coefficients, prices are determined and p is strictly positive, meaning that the price system is internally, structurally coherent:[11] **(1.19.8)**

$$\mathrm{p_1} = (\mathrm{I} - \mathrm{R_{d1}Z_{d1}M_{11}})^{-1}\mathrm{R_{d1}Z_{d1}}(l^{\star}{}_1\mathrm{w} + \mathrm{d_1})$$
$$\mathrm{p_2} = (\mathrm{R_{d2}Z_{d2}M_{21}})(\mathrm{I} - \mathrm{R_{d1}Z_{d1}M_{11}})^{-1}\,\mathrm{R_{d1}Z_{d1}}(l^{\star}{}_1\mathrm{w} + \mathrm{d_1}) + \mathrm{R_{d2}Z_{d2}}(l^{\star}{}_2\mathrm{w} + \mathrm{d_2});$$

$$p_1 = (I - R_{d1}Z_{d1}M_{11})^{-1}R_{d1}Z_{d1}(l^*_1 w + d_1)$$

$$p_2 = (R_{d2}Z_{d2}M_{21})\,(I - R_{d1}Z_{d1}M_{11})^{-1}R_{d1}Z_{d1}(l^*_1 w + d_1) + R_{d2}Z_{d2}(l^*_2 w + d_2);$$

2. That the material and labor pricing coefficients cannot be reduced to a homogeneous quantity of labor;
3. That, with given values for **w** and **d**, different compositions of M, R_d, Z_d, and l^* produce different market prices; and
4. That because **d** and **w** are in terms of state money, so are going concern market prices.

The *theoretical properties* can also be briefly stated. First, with irreducible material and labor pricing coefficients, prices cannot be reduced to, and hence conceived of, as a comparable homogeneous substance such as a homogeneous quantity of labor power. Consequently, the relative comparability of market prices is not governed by the relative amounts of a measurable, common substance supposedly embodied in them. And even if it is possible to do such a reduction process, prices would still not be reduced to an amount of the common substance such as quantity of labor power because of (p. 479) the existence of state-money-denominated depreciation. Second, price systems with structurally different pricing equations produce different prices, which mean for post-Keynesians that models of the price system must structurally represent the range of pricing equations actually used in the economy if their prices are to be theoretically accurate and hence relevant for theoretical and applied research (Lee 1996). Third, because prices exist as long as the profit markups and the wage rates are both positive, it is the basic goods price system that determines the basic goods prices, $\mathbf{p}_1$, while it is the price system as a whole that determines the surplus goods prices, $\mathbf{p}_2$. Since the price system reflects and is embedded in the social system of production, it is the latter that determines prices or, more accurately, provides the material and social basis for their existence. Last, because wage rates, depreciation, and market prices are denominated in the state monetary unit, profit markup (which is denominated differently, as a percentage on costs) and wage rates are determined independently of each other and hence can vary independently. So state-money prices of goods and services are free to vary in response to changes in the wage rate or the profit markup. Thus an increase in wage rates does not require a structural reduction in profit markups and vice versa (Pivetti 1985; Nell 2003).[12] In particular, an equal percentage increase in wage rates will not appreciably alter the price-wage rate ratios or affect at all the profit markup or the price-cost ratio ($p_i - ATC_{Bi}/\mathrm{ATC_{Bi}}$), whereas an equal percentage increase in the profit markup will do so (Lee 2011a). This asymmetrical outcome occurs because money wages do not equal real wages, whereas due to its nature as a percentage of costs, the profit markup appropriates in a sense real goods and services and thus is equivalent to the real wage but for capitalists.

The structural-theoretical properties do not completely determine the outcomes of the price system; there is also a role for *agency*, that is, the acting enterprise. In particular, actual prices (p_i) are set, changed, and reset by the enterprise. Price changes occur only when enterprises and their market governance organizations decide to vary money wage rates or profit markups or by altering the pricing coefficients. Thus, going concern market prices reflect agency on the one hand and the structures of the social system of production on the other. This conjuncture of agency and structure raises an important theoretical issue of convergence of agency-set market prices to structural-solution short-period or long-period prices. As argued in Lee (1996), enterprises and market governance organizations can decide to change prices at various time periods, such as every six months or a year, with the result that it can take a long time for structural-solution prices to be reached. However, if an agency, when setting the market prices, also changes the pricing coefficients, overhead/profit markups, and/or wages rates, then structural-solution prices are never attained and actual prices are not "imperfect production prices" (Lavoie 2010). This suggests that post-Keynesians should not carry out economic analysis in terms of actual-price convergence to structural price solutions (or long-period/short-period positions) which implies a closed system methodology. Rather, economic analysis should be in terms of open-systems and agency-structure interaction; that is, it should be a historically differentiated analytical story. This is why the price model (equation 1.19.6) has input prices at time t and output prices at time t + (p. 480) 1 and the two prices are not the same. In short, post-Keynesian price theory consists of enterprise and market pricing equations (1.19.1–1.19.5), a model of the price system of the economy (equations 1.19.6–1.19.7), the structural, theoretical, and agency properties of the model, and the accompanying narrative, all of which explains how going concern prices are set and changed relative to the state monetary unit.

Conclusion

Post-Keynesian price theory explains the formation of going concern market prices, that is, prices that ensure that business enterprises are going concerns, and how the price system behaves when cost variables and profit markups change. But it does little more than this. Because prices are based on budgeted rather than actual output, and prices and output are not functionally qua causally related, pricing decisions and resulting market prices are separate from decisions to produce the social surplus and the resulting market output and employment. As a consequence, effective demand decisions (relative to pricing decisions) are more significant to simply understanding the workings of the economy and the social provisioning process. In terms of theory, it is plausible to conjecture (in a Kalecki-Sraffa fashion) that decisions to produce the social surplus conceptually creates qua theoretically generates the analytical categories of wages, profits, and state expenditures and the corresponding, the surplus-acquiring, provisioning-accessing variables of wage rates, profit markups, and state money. That is, as suggested in the arguments by Ball, Wood, Harcourt-Kenyon, and Eichner, the decision by business enterprises to demand and purchase fixed investment goods requires them to also have an income variable, the profit markup, by which to acquire them. Similarly, the decision by the state to demand and purchase government goods and services requires it to also have an income variable, state money, by which to acquire them and the business enterprise to have a profit markup to capture the state expenditures as profits. Finally, the decision to produce consumption goods and services requires the existence of income variables, the wage rate, and government payment for households to purchase them. Thus, the production of the social surplus requires the simultaneous "production" of income variables (and prices)—wage rates, profit markups, government payments, and state money—in order for the state, business enterprises, and households to gain access to the social provisioning process (Lee 2011a). In fact, it is not just that the income variables are produced simultaneously with the production of the surplus, the production of the social surplus also generates the incomes by which they are purchased; and it is an outcome that is independent of the competitive nature of the markets (Pasinetti 1997, 2001).

If the production of investment goods creates profits and the production of consumption goods and services creates wages, then it is also plausible to conjecture that it is the production of differentiated investment and consumption goods and services that creates differentiated profit markups and wage rates. This conjecture suggests that it is **(p. 481)** not differentiated competitive pressures that creates differentiate markups and wage rates, the existence of which is clearly evident. Thus, future work on post-Keynesian price theory lies only in part in the areas of costing, pricing, and market governance; rather the major area work lies in detailed, enterprise-specific case study work on the determination of the profit markup and on its subordinate and reflexive relationship to the post-Keynesian theory of effective demand. For it is a certainty in post-Keynesian economics that it is the ruling class's decisions that drive the production of the surplus, employment, and access to the provisioning process, while the price system plays a secondary role.

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Notes:

(1.) The going concern conception of the business enterprise originated with Veblen and Commons and is virtually identical to the conception of the business enterprise used by post-Keynesian economists (Commons 1957; Ramstad 2001; Kaufman 2006; Veblen 1904).

(2.) This argument is in contrast to the long-held view by post-Keynesians that business leaders seek profits and the accumulation of capital as an end in itself. This latter position essentially separates the business leaders from society, thus making their decisions and activities asocial. However, more recent work by post-Keynesians delineated above, drawing upon the social fabric, social accounting, and social structures of accumulation approaches, socially embeds the economy and accordingly business leaders and their motivation—see Lee (2011b).

(3.) The implication of subgoals or strategies with different temporal dimensions is that they overlap with each other. Consequently, it is not possible to argue in terms of short period or long period or the classical-Marxian long period, or any other kind of analytical ahistorical time period. The only permissible analytical time period is historical time.

(4.) From the 1700s to sometime after 1970, enterprises used the term *normal* output or capacity utilization instead of budgeted. Normal was based on past data and thus considered to be relatively stable. Budgeted, in contrast, suggests that it is responsive to management decision-making and thus could be changed from one pricing period to the next. While either are possible, their commonality and importance are that they fix the level of output on which costs are determined. This clearly suggests a disjunctive between price and actual costs and output (Brierley, Cowton, and Drury 2006; Hertenstein, Polutnik, and McNair 2006).

(5.) Because pricing is a procedure carried out by the business enterprise, it is through descriptive evidence (rather than econometrics) that we know what they are. Econometrics can be used to see how closely correlated are changes in costs, profit markups, sales, and prices, and thus whether it is cost changes or changes in sales (demand) that drive administrative, nonmarket price changes. For the post-Keynesian econometrics of pricing, see

Coutts, Godley, and Nordhaus (1978), Downward (1995, 1999), and Coutts and Norman (in this volume).

(6.) For a historical survey of costing and pricing studies and of post-Keynesian approaches to pricing, see Lee (1998); also see Coutts and Norman (in this volume).

(7.) Target-rate-of-return pricing is often tied to the post-Keynesian arguments by Ball (1964), Wood (1975), Harcourt and Kenyon (1976), and Eichner (1976) that investment decisions determine the target markup and hence prices—see Lee (1998, 175–84). Also see the conclusion.

(8.) Since $TC_B = TR_B$ and TR_B = price × budgeted output, price equals ATC_B.

(9.) Whether the degree of market concentration is high or low or the barriers to entry are significant or not, they have little impact on market governance per se; rather they only affect the organizational form that market governance takes.

(10.) The evidence on trade associations, cartels, price leadership, and government regulations controlling market competition and regulating prices is so extensive that it is plausible to argue that regulated competition has always existed under capitalism—see Lee (1998, 208 n. 15) for a number of references. For references with an international flavor, see Schaede (2000), Viton (2004), and Connor (2008).

(11.) There is an upper limit to the values for R_{d1} and Z_{d1} above which the price model becomes structurally incoherent. This occurs when the maximum eigenvalue of $R_{d1}Z_{d1}M_{11}$ is greater than one. In this case, $(I - R_{d1}Z_{d1}M_{11})^{-1}$ ceases to be a strictly positive matrix and hence will have negative elements. This means that some market prices will be negative.

(12.) This implies that even though prices are determined by the social system as a whole, they can also be characterized as cost-based prices. Thus, prices relative to the state monetary unit can vary, but do so because of changes in the values of the various components that make up the price equation, only one of which represents the difficulty of production, while a second represents the state legal system (depreciation and wage rates), a third represents socially constructed cost accounting practices, and a fourth represents agency (profit markup as well as markups for overhead costs, determination of budgeted output, and wage rates). In particular, prices generally increase relative to the state money unit (inflation).

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Kaleckian Economics

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[–] Abstract and Keywords

Kaleckian economics may be broadly defined as the economic theories enunciated by Michał Kalecki (1899–1970) and the extensions of those theories by economists who were influenced by him. In 1933, Kalecki published his first analysis of the business cycle under capitalism, arguing that it was due to the instability of investment, which in turn was caused by fluctuations in capitalists' profits. During the 1950s, Kalecki was influential in the monopoly capitalism school of Marxists, through the work of Paul Sweezy and Josef Steindl. Post-Keynesian economics spliced Kalecki's price and business cycle theory onto more orthodox Keynesian concerns about aggregate demand and full employment. This chapter explains the key features of Kalecki's analysis of a capitalist economy with reference, where appropriate, to the standard two-sector model. It then looks at Hyman Minsky's extension of Kalecki's ideas and examines Kalecki's macroeconomics in the short run. It also discusses what it is about a capitalist economy that makes it prone to crises and persistent involuntary unemployment. The chapter also assesses the political aspects of full employment.

Keywords: Kaleckian economics, Michał Kalecki, business cycle, capitalism, investment, profits, Paul Sweezy, Josef Steindl, post-Keynesian economics, unemployment

Introduction

Kaleckian economics may be broadly defined as the economic theories enunciated by Michał Kalecki (1899–1970) and the extensions of those theories by economists who were influenced by him. His importance is such that many writers see themselves as contributing to a post-Kaleckian economics (Sawyer [1982] 1985), a view to which we subscribe.

Kalecki was a Polish engineer and mathematician who taught himself economics in a left-wing political milieu during the 1920s, where the main intellectual influences were Austro-Marxism, Rosa Luxemburg, Tugan-Baranovsky and Henryk Grossman. From 1929 to 1936 he was employed at the Business Cycle and Prices Institute in Warsaw, where the first national income statistics for Poland were constructed. In 1933 he published his first analysis of the business cycle under capitalism, arguing that it was due to the instability of investment, which in turn was caused by fluctuations in capitalists' profits. Investment was crucial. Under capitalism, in Kalecki's view, investment is the main exogenous (and most volatile) component of aggregate demand, in its turn determining profits, while capitalists' costs are mainly accounted for by wages, which are by and large consumed. Kalecki's view was summarized in an aphoristic précis of Kalecki's theory (attributed by some to Joan Robinson, and by others to Nicholas Kaldor): "Workers spend what they get, capitalists get what they spend." This can easily be derived from the well-known Keynesian saving-investment identity in which aggregate expenditure (AE) is by definition equal to consumption—made up of consumption out of wages (C_W) and consumption out of profits (C_P)—gross investment (I), government expenditure (G) plus the trade surplus (exports minus imports, X − M). Assume that there are only

two classes in society, capitalists and workers, receiving profits and earning wages respectively, with aggregate income (Y) equal to wages (W) plus profits (P). Allowing for taxes (T) we may write that

$$Y = W_N + P_N + T,$$

$Y = W_N + P_N + T,$

where the subscript "N" indicates that income is being measured after tax.

(p. 486) Setting aggregate income and aggregate expenditure equal and rearranging, we find an expression for aggregate after-tax profits of

$$P_N = (C_W - W_N) + C_p + I + (G - T) + (X - M).$$

$P_N = (C_W - W_N) + C_p + I + (G - T) + (X - M).$

Since worker's saving (S_W) is the difference between their after-tax income and their consumption spending, we may write

$$P_N = C_P + I - S_W + (G - T) + (X - M).$$

$P_N = C_p + I - S_W + (G - T) + (X - M).$

Profits are therefore equal to gross investment plus capitalists' consumption minus workers' saving, plus the fiscal deficit, plus the trade surplus. The greater is capitalists' expenditure on investment or their own consumption, or the fiscal surplus, or the expenditure of foreign residents on exports, the greater will profits be. Higher profits will tend to result in higher investment, until excess capacity emerges and investment is reduced, causing profits to fall and a decline in economic activity to continue until excess capacity is eliminated and investment starts to rise. Higher profits then finance higher investment and stimulate a boom in economic activity.

In 1936 Kalecki left Poland for Stockholm in order to research Wicksellian theories of the business cycle. Following the publication of Keynes's *General Theory*, he moved to London, where Joan Robinson recruited him to Keynes's circle. While critical of Keynes's equilibrium reasoning, he readily participated in Cambridge and later Oxford discussions on the possibilities of full employment under capitalism. At this time he developed his pricing analysis, in which the markup over prime costs is determined by imperfect competition (with raw material prices being determined by a Marshallian short-period supply-and-demand process), and an analysis of corporate finance in which external finance is a liability that enhances financial risks, as well as providing liquidity. After World War II, Kalecki worked for nearly ten years for the United Nations, where he studied in detail the problems of developing countries. Out of this, in later years, came an analysis of economic development focusing on financial bottlenecks to capital accumulation in the developing countries, in a context of socioeconomic "structural" obstacles, poverty, rural backwardness, and food supply, to capitalist primary accumulation. In 1955 Kalecki returned to Poland. In the dislocation caused by Stalinist overinvestment, he emphasized the limited effectiveness of investment because of the need to maintain adequate levels of consumption and avoid excessive imports. He was a strong critic of market socialism, arguing that market mechanisms are less efficient than an effectively adjusted and centralized investment program. Kalecki and his associates were subjected to political attacks and an anti-Semitic purge in 1968.

In the years after Keynes's death, Joan Robinson championed Kalecki's work for its radical criticism of capitalism, namely that capitalism is unstable (the business cycle), tends to regressive distributional values (cost-minimization holds down wages, while high profits are necessary to maintain investment), and is hostile to full employment (because it undermines labor discipline) (Robinson [1964] 1965).[1] Kalecki's exposition of his analysis in the (p. 487) form of mathematical models based on national income identities made his work attractive to the first generation of Keynesian model-builders, in particular Lawrence Klein and David Worswick. They were attracted by models that gave a more systematic account of business cycles than Keynes's (Klein 1947; Worswick 1991; see also Sawyer 1999).

During the 1950s Kalecki was influential in the monopoly capitalism school of Marxists, through the work of Paul Sweezy and Josef Steindl. Kalecki's analysis shows how the problem of realizing surplus value as profits, in twentieth-century capitalism, was alleviated by corporate investment and deficit spending by governments. At the

same time, the absence of competition gives capitalists monopoly profits, which makes excess capacity more tolerable. Such excess capacity in turn reduces the capitalists' inclination to invest, causing a tendency to economic stagnation (Baran and Sweezy 1966; Steindl 1952).

Kalecki's ideas were at the forefront of the emergence of post-Keynesian economics during the 1970s. Here Kaleckian economics provided a clear and consistent alternative to the neoclassical synthesis of Keynesian ideas with Walrasian general equilibrium. Kalecki could not only provide a theory of the business cycle (an essential element of any economic analysis after the return of economic instability to capitalism in the 1970s), but also microeconomic foundations, which are largely absent in Keynes's *General Theory*. (Their absence had facilitated the neoclassical and monetarist interpretation of Keynesian unemployment as being due to money and/or real wage inflexibility.) Kalecki provided a more radical microeconomic explanation, in terms of monopoly and excess capacity reducing the propensity to invest out of profits (King 1996; Sawyer 1985). In this way post-Keynesian analysis spliced Kalecki's price and business cycle theory onto more orthodox Keynesian concerns about aggregate demand and full employment.

However, post-Keynesians have, by and large, preferred to overlook two aspects in which the work of Kalecki and Keynes is less than compatible. The first of these arises out of their respective treatment of expectations and uncertainty. Expectations play a central role in Keynes's explanation of the instability of investment, to which both theorists attributed the business cycle.[2] In Kalecki's view, business confidence is largely determined by current profits, so that further analysis of the subjective elements entering into businessmen's expectations is unnecessary. Uncertainty plays a crucial role in Keynes's liquidity preference theory of money. Coming from outside the Marshallian tradition, Kalecki did not find it necessary to postulate any aggregate demand for and supply of money, outside the wholesale money markets, and he took it to be a central feature of capitalism that the banking system accommodates business demand for credit. Money is therefore endogenous to the system, and uncertainty is less important in the portfolio demand for money (Keynes's "speculative" demand) than changes in short-term interest rates, relative to the long-term rate of interest.

Kalecki was also critical of Keynes's emphasis on the long-term rate of interest (the yield on long-term bonds) as a determinant of investment. That rate of interest was shown to be relatively stable, and therefore was of little use in explaining the instability of investment. Keynes resolved this problem by arguing that the expected return on investment that is in excess of the long-term rate of interest (his marginal efficiency of capital) **(p. 488)** is volatile, and therefore accounts for the instability of investment. Kalecki argued instead that investment is volatile because the internal liquidity of the corporate sector that is free of external financial liabilities, and is therefore available for investment without imposing potentially ruinous financial overheads on companies, fluctuates with profits and the degree of external financing. This is Kalecki's Principle of Increasing Risk. W. H. Locke Anderson made a pioneering study of this in the early 1960s (Anderson 1964). The principle derives from the work of Kalecki's colleague in Warsaw, Marek Breit, who first put forward the idea that firms pay a higher margin on interest costs the more they borrow in relation to their internal (liquid) reserves. While Breit used it to explain why firms that had run down their liquid reserves in the depression were charged high risk margins on top of the risk-free rate of interest, Kalecki argued that implicit in this analysis is a theory of firm size. In the Austrian and neoclassical theory of the firm, in which capital markets supply whatever capital entrepreneurs may reasonably demand, the size of a firm is indeterminate. As Kalecki pointed out, even long-run cost curves, which are supposed to determine the "scale" of production, only do so for a given plant or factory. A firm may produce on an even larger scale by owning more than one plant or factory. What prevents it becoming so large is either the cost of borrowing, to buy or build the factories, which would rise in proportion to ratio of external to internal finance, or the loss of control by the entrepreneur, or the prospect of sharing a given level of profit over a larger number of shareholders, in the case of equity finance.[3] The chief exponent of post-Keynesianism as a theory of finance capital, Hyman Minsky,[4] used Kalecki's theory of the business cycle but developed his own analysis of investment financing based on Keynesian expectations and Irving Fisher's debt deflation theory of economic depressions (Minsky 1982, 1986).

While post-Keynesians have tended to use Kalecki's analysis selectively to fill the lacunae in Keynes's economics, and the collapse of Communism has seriously limited the interest in Kalecki's economics of socialism, recurrent economic crises in developing and newly industrialized countries and volatile financial conditions in the older capitalist countries offer scope for new developments in, and applications of, Kalecki's economics.

In the next section of the chapter we attempt to explain the key features of Kalecki's analysis of a capitalist

economy with reference, where appropriate, to the standard two-sector model. We then look at Minsky's extension of Kalecki's ideas.

Kalecki's Macroeconomics in the Short Run

In this section of the chapter we aim to explain the key features of Kalecki's approach in the context of a two-sector model in which there is no government and no trade and all economic activity is devoted either to the production of consumer goods (*C*) or new capital goods (*I*).[5] We assume that each sector is vertically integrated so that raw materials "net-out" in the aggregate.

(p. 489) We are going to focus on the Kaleckian theory of "spending and output" in the short run. Among other things, this implies that we are going to study the consequences of producing new capital goods but not look at the consequences of using them. We also assume a reserve army of labor and excess capacity.[6]

The total number of workers employed (*L*) will be the sum of the number employed in the C-sector (L_C) and the number employed in the I-sector (L_I)

$$L = L_C + L_I,$$

$L = L_C + L_I,$

while aggregate output will equal the sum of aggregate consumption (*C*) and aggregate investment (*I*).

$$Y = C + I$$

$Y = C + I$

Aggregate output will also equal aggregate incomes, which will take one or other of two forms, wages or profits. Let the total amount of wages paid (sometimes called "the wages bill") be denoted by *W* and the total amount of profits received equal *P*.

$$Y = W + P$$

$Y = W + P$

Wages will be paid in both sectors and profits will be received in both sectors and so, denoting those sectors by subscripts *C* and *I* respectively,

$$W = W_C + W_I \quad \text{and} \quad P = P_C + P_I$$

$W = W_C + W_I \quad \text{and} \quad P = P_C + P_I$

Notice also that

$$C = W_C + P_C \quad \text{and} \quad I = W_I + P_I.$$

$C = W_C + P_C \quad \text{and} \quad I = W_I + P_I.$

Now, a key element in the model is the idea that society is made up of "classes" who receive incomes from different sources and whose savings behavior differs. We imagine a world in which there are only two sorts of people: capitalists—who own the stock of capital goods and who receive their income in the form of profits—and workers—who own no capital goods (directly or indirectly) and who receive their income in the form of wages.

We will assume for the time being that workers spend all that they get—so that the propensity to save out of wages is zero—while capitalists save all of their income—so that the propensity to save out of profits is unity.

As a result, in this model the value of spending on consumption goods in any period will equal the total value of wages paid out in that period:

$$C = W.$$

$C = W.$

(p. 490) Since wages (the money spent on consumption goods) comes from employment in both the investment goods sector and employment in the consumption sector, we can write

$$C = W_C + W_I.$$

$C = W_C + W_I.$

From the point of view of the sellers of consumption goods, their revenue, which is equal to *C*, is paid out (distributed between capitalists and workers) either in the form of wages or profits, that is,

$$C = W_C + P_C.$$

$C = W_C + P_C.$

But "there can only be profits in the aggregate if money which has not already been entered in business accounts as a direct cost of production is spent on goods" (Eltis 1973, 73) and since we have already seen that their revenue is derived from payments to labor, including workers in their own sector, it follows that

$$P_C = W_I.$$

$P_C = W_I.$

This result makes sense. For the firms in the consumption goods sector to make profits, that is, for them to receive sales revenue in excess of their (labor) costs, there must be money that has not already been entered into their business accounts as a cost of production spent on consumption goods. If all that happened was that their own workers spent their wages on consumption goods, they are only getting back as revenue what they have already paid out as a cost of production. Since the only other source of spending on consumption goods in this model is the spending out of wages paid by firms in the investment goods sector it follows (given our assumptions) that $P_C = W_I$.

Given this, what can we say about the level of *total* profits and its determination?

Recall that $P = P_C + P_I$. Now we have just seen that $P_C = W_I$ and so it must be the case that

$$P = W_I + P_I.$$

$P = W_I + P_I.$

But we know that the total value of investment output will equal

$$I = W_I + P_I.$$

$I = W_I + P_I.$

In other words it must be the case that[7]

$$P = I.$$

$P = I.$

As previously noted, this model is often summed up by the phrase "Workers spend what they (the workers) get, while capitalists get what they (the capitalists) spend." It is no mere tautology; it follows from the logic of the model, from the logic of the sectoral (p. 491) relations. It also follows from Kalecki's distinctive definition of capitalist enterprise. As he noted, "Many economists assume, at least in their abstract theories, a state of business democracy where anybody endowed with entrepreneurial ability can obtain capital for a business venture. This picture of the activities of the 'pure' entrepreneur is, to put it mildly, unrealistic. The most important prerequisite for becoming an entrepreneur is the *ownership* of capital" (Kalecki 1971, 109, emphasis in original). That capital, as Kalecki made clear, includes money capital, which is put into circulation and returns to capitalists as profits, as we have seen above.[8]

Mindful of the derivation of this relationship from national income identities, and of the feedback effects from profits today to investment in the future, Kalecki argued that the direction of causation is from investment to profits: "What

is the significance of this equation? Does it mean that profits in a given period determine … investment, or the reverse of this? The answer to this question depends on which is these items is directly subject to the decisions of capitalists. Now, it is clear that capitalists may decide … to invest more in a given period than in the preceding one, but they cannot decide to earn more. It is, therefore, their investment … decisions which determine profits, and not vice versa" (Kalecki 1971, 78f).[9]

An Aside: If Capitalists Consume?

It is easy to modify the model to allow for capitalists to consume.[10]

In such a case the level of total consumption in any period will be the sum of consumption by workers (C_W) and consumption by capitalists (C_P). Retaining the assumption that workers spend all of their income on C-goods (so that $C_W = W$), we can write

$$C = C_{\mathrm{w}} + C_P = W_C + W_I + C_p.$$

$C = C_W + C_P = W_C + W_I + C_P.$

And so profits in the consumption goods sector will equal

$$P_C = C_W + C_P - W_C = W_I + C_P.$$

$P_C = C_W + C_P - W_C = W_I + C_P.$

And so total profits will equal

$$P = P_I + P_C = P_I + W_I + C_P = I + C_P.$$

$P = P_I + P_C = P_I + W_I + C_P = I + C_P.$

Which is to say that "capitalists get what they spend" even if their spending is on current consumption.[11]

Given this, the question arises, why do they accumulate rather than enjoy "riotous living"? Some writers assert that they do it because it is in their nature. Marx would seem to be in this category—he writes, "Accumulate, accumulate! That is Moses and the prophets!" ([1867] 1976, 742). Keynes[12] also seems to be of this view; he attributes (p. 492) accumulation to "animal spirits," and like Marx and the classical economists he sees capitalists investing even when their actions result in lower and lower returns. Kalecki had a more subtle and arguably more direct view: Capitalists invest because current production is profitable, and therefore they expect future production to be profitable too.

The Two-Sector Model and the Real Wage

In a Kaleckian (and Robinsonian)[13] world the real wage is associated with clearing the market for consumption goods, unlike the neoclassical model, where it "clears" (and brings into equilibrium) the market for labor (on this see Solow and Stiglitz 1968, 537).

Let w be the money wage per worker (all workers are assumed to be identical, so both sectors pay the same w) and p_C be the price of consumption goods (assume there is just one type). So the "real wage" (measured from the point of view of the worker) is defined as w/p_C and this is the same for all workers.

Now we know that the total money amount spent on consumption goods in this model (total demand for consumption goods) is the total wages bill for the economy (we are assuming all profits are saved)

$$p_C C_r^D = W = wL,$$

$p_C C_r^D = W = wL,$

where C_r^D is demand for consumption goods in real terms.

What about total supply? One approach is from the standpoint of labor productivity. Define "the average product of

labor" (aka "labor productivity") as the ratio between the total amount produced and the number of workers employed. So the average product of labor in the consumption sector (which we will denote by A_C) will be

$$A_C = \frac{C_r}{L_C},$$

$A_C = \frac{C_r}{L_C},$

where C_r is the supply of consumption goods in real terms (assumed to equal the quantity produced).

This implies that the output of consumption goods (i.e., the quantity of consumption goods supplied) in any period is

$$C_r = A_C L_C.$$

$C_r = A_C L_C.$

If the market for consumption goods is cleared (whether by price or quantity variations, or a combination of both), it must be the case that

$$p_C C_r = p_C A_C L_C = wL.$$

$p_C C_r = p_C A_C L_C = wL.$

(p. 493) In other words, the size of the real wage must reflect the relative size of employment in the two sectors, as

$$\frac{w}{p_C} = A_C \left(\frac{L_C}{L} \right)$$

$\frac{w}{p_C} = A_C \left(\frac{L_C}{L} \right)$

or, since $L = L_C + L_I$

$$\frac{w}{p_C} = A_C \left(\frac{L - L_I}{L} \right) = A_C \left(1 - \frac{L_I}{L} \right).$$

$\frac{w}{p_C} = A_C \left(\frac{L - L_I}{L} \right) = A_C \left(1 - \frac{L_I}{L} \right).$

In other words the real wage reflects the *average* product of labor in the consumption sector and the sectoral composition of employment.

Given that $(w/p_C) = A_C(L_C/L)$, we can write

$$L = L_C \left(\frac{A_C}{w/p_C} \right).$$

$L = L_C \left(\frac{A_C}{w/p_C} \right).$

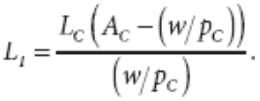
And since $L_I = L - L_C$ we can say

$$L_I = L - L_C = L_C \left[\left(\frac{A_C}{w/p_C} \right) - 1 \right],$$

$L_I = L - L_C = L_C \left[\left(\frac{A_C}{w/p_C} \right) - 1 \right],$

which can be rearranged as

$$L_I = \frac{L_C\,(A_C - (w/p_C))}{(w/p_C)}.$$

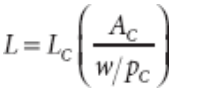


This makes sense not simply as a statement about how employment in the two sectors is related but also as the basis for a model of capital accumulation and growth. The term ($A_C - (w/p_C)$) is the surplus output (the excess of output over consumption) in real terms produced by any one worker in the consumption sector. If we multiply that by L_C, we have the total size of the surplus available to support workers in the I-sector. How many Investment sector workers that size surplus will support depends on the real wage.[14] What level of Investment output can be achieved will depend upon the number of Investment sector workers and labor productivity in that sector.

The Employment Multiplier

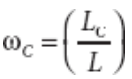
Define $\omega_C = \frac{w}{p_C A_C}$ to be the wage share in the consumption sector; then given that

$$L = L_C\left(\frac{A_C}{w/p_C}\right)$$



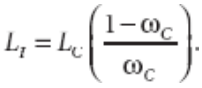
(p. 494) it is easily seen that

$$\omega_C = \left(\frac{L_C}{L}\right)$$



and that

$$L_I = L_C\left(\frac{1-\omega_C}{\omega_C}\right).$$

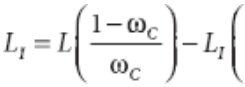


Notice that if A_C and (w/P_C) are fixed (in other words the wage-share in the consumption sector is given), then changes in L_I must be accompanied by changes in L_C; in other words, there will be an "employment multiplier" in the sense that if L_I rises, then L_C will also rise and so total L must rise more than the rise in L_I alone. (Clearly this assumes unemployed labor or a "reserve" of labor that can be brought into play at any time.)

The exact size of the "employment multiplier" relating to L to L_I can be shown as follows.[15]

Since $L_C = L - L_I$, we can write

$$L_I = L\left(\frac{1-\omega_C}{\omega_C}\right) - L_I\left(\frac{1-\omega_C}{\omega_C}\right).$$



Collecting like terms together and simplifying gives

$$L = \left(\frac{1}{1-\omega_C}\right) L_I.$$

$L = \left(\frac{1}{1-\omega_C}\right) L_I.$

Since $0 < \omega_C < 1$, the multiplier on the RHS of the above will be greater than 1. If, in addition, we can say that $\omega_C > 0.5$, then the multiplier will be greater than 2.

The level of employment in the investment goods' sector can be seen as dependent upon the level of investment in real terms (I_r) and the average product of labor in that sector (A_I), so we can write the above as[16]

$$L = \left(\frac{1}{1-\omega_C} \times \frac{1}{A_I}\right) I_r.$$

$L = \left(\frac{1}{1-\omega_C} \times \frac{1}{A_I}\right) I_r.$

An implication of this is that, with a given level of Investment in real terms and given techniques, a rise in the real wage (and thus, given A_C, a rise in the wage share in the C-sector) will be accompanied by *a rise* (not a fall) in the level of employment (and vice versa in the case of a fall in the real wage).[17] As Kalecki noted: "one of the main features of the capitalist system is the fact that what is to the advantage of a single entrepreneur does not necessarily benefit all entrepreneurs as a class. If one entrepreneur reduces wages he is able *ceteris paribus* to expand production; but once all entrepreneurs do the same thing—the result will be entirely different" (1971, 26).

(p. 495) **The Investment Multiplier**

Kalecki summarized the relationship between exogenous changes in investment and the consequent changes in aggregate output (Y) as follows: "The relation between changes in … the production of investment goods, and those of aggregate production materialises in the following way. When production of investment goods rises the aggregate production increases directly *pro tanto*, but in addition there is an increase due to the demand for the consumer goods on the part of the workers newly engaged in the investment good industries. The consequent increase in employment in the consumer goods industries leads to a further rise in the demand for consumer goods" (Kalecki 1971, 11f). It should be noted that this was originally published in 1933, three years before Keynes's *General Theory*.

The exact relationship between the level of I in any period and the total level of Y associated with it, can be developed as follows.

We have seen that the total level of profits in the consumption sector is equal to the wages bill in the investment goods sector (we are assuming that consumption by the capitalists is zero). Another way to put this is to say that

$$P_C = \omega_I I,$$

$P_C = \omega_I I,$

where ω_I is the wage-share in the investment goods sector.

However, it is also the case that

$$P_C = (1-\omega_C)C,$$

$P_C = (1-\omega_C)C,$

and so we can write

$$C = \frac{1}{1-\omega_C}(\omega_I I),$$

$$C = \frac{1}{1-\omega_C}(\omega_I I),$$

Now, since Y = C + I we can write

$$Y = \left(1 + \frac{\omega_I}{1-\omega_C}\right) I.$$

$$Y = \left(1 + \frac{\omega_I}{1-\omega_C}\right) I.$$

Since $0 < \omega_C < 1$ the multiplier on the RHS of the above will be greater than 1. If, in addition we can say that $\omega_I > \omega_C > 0.5$, then the multiplier will be greater than 2.

Notice that in the Kaleckian model the "multiplier" is to do with distributional phenomena (we shall see shortly that these are determined by price-cost margins set by firms) and the ability or inability of the supply of consumption goods to respond to an (p. 496) expansion of employment in the sector producing investment goods. The relationship between aggregate output and investment is not a purely "mechanical" demand-driven relationship independent of market structure and the price-behavior of firms.[18]

Kalecki, Markup Pricing, and the Degree of Monopoly

"Markup" pricing is where firms set prices by "marking up" unit costs—the markup is to allow for overheads to be met and to provide a profit margin.

In his essay "Costs and Prices" Kalecki writes: "In fixing the price the firm takes into consideration its average prime costs and the prices of other firms producing similar products" (Kalecki 1971, 44), and he then goes on to explore this relationship, which he says "*reflect* what may be called the degree of monopoly of the firm's position" (45, our emphasis).[19] In an (earlier) essay titled "Distribution of National Income" he shows the relationship between the markup—and thus "the degree of monopoly"—and the wage share. His focus here is on aggregations of firms at the level of an industry or sector (Kalecki tends to concentrate on manufacturing and similar industries). Here aggregate wages (W) and materials (M) costs are marked up to cover overheads and generate a profit. Kalecki writes the relationship (1971, 62) as follows:

$$overheads + profits = (k-1)(W+M),$$

$$overheads + profits = (k-1)(W+M),$$

where *k* is the ratio of proceeds (sales revenue) to prime costs.

The share of wages in value added (ω) will be

$$\omega = \frac{1}{W + (k-1)(W+M)} = \frac{1}{1 + (k-1)(j+1)},$$

$$\omega = \frac{1}{W + (k-1)(W+M)} = \frac{1}{1 + (k-1)(j+1)},$$

where *j* is the ratio of the aggregate cost of materials to the wage bill.

It follows that "the relative share of wages in the value added is determined by the degree of monopoly and by the ratio of the materials bill to the wages bill" (1971, 62). The degree of monopoly depends on the level of concentration, explicit or implicit collusion between firms, the extent to which price competition is replaced by sales promotion, variations over time in the level of overheads and trade-union power and so on (Kalecki 1971, 49–52).[20]

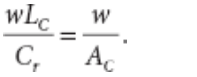
Markup pricing is not only discussed, as we have seen above, in the context of modeling "factor shares" but also when modeling responses of firms to demand shocks in the short run (this is because if markups are fixed and average variable costs do not vary with output, then a markup model predicts that firms will respond to demand

shocks by (p. 497) altering their output and not their prices). As Joan Robinson (among others) has put it, "The importance of Kalecki's line of argument was in integrating the analysis of prices with the analysis of effective demand" (Robinson 1979, 190). This integration is most clearly seen by demonstrating the relationship between price-cost markups and the key relations covered in the preceding sections.

In what follows we will assume that firms in each sector are vertically integrated so that the only variable costs are labor costs. We will also assume that markups do not vary (within the limits set by productive capacity) with demand and thus with sales[21] or with unit labor cost (and thus with the wage).[22]

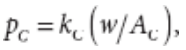
We define "unit labor cost" in the consumption goods sector as

$$\frac{wL_C}{C_r} = \frac{w}{A_C}.$$



If labor costs are the only variable cost, then a price-setting model might be

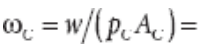
$$p_C = k_C\,(w/A_C),$$



where k_C is the "markup" on consumption goods and $k_C > 1$.

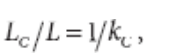
Notice that this implies that the real wage depends on the degree of monopoly and the average product of labor in the consumption goods sector, as $w_r = w/p_C = A_C/k_C$, and that the share of wages in the consumption goods sector will equal

$$\omega_C = w/(p_C A_C) = 1/k_C.$$



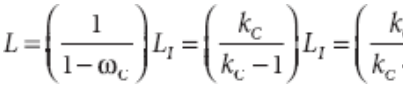
Earlier we saw that a key relationship in the Kaleckian two-sector model is the ratio of L_C to L, which is equal to the ratio $w/(p_C A_C) = \omega_C$. Given the above, we can write

$$L_C/L = 1/k_C,$$



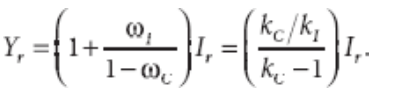
while the employment multiplier is

$$L = \left(\frac{1}{1-\omega_C}\right) L_I = \left(\frac{k_C}{k_C - 1}\right) L_I = \left(\frac{k_C}{k_C - 1} \times \frac{1}{A_I}\right) I_r.$$



Likewise the output multiplier can be written as

$$Y_r = \left(1 + \frac{\omega_I}{1-\omega_C}\right) I_r = \left(\frac{k_C/k_I}{k_C - 1}\right) I_r.$$



(p. 498) So that all of our key relationships have as their determinants the level of investment and/or the size of the markup(s). For example, in relation to the distribution of national income, Kalecki writes: "changes in the distribution of income occur not by way of a change in profits, but through a change in gross income or product. Imagine for instance that as a result of [an] increase in the degree of monopoly the relative share of profits in the

gross income rises. Profits will remain unchanged because they continue to be determined by investment … but the real wages and salaries and the gross income or product will fall. The level of income or product will decline to the point at which the higher share of profits yields the same absolute level of profits" (Kalecki 1971, 95). As Robinson puts it, "grouping all the influences that play on gross margins … under the title of the degree of monopoly, the share of wages is determined by how great the degree of monopoly is" (Robinson 1960, 145). "The proposition that the share of profits in income is a function of the ratio of investment to income is perfectly correct, but capacity and the degree of monopoly have to be brought in to determine what income it is that profits are a share of, and investment is a ratio to" (Robinson 1960, 149).

An excellent summary of Kalecki's analysis of profits and the way in which it acts as the foundation for his theory of employment and income determination has been given by Joan Robinson when she writes: "There are two elements in Kalecki's analysis of profits: the share of gross product in the product of an industry is determined by the level of gross margin, while the total flow of profits per annum depends upon the total flow of capitalists expenditure on investment.… Combining these two theories, we find the very striking proposition that firms, considered as whole, cannot increase their profits merely by raising prices. Raising profit margins reduces real wages and consequently employment in wage-good industries. The share of profit is increased but the total profits remain equal to the flow of capitalists expenditure" (Robinson 1979, 192).

Kalecki's Dynamic Analysis

Seen in the light of Kalecki's writings a capitalist economy "only works well as an investing economy, for investment generates profits.… Investment takes place because it is expected that capital assets will yield profits in the future, but these future profits will be forthcoming only if future investment takes place. Profits are the carrot and the stick that make capitalism work" (Minsky 1982, 104f). One implication of this is that if stabilization policy is to be successful, it must stabilize profits. In the next section of the chapter we consider Minsky's extension of Kalecki's ideas to the study of financial instability.

While Keynes emphasized the role of volatile expectations in changing the volume of investment, Kalecki's firms were much more rational in making investment decisions on the basis of current profitability and the amount of accumulated retained profits held by firms. Initially, Kalecki thought that the rate of interest would be a factor in investment, (p. 499) as Keynes thought, and as remains the common view among economists. However, by 1940 his empirical investigations convinced Kalecki that the rate of interest could have little if any bearing on investment. This is simply because the relevant interest rate, the long-term rate, exhibits little variation "and therefore only aggravates the crises, but is not of fundamental importance for the mechanism of the trade cycle" (Kalecki 1939, 114). Thereafter profits played the key role not only in financing investment, but also in providing the incentive for it.

Business cycles therefore arise because, in Kalecki's view, it is impossible for capitalists to maintain a stable level of investment over time. This is because investment adds to capacity, so that a constant amount of investment over time must, since investment determines profits, result in a falling rate of profits, measured as the amount of profit obtained from the growing capital stock. Moreover, as capacity expands, with a constant level of investment, excess capacity would emerge before the economy reached a stable state in which gross investment is wholly absorbed by depreciation, or replacement investment. Excess capacity discourages new investment. As investment falls, profits too are reduced, further discouraging investment. Kalecki famously remarked that "The tragedy of investment is that it causes crisis because it is useful. Doubtless many people will consider this theory paradoxical. But it is not the theory which is paradoxical, but its subject—the capitalist economy" (Kalecki 1939, 149).

In this way, the economy succumbs to slumps which continue until depreciation picks up, or until excess capacity is eliminated, or until government investment stimulates private sector investment. An increase in investment then raises profits, causing a further rise in investment. In this way the economic boom is secured (Kalecki 1971, 135–37).

Kalecki produced a number of models of investment and the business cycle, with none of which he was entirely satisfied (Kalecki 1971, viii; Steindl 1981). He also introduced lags between investment decisions (implemented over a number of periods) and actual investment in a given period. In this way, he further attenuated the scope of

business expectations since, in any given period, those expectations could only influence projected *new* investments, rather than current investments in the process of completion.

A key feature of Kalecki's approach to the cycle is the view that "the long-run trend is but a slowly changing component of a chain of short-period situations; it has no independent entity." This is "the only key to the realistic analysis of the dynamics of a capitalist society" (Kalecki 1971, 165). For Kalecki, "the trend and the cycle are indissolubly mixed" (Harcourt 2006, 146).

The Money Economy and the Real Economy

Mainstream economic theory regards money as operating in a general equilibrium system of relations between economic variables. For Monetarists, money, apart from being the medium of exchange, is a unit of account, that is, the commodity in which (p. 500) other goods are priced. Changes in the quantity of money therefore give rise to price adjustments, and only temporary deviations from equilibrium output or employment. Monetarists therefore confuse changes in relative prices with inflation. In the New Consensus view on monetary policy, money disappears, but its price, the rate of interest, has dynamic effects through various "channels" (e.g., the exchange rate, the cost of borrowing, the supply price of capital). The New Consensus view simplifies policymaking to questions of whether to raise or lower central bank interest rates. But by ignoring the underlying structure of the economy, this view overlooks certain issues of consistency. These issues are conceptual (e.g., how is it possible to have a price for a commodity whose demand and supply are unspecified?) and analytical (the transmission mechanism of monetary policy is only statistically defined). Monetarists, New Classical theorists, and New Keynesians regard the economy as coming into a general equilibrium that is determined by the interaction of real variables, with monetary factors playing an incidental part because of information asymmetries or temporary disequilibria in particular markets.

For post-Keynesians, money is the foundation of and the rationale for economic activity. Therefore it is impossible to analyze modern capitalism ("the monetary production economy") solely as a set of "real" (i.e., nonmonetary) relationships, as postulated, for example, by New Classical economists. Money conditions how firms and households conduct their economic activities, in the following ways.

First of all, money is the way in which time enters into economic decision-making. In an Arrow-Debreu world, with complete markets, we could make a set of contracts today that would secure us leisure and consumption for the rest of our lives. We would not then need money any more because no further exchanges would be necessary, only deliveries of goods and services contracted. In fact, because the future is unknown, and we do not have complete markets for goods and services for delivery at all times today and in the future, money becomes necessary as a store of value. This gives rise to a demand for money ("liquidity preference") that is motivated by uncertainty. Money therefore affects exchange and production when firms and households decide to hold income as money, rather than using their income to buy goods and services or to finance production.

The second way in which money conditions economic activity is through the money markets, where the rate of interest is determined. This rate of interest influences the cost of capital, which entrepreneurs set against the prospective return on investments in the real economy. The higher is the rate of interest, the lower will be the prospective return on investments after payment of financing costs. As Keynes argued in his chapter "The Essential Properties of Interest and Money," changes in the money rate of interest influence entrepreneurs in their decisions to produce goods, and therefore in their decisions on how many workers to employ (Keynes [1936] 1973, chap. 17).[23] For most post-Keynesians, the rate of interest is the crucial determinant of investment. However, as argued above, Kalecki and his followers dissented from this interest rate doctrine. They argued that internal finance (accumulated retained profits) is the vital influence on investment, as opposed to finance raised by firms in the financial markets (p. 501) and the price of that finance in the rate of interest. This argument appears in the "financial post-Keynesianism" of Minsky, who put forward a third way in which the monetary and financial system impacts in a destabilizing way upon nonfinancial activity in the modern capitalist economy.

Minsky argued from Kalecki's theory of profits the importance of investment in generating the gross operating profits (profits before payment of interest and dividends to shareholders) that firms need to pay financing obligations. In Minsky's view, finance and balance sheets consist of a series of dated payment commitments, stretching into the future. For nonfinancial firms, these payment commitments are entered into by firms in order to

obtain finance for investment when the cost of such investment exceeds the amount of internal finance that firms have. Both investment and finance, according to Minsky, are ways in which time enters into the system of capitalist production and exchange. Investment takes time, so that in any given period expenditures are being made on fixed capital projects that were planned and initiated in previous periods. This distinction between current investment and investment decisions is also derived from Kalecki (see above). Such expenditures then generate the operating profits necessary to pay financing costs (Kalecki [1954] 1969, chap. 9; Minsky [1978] 1982; and 1986, chaps. 7 and 8). Minsky puts the essence of the argument as follows: "An economy with private debts is especially vulnerable to changes in the pace of investment, for investment determines both aggregate demand and the viability of debt structures" (1982, 65). Thus, the modern capitalist economy is inherently unstable because of the possibility that if investment is reduced, insufficient profits may be generated. Firms will then be unable to pay their financing commitments without borrowing more money. Minsky called this situation of further borrowing to defray financing expenses Ponzi financing, because it leads to exponential increases in indebtedness. Such Ponzi financing, according to Minsky, is inevitable in a laissez-faire capitalist economy because as investment increases in the course of an economic boom, so do financing commitments. At some stage the amount of external financing commitments must exceed investment, and hence the gross profits from which financing costs may be paid. At that point firms find themselves unable to pay financing costs, and financial crisis breaks out.

Minsky's theory owes more to Kalecki than to Keynes. Minsky based it on Kalecki's theory of profits, an analysis that Keynes had abandoned well before he wrote his *General Theory*. In addition, the key part in Minsky's analysis is played by firms' gross fixed capital investment in the kind of financial business cycle context that Kalecki considered to be the central problem of capitalism. This differs from Keynes not only because the latter adopted the Marshallian short-period equilibrium for his analysis in the *General Theory*. Monetary policy plays a part in Minsky's theory in inducing financial crisis by the rise in the rate of interest, and hence financing costs, as an economic boom proceeds. But the demand for money, which Keynes and post-Keynesians consider to be central to their analysis, is not a key factor in Minsky's theory. Indeed, there are traces in Minsky of the kind of credit system monetary endogeneity that Kalecki derived from German monetary theory.

(p. 502) Kalecki and Keynes shared a common perspective in seeing investment as the key determinant of output and employment in the capitalist economy. Keynes gave primacy to monetary policy, supported by fiscal policy, in ensuring that investment is sufficient to secure full employment. Kalecki was more skeptical about the ability of investment to continue at a sufficiently high level to give a return on profit proportionate to the rising capital stock. Minsky highlighted the role of rising financing commitments in the periodic breakdown of capitalist prosperity. They shared a belief that money and finance determine the character and dynamics of the modern capitalist economy, as opposed to the mainstream view that the interaction of real variables in perfect or imperfect markets accounts for that character and dynamics.

What Is It about a Capitalist Economy That Makes It Prone to Crises and Persistent Involuntary Unemployment?

While both Keynes and Kalecki saw the deficiency of effective demand as a feature of the "normal" functioning of a capitalist economy and both saw investment as volatile and "autonomous," they offer fundamentally different explanations for the "ultimate cause" of unemployment.[24] Keynes's explanation, which is that it is ultimately to do with the presence of uncertainty and the nature of money (Shackle 1967), amounts to saying that unemployment arises in a capitalist economy because it is a money-using economic system and so "bargains" are not struck in real terms. In Marxian language Keynes is saying unemployment arises in a capitalist economy because it is a system of "commodity production" and the use of money is widespread. This is *not* Kalecki's view. Kalecki, a socialist, influenced by Marx,[25] was keen to go beyond this and to elucidate the contradictions of capitalism.[26] If we take Kalecki's work as a whole it is clear that there are two reasons, beyond that which he has in common with Keynes (demand deficiency), why (involuntary) unemployment exists and persists in a capitalist economy. Both reasons go to the nature of capitalism and to the interests and power of the (monopoly) capitalists. Both reasons go beyond the fact that in a capitalist economy money is used. One reason given by Kalecki applies to the world in which we live, a world of mixed capitalism where the possibility of government intervention by monetary or fiscal (or wage-tax trade-offs or some other) policy to maintain full employment exists. Kalecki pointed out very early in the piece that whether full employment is in fact achieved or not depends on class interests and thus "political aspects" of the economy (Kalecki [1943] 1971—more on this remarkable paper below).[27] The second reason, not

unrelated to the first, applies to a laissez-faire economy. To fully explain the existence (and persistence) of unemployment we have to go beyond explaining why firms (employers) will not offer enough jobs to clear the labor market. We need instead to explain why the unemployed are dependent on others for (p. 503) their livelihood and why it is that they are unable or unwilling to employ themselves or to form viable cooperatives. At the end of the day the Marxian and Kaleckian explanation for unemployment is that the working class does not own the means of production and that workers are unable to borrow to obtain the required means of production.[28] "[M]any economists assume … a state of business democracy where anybody endowed with entrepreneurial ability can obtain capital for starting a business venture. This picture … is, to put it mildly, unrealistic. The most important prerequisite for becoming an entrepreneur is the *ownership* of capital" (Kalecki [1937] 1971, 109, emphasis in the original).

In short, Keynes sees the ultimate cause of the persistence of unemployment as the fact that we live in an economic system where money is used. For Kalecki the ultimate cause goes beyond this to include also the nature of capitalism itself and the power of the ruling class, a power derived ultimately from its monopoly of the means of production. However, because they are different explanations does not mean they are incompatible, far from it. They are "different" in that one goes beyond the other, not that the one negates the other.

Political Aspects of Full Employment

In a remarkable article published in 1943 Kalecki explored the political business cycle. He notes that the mere existence of the theoretical apparatus and the policy tools for the maintenance of full employment does not guarantee that they will be used. "The assumption that a Government will maintain full employment in a capitalist economy if it knows how to do it is fallacious. In this connection the misgivings of big business about maintenance of full employment by Government spending are of paramount importance" (Kalecki [1943] 1971, 138). He lists three reasons why the industrial leaders would be opposed to full employment achieved by government spending. The first reason is a dislike of government attempts to directly bring about full employment by widening of state activity. The second is a dislike of public sector investment and any subsidization of consumption. The third is more general and involves a dislike "of the social and political changes resulting from the *maintenance* of full employment" (139, emphasis in original). Under such a regime "'the sack' would cease to play its role as a disciplinary measure … and the self assurance and class consciousness of the working class would grow," resulting in political tension (140–41).

In addition, and as a result of the opposition to full employment by government spending, there will emerge the conception of counteracting the slump by stimulating private investment. "Under a laissez-faire system the level of employment depends to a great extent on the so-called state of confidence. If this deteriorates, private investment declines, which results in a fall of output and employment (both directly and through the secondary effect of the fall in incomes upon consumption and investment). This gives the capitalists a powerful indirect control over government policy: everything which may shake the state of confidence must be carefully avoided because it would cause an (p. 504) economic crisis. But once the government learns the trick of increasing employment by its own purchases, this powerful controlling device loses its effectiveness. Hence budget deficits necessary to carry out government intervention must be regarded as perilous. The social function of the doctrine of 'sound finance' is to make the level of employment dependent on the state of confidence" (Kalecki 1971, 139). He points out that in a slump "either under the pressure of the masses, or even without it, public investment financed by borrowing will be undertaken to prevent large-scale unemployment. But if attempts are made to apply this method in order to maintain the high level of employment reached in the subsequent boom, strong opposition by business leaders is likely to be encountered, … lasting full employment is not at all to their liking. The workers would 'get out of hand' and the 'captains of industry' would be anxious to 'teach them a lesson.' In this situation a powerful alliance is likely to be formed between big business and rentier interests, and they would probably find more than one economist to declare that the situation was manifestly unsound. The pressure of all these forces, and in particular of big business—as a rule influential in government departments—would most probably induce the government to return to the orthodox policy of cutting down the budget deficit" (Kalecki 1971, 144).[29]

Concluding Remarks

The pursuit of a post-Kaleckian economics is worthwhile, not only because Michał Kalecki was an original and

"great" thinker but also because at the heart of his work is the indissoluble and essential unity of finance, microeconomics, and macroeconomics and all of those with the political.

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Notes:

(1.) See also Toporowski (2011).

(2.) "Credit for all" did not exist in their lifetimes, so consumption (as a function of income) could legitimately be regarded as more stable than investment expenditure. Also, whereas for Keynes it is the price of credit (interest rates) that influences investment, for Kalecki it is the quantity of credit (Kriesler 1997, 312). In other words, lack of internal finance can constrain investment, a view Keynes came to after the *General Theory* when he added the finance motive as a demand for money (Keynes [1937] 1973).

(3.) See "Entrepreneurial Capital and Investment" in Kalecki 1971, 105–9.

(4.) Minsky's most influential works are about Keynes (1976)—in which he argued that the presence of uncertainty was central to Keynes's message—and numerous works extending Kalecki's ideas especially insofar as they relate to the financial position of firms (1982, 1986). The most succinct statement of Minsky's ideas on financial instability may be found in his 1978 paper ([1978] 1982). John King has an excellent discussion of his work elsewhere in this *Handbook*.

(5.) For simplicity we neglect depreciation and replacement investment.

(6.) One way in which our (essentially static) analysis differs from that of Kalecki himself is that he saw time lags as very important determinants of the dynamics of a capitalist economy; see, for example, Kalecki (1971, chaps. 1 and 7–11).

(7.) The only people who are doing the saving in this model are the capitalists, and total saving is exactly equal to their (the capitalists) income, which is Profits. So total saving equals total investment. Notice also that, by implication, this says that if the capitalists can increase investment spending (maybe by borrowing money from another capitalist) then *I* will increase but, as a result, so also will *P* (and Saving).

(8.) The function of the price system is to distribute the profits aggregate among the capitalists and firms in the economy. This is a key point that distinguishes Kalecki's theory from that of many Ricardian Marxists and post-Keynesians, for whom the price system determines the distribution of income between wages and profits.

(9.) In addition to Kalecki, Keynes also saw changes to investment causing changes in aggregate profits and this leading in turn to changes in the aggregate level of economic activity. For example, in an article in *The Times* in 1937 titled "How to Avoid a Slump," written after his *General Theory* was published, Keynes says "the production of investment goods tends to fluctuate widely, and it is these fluctuations which cause the fluctuations, first of profits, then of general business activity, and hence of national and world prosperity" (Keynes [1937] 1982, 386). This idea that it was movements in the level of profits (not inventories) that were the "mainspring of change" was a key in pretty much all of Keynes's writings.

(10.) There is a complication if we allow for workers saving. We have been talking about a model in which there are two classes, workers (who derive their income solely from wages) and capitalists (who derive their income solely from profits—or dividends or interest payments). But if the workers are saving part of their income, we should allow them to receive nonwage income. See Pasinetti (1962) and Harcourt (1972, chap. 5).

(11.) Keynes also noted this in his *Treatise on Money*: "However much of profits entrepreneurs spend on consumption, the increment of wealth belonging to the entrepreneurs remains the same as before. Thus, profits, as a source of capital increment for entrepreneurs, are a widow's cruse which remains undepleted, however much they may be devoted to riotous living" (Keynes 1930, 139).

(12.) "Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits—a spontaneous urge to action rather than inaction" (Keynes 1973, 161).

(13.) See also Harcourt (2006, chap. 2).

(14.) We are assuming throughout that the real wage is the same for all workers (and does not depend upon which sector they are employed in). For an attempt to build sectoral wage differentials into the model see Dixon (1979).

(15.) In his *General Theory* Keynes defined the "employment multiplier" as "the ratio of the increment of total employment which is associated with a given increment of … employment in the investment industries" ([1936] 1973, 115). Sawyer (2008) provides an excellent discussion of Kalecki's view of the determinants of investment and of the bidirectional relationship between investment and profits Kalecki [1937] 1971.

(16.) We assume that investment goods are produced to order and that the price-labor cost ratio for investment goods is exogenous, having been specified in the contract of sale agreed before the commencement of work (see Harcourt 2006, 13).

(17.) See also Kalecki ([1939] 1991). By proposing that real wages and employment are positively and not inversely related, Kalecki was taking a position very different from that adopted by Keynes in his *General Theory*.

(18.) That the multiplier is a relationship between sectoral outputs (and employments) was stressed by Shackle in his *Years of High Theory*: "Underlying all such phenomena is the interdependence of all sectors and components of the economic society, an interdependence … arising from specialisation of role and product, from the 'division of labour'" (Shackle 1967, 198). It was Harry Johnson who famously described Keynes's multiplier as "that inexhaustibly versatile mechanical toy" (1961, 11).

(19.) For a discussion and defense of Kalecki against the claim that his theory is tautological see Riach (1971) and especially Kriesler (1987, 107–11). See also Kalecki (1971, 168).

(20.) He discusses trade-union power at greater length in his essay "Class Struggle and the Distribution of Income" in Kalecki 1971, 156–64.

(21.) The assumption that markups do not vary with demand requires either that all firms within each sector have the same markup, or that the composition of each sector's output does not change with changes in the level of output.

(22.) This is reasonable given our assumption of unemployed resources. However, once full employment is reached, it is no longer plausible to imagine that wages and/or markups are constant and exogenous.

(23.) See also Tily (2007).

(24.) Both authors see the “proximate” or “superficial” cause as a lack of effective demand. Here we are talking about the features of a capitalist economy that might be regarded as the “ultimate” cause.

(25.) Sebastiani (1994) provides an excellent account of Kalecki’s political economy and its relation to Marx and Luxemburg. We draw attention to the fact that in Kalecki’s “review” of the *General Theory* he refers to the “unemployed” as the “*reserve army* of unemployed labour” (Kalecki 1982, 246; our emphasis).

(26.) “The essence of Marxism consists of elucidating … the contradictions of monopoly capitalism. From 1933 to 1968 I worked on explaining them” (Kalecki [1968] 1993, 259).

(27.) Keynes read this “exceedingly good and most acute” article “with much sympathy and interest” (Keynes to Kalecki, cited in *Collected Works of MichałKalecki*, ed. J. Osiatyński, vol. 1, trans. C. A. Kisiel [Oxford: Clarendon Press; New York: Oxford University Press, 1990], 573).

(28.) And that, even if they were able to do so, because of the presence of collusion and increasing returns to scale they are unable to compete in the marketplace with the incumbents, with the capitalists.

(29.) At the time of writing this (2011) we are struck at how well this paper of Kalecki’s describes the events and the response by economists of different persuasions to the Global Financial Crisis and the European debt crisis.

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Wages Policy

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[–] Abstract and Keywords

In the New Neoclassical Synthesis, inflation is treated as a purely monetary phenomenon, which is to be dealt with by means of monetary policy. Central banks are assumed to target output price inflation—not asset price inflation—and to set interest rates according to some version of the Taylor Rule, increasing the real interest rate when expected inflation exceeds the target and decreasing it when inflation falls below the target. In post-Keynesian economics, cost inflation has always been taken very seriously. Whereas wages policy plays no role in the New Neoclassical Synthesis, it is central to post-Keynesian thinking on inflation. Another important difference between post-Keynesian and mainstream thinking on the aggregate price level concerns price deflation. This chapter presents a post-Keynesian critique of wages policy. It examines Sidney Weintraub's criticism of the neoclassical-Keynesian synthesis, as well as the role of workers' expectations and the power of trade unions in post-Keynesian explanations of the great stagflation of the 1970s and early 1980s.

Keywords: New Neoclassical Synthesis, inflation, monetary policy, post-Keynesian economics, cost inflation, price deflation, wages policy, Sidney Weintraub, trade unions, stagflation

Introduction

In the New Neoclassical Synthesis inflation is treated as a purely monetary phenomenon, which is to be dealt with by means of monetary policy. Central banks are assumed to target output price inflation—not asset price inflation—and to set interest rates according to some version of the Taylor Rule, increasing the real interest rate when expected inflation exceeds the target and decreasing it when inflation falls below the target. Interest rates determine the level of aggregate demand, which in turn establishes a rate of unemployment that is consistent with the achievement of the inflation target. The level and rate of change of money wages are the outcomes of this process, via the downward-sloping (short-run) Phillips curve that links the rate of wage inflation to the unemployment rate. The money wage rate has no causal significance, since output price inflation is regarded as a demand-side problem.

In post-Keynesian theory, in contrast, cost inflation (or sellers' inflation, as Abba Lerner termed it) has always been taken very seriously. Whether it is the price of raw materials (especially imported raw materials), the price of labor, or the profit aspirations of giant corporations, cost shifts are regarded as being no less important than demand shifts as causes of inflation. (A precedent for this can be found in the "fundamental equations" in Keynes's *Treatise on Money*.) Post-Keynesians have always been skeptical of the ability of monetary policy to overcome cost-inflationary pressures. Hence they have argued for policies that operate directly on cost inflation, including commodity price stabilization schemes, antimonopoly measures to restrict "profit-push" inflation, and wages policy to ensure that money wage increases are not so large as to give rise to excessive output price inflation. Wages policy plays no role in the New Neoclassical Synthesis, but it is central to post-Keynesian thinking on inflation.

There is another important difference between post-Keynesian and mainstream thinking on the aggregate price level. This concerns price *deflation.* All strands of mainstream macroeconomic theory, both New Classical and so-called New Keynesian, emphasize the adverse consequences of (downward) price and wage rigidity. They therefore tend (p. 511) to see reductions in the general level of prices and money wages as good things, albeit possibly unattainable, since a fall in the price and wage level would restore equilibrium in product and labor markets affected by excess supply. Post-Keynesians, however, follow Keynes in highlighting the dangers of deflation. In a neoliberal world in which trade unions are much weaker than they used to be, and in which the threat of wage inflation is correspondingly less serious, post-Keynesians are beginning to identify a new role for wages policy—the avoidance of deflation.

In the Beginning

The money wage level played a critically important role in the *General Theory*, as can be inferred from Keynes's decision to express all macroeconomic magnitudes in terms of "wage units." He did not, perhaps, articulate his criticism of the Quantity Theory as fully as he might have done, but his alternative theory of the price level was clearly stated in chapter 18, where he discussed the forces that tended to maintain a precarious stability in the capitalist economy:

> When there is a change in employment, money-wages tend to change in the same direction as, but not in great disproportion to, the change in employment; *i.e.* moderate changes in employment are not associated with very great changes in money-wages. This is a condition of the stability of prices rather than of employment.
>
> (Keynes 1936, 251)

Thus changes in the price level were, for Keynes, driven by changes in the money wage level and, in the long run, by changes in the productivity of labor, through their effect on production costs, and not by exogenous increases or decreases in the stock of money.

He strongly advocated the virtues of a stable price level. In the context of the 1930s this was primarily a case against *falling* prices. Deflation, Keynes suggested in chapter 19 of the *General Theory*, had several powerful disadvantages, not least its effect on the state of confidence, on the real rate of interest and on the burden of debt. The objections to a falling price level applied both to the sharp cyclical deflations of 1920–22 and 1929–33 and to the proposal, favored by many liberal economists, that the price level should decline in the long term *pari passu* with rising labor productivity, money wages remaining constant. Thus Keynes's discussion of wages policy in the *General Theory* was principally devoted to *maintaining* the price level in the face of deflationary pressures:

> There are advantages in some degree of flexibility in the wages of particular industries so as to expedite transfers from those which are relatively declining to those which are relatively expanding. But the money-wage level as a whole should be maintained as stable as possible, at any rate in the short period.
>
> (1936, 270)

At least one of his Cambridge disciples was already setting out a rather different position, which was much more concerned with the dangers of inflation. In her *Essays in* (p. 512) *the Theory of Employment*, written in 1935 but not published until two years later, Joan Robinson observed that "a constant upward pressure upon money wages is exercised by the workers (the more strongly the better they are organised) and a constant downward pressure by employers, the level of wages moving up or down as one or other party gains an advantage" (Robinson 1937, 5). The balance of power depended, rather loosely, on the level of economic activity and hence on the state of the labor market, since "there is a more or less definite level of employment at which money wages will rise, and a lower level of employment at which money wages fall. Between the two critical levels there will be a neutral range within which wages are constant" (7). Robinson did not speculate as to just how extensive this "neutral range" might be, but there was no suggestion of a single Non-Accelerating-Inflation Rate of Unemployment, still less a "natural rate of unemployment" à la Friedman. It was "idle," Robinson concluded, "to attempt to reduce such questions as Trade Union policy to a cut-and-dried scheme of formal analysis" (7). But money wages always played a central role in Robinson's analysis of inflation, both under "normal" conditions and in situations of

hyperinflation, in which continuous increases in money wage rates were a necessary (but often overlooked) condition for the continued acceleration of the inflationary process (Robinson 1951; Boianovsky 2005).

Like Michał Kalecki, Robinson welcomed the rapid achievement of full employment early in World War II, but was worried about its effects on "discipline in the factories," and in particular on the rate of growth of money wages. Both Kalecki and Robinson anticipated considerable hostility toward full employment after the war on the part of capitalists who needed high unemployment to make the threat of the sack credible and keep wages down, thereby enforcing what another early Keynesian, Thomas Balogh, would later describe as "the incomes policy of Karl Marx" (Balogh 1982, 178). Without a substantial "industrial reserve army" of the unemployed, Balogh asked, what was there to prevent excessive rates of increase in money wage rates other than a rigorous wages policy? This question would assume great importance after 1973, since it was fundamental to explaining the age of stagflation (Harcourt 2001, chap. 17).

Wages Policy in the Golden Age

Keynes himself became a strong advocate of wages policy during the war (Phelps Brown 1990), while Robinson noted, soon after it ended, that inflation had indeed been mitigated between 1939 and 1945 by means of a "vague and unformulated, but nevertheless fairly successful, wages policy," in addition to heavy taxation, price controls, and rationing (Robinson 1978, 22). She was clear that something more formal would be needed in peacetime. Her friend and wartime neighbor Nicholas Kaldor had set out the case for a permanent social compact on wages as early as 1942, in a popular pamphlet that he wrote with the Fabian socialist Peggy Joseph:

> There is a great danger … that with the present system of sectional wage-bargaining, in a state of full employment, a tug of war will ensue between the workers of different **(p. 513)** industries for larger slices of the national cake, in the course of which wages and prices will continually rise.… A policy of full employment will require, therefore, that the present system of wage-bargaining by trade unions and employers' federations in *individual industries* should be replaced by a system of wage determination on a national basis.
>
> (Joseph and Kaldor 1942, 18; original stress)

In the technical appendix that he wrote for the Beveridge Report, Kaldor again asserted the need for wages policy as an essential anti-inflationary mechanism, along with international commodity price agreements to prevent cost-inflationary pressures from that source. Full employment was to be maintained, and demand inflation avoided, by judicious use of fiscal policy, while the balance of payments was to be taken care of by international agreement, supplemented where necessary by import controls and, in extremis, by currency devaluation. Monetary policy had a very limited role: Kaldor simply advocated low interest rates, on the grounds that "cheap money" would benefit the average taxpayer at the expense of rentiers (Kaldor 1944). There was no suggestion that monetary policy might be the principal instrument against inflation.

In June 1950 Kaldor wrote a memorandum on wages policy for the Chancellor of the Exchequer, Hugh Gaitskell, which, although unpublished until 1964, set out the principles of (post-)Keynesian thinking on incomes policy with exceptional clarity (Kaldor 1964). To avoid inflation, he argued, money wages must rise on average at the same rate as labor productivity (his tacit assumption is that the existing shares of labor and capital in GNP were to remain constant). At the same time, changes in the wage structure should be permitted, to encourage the reallocation of labor between industries and thereby facilitate structural change: growing industries must be permitted to raise wages in order to attract labor from declining sectors. But this did not mean that wages should be closely linked to productivity growth in individual industries. As a general rule, Kaldor argued, the benefits of technical progress should be passed on to the community as a whole in the form of lower prices. He also opposed linking pay to the performance of individual firms. As he argued, almost thirty years later:

> There is no doctrine which is more fallacious than the idea that wages should be fashioned enterprise by enterprise, according to the value of output per worker. All it means is that inefficient enterprises are artificially sustained by their being able to pass on their inefficiency to their workers who get lower wages.
>
> (Kaldor 1979, 3)

Thus, if inflation were to be avoided, prices had to fall in some sectors of the economy in order to offset the inevitable price increases in others. And continuous wage pressure was an important factor in stimulating productivity growth, through the pressure that it put on poorly performing enterprises. This was an explicit feature of the Rehn-Meidner model that was influential in Sweden in the 1950s and 1960s (Erixson 2004).

To administer wages policy, Kaldor proposed the establishment of a Wages Board to determine whether or not wage increases in particular occupations or industries should be permitted immediately or postponed. He favored controls over dividend payments, thereby converting wages policy into a more general incomes policy, but without (p. 514) damaging the incentives for risk-taking and innovation: "any lasting policy with regard to dividends must necessarily permit the rewards of success to be reaped as well as the penalties of failure" (Kaldor 1964, 118). This could be achieved by restricting dividend payments to some given percentage of current profits. The important thing was to preserve economic incentives, so that both labor and capital were employed where they were most urgently needed.

There were repeated attempts to operate an incomes policy of this sort in Britain for the next twenty-five or thirty years, until Margaret Thatcher restored "the incomes policy of Karl Marx." They enjoyed only limited success and repeatedly ran into political no less than economic difficulties (Crouch 1979). Many employer groups objected on principle to any government interference with the market mechanism and complained in particular about dividend restrictions and price controls. Trade unionists criticized the conservative nature of incomes policy, which maintained the relative shares of wages and profits and did nothing to redistribute income and wealth toward the poor. Dividend controls were dismissed as irrelevant, since they simply allowed profits to be stored in "the rich man's piggy bank" (a phrase associated with the white-collar trade union leader Clive Jenkins).

When he visited Australia in 1964 Kaldor found that very similar ideas were being developed there, with the machinery for their implementation already in existence in the form of the country's long-established system of compulsory arbitration. Two local economists, Eric Russell and Wilfred Salter, advocated a rule for annual increases in average award rates of pay that was very similar to Kaldor's own proposal for the United Kingdom. To allow employees to share in the growing prosperity, they argued, wages and salaries should increase at a rate equal to price inflation plus productivity growth. This rule can be written as (1.21.1)

$$w = p + a,$$

$w = p + a,$

where *w* is the permissible annual rate of increase in money wages, *p* is the inflation rate, and *a* is the anticipated trend rate of productivity growth (Smithin 2003, 188). This might be termed the Kaldor-Russell-Salter Law of wages policy. Since Australia was a small open economy, Russell and Salter insisted that employees should also share in the benefits (drawbacks) of any improvement (deterioration) in the terms of trade. This could be done by restricting *p* to internal price inflation, or by defining *a* net of changes in the terms of trade (Russell 1965). Similar considerations governed the operation of wages policies in the Scandinavian countries and the Netherlands for several decades after 1945.

There was nothing distinctively post-Keynesian about this. Indeed, the term "post-Keynesian" was rarely used in the 1960s, and never to define a particular school of macroeconomic thought in opposition to mainstream Keynesianism; all that came later. Both the Cambridge Keynesians and their Australian and European counterparts regarded wages policy simply as an essential element in any sensible full employment policy.

(p. 515) Sidney Weintraub and Tax-Based Incomes Policy

Things were different in the United States, where the IS-LM model was taken more seriously and the Phillips curve was seized upon as the final component in a macroeconomic model that now constituted a synthesis of neoclassical and Keynesian ideas. Unlike Kaldor and Robinson, the University of Pennsylvania economist Sidney Weintraub was engaged for decades in a critique of the neoclassical-Keynesian synthesis. His criticism hinged on its neglect of cost inflation. Weintraub was never one to understate his case, and he almost certainly exaggerated the difference between his position on the control of inflation and that of neoclassical, Old or (as Robinson rudely put it) "Bastard" Keynesians like Paul Samuelson and Robert Solow, who were broadly supportive of the wages policies of the Johnson and Nixon administrations between 1964 and 1975. Cost inflation did, however, constitute

an extremely important element in Weintraub's attack on the neoclassical-Keynesian synthesis and was fundamental to his articulation of a "fundamentalist Keynesian" version of post-Keynesian economics.

Weintraub's critique had both a theoretical and a policy dimension. At the theoretical level, Weintraub disinterred Keynes's Aggregate Demand-Aggregate Supply model, set out in chapter 3 of the *General Theory* and then largely forgotten both by its author and his disciples; an important exception was the Canadian Keynesian, Lorie Tarshis (Harcourt 1982). This model, it is important to note, is in aggregate proceeds/total employment or *Z*-*N* space, not in the price level/real GDP or *P*-*Q* space favored by mainstream textbook writers. Weintraub placed particular emphasis on the Keynesian AS curve, with the money wage rate playing a fundamental role in fixing the price level and changes in money wages as the principal determinant of inflation. In terms of macroeconomic policy, Weintraub objected that the mainstream Keynesians had largely ignored cost inflation in favor of demand inflation, with serious adverse consequences for the US economy. There had been heavy costs of lost output and employment as a result of monetary and fiscal policy measures taken unnecessarily to reduce aggregate demand when action against cost pressures would have been much more effective (Weintraub 1961). Note that these criticisms were made *before* the rise of Monetarism; Weintraub was attacking US economic policy in the 1950s.

The policy that Weintraub proposed was designed to support the price mechanism, and especially to maintain flexibility in relative wages as a means of obtaining an efficient allocation of labor between industries, occupations, and regions. His *tax-based incomes policy*, or TIP, was intended as a counterinflationary alternative to direct controls, on the one hand, and to demand deflation, on the other. Firms could decide to increase the wage rates that they paid by more than the specified (noninflationary) norm, but they would be taxed accordingly, since the inflationary effects meant that the social costs of large wage increases were greater than the private costs. Weintraub denied that TIP was antilabor. There was very strong empirical evidence, he believed, that in the long run **(p. 516)** the wage and salary share in national income was constant, so that changes in the rate of wage inflation had no effect whatever on the distribution of income between labor and capital. In terms of equation (1.21.1), a decline in *w* would lead to an equivalent fall in *p* (and TIP would have no adverse effect on *a*, unlike direct controls, which might reduce the rate of productivity growth). Weintraub's proposals were also consistent with free collective bargaining. Unions could ask for any wage increase they liked, but they would need to recognize that firms' resistance would be strengthened by the extra costs associated with the inflation tax. TIP need only apply to the largest 1,000 US corporations, and would thus be simple and inexpensive to administer (Wallich and Weintraub 1971).

These ideas were for a time very influential among American post-Keynesians, but they made little impact overseas and had no effect whatever on anti-inflation policy. Faced with accelerating inflation in the late 1960s, both the Johnson and Nixon administrations first sought voluntary agreement from unions and corporations on wage moderation, as in Europe, and then (in the case of Nixon) resorted to direct controls. Weintraub was, perhaps, a decade or two ahead of his time: TIP was better suited to a neoliberal age, when there was a general presumption in favor of market-based policies of all types. Ironically, this was precisely the period in which wage inflation had lost its sting, and TIP was no longer needed

Weintraub was a liberal Democrat, but TIP won most support from more conservative economists. His coauthor Henry Wallich was a prominent Republican, and his friend Abba Lerner, who argued for a broadly similar "market-based anti-inflation policy," or MAP, was sympathetic to both post-Keynesian and Austrian economics. Another energetic supporter of TIP, Lawrence Seidman (1978), always regarded himself as a mainstream Keynesian. Opposition to TIP, and to wages policy more generally, came from the left. The radical economist James Crotty, for example, dismissed the pluralist political vision of the post-Keynesians as totally unrealistic. "Like Keynes' own theory of politics," he wrote, "it fails to appreciate the immense power that corporations derive from their exclusive control of capital investment, and thus of jobs and income" (Crotty 1980, 25). Capitalists would never willingly give up this power in the public interest, he maintained, and they did not need to do so, since rising unemployment had undermined both the expectations and the power of organized labor.

Wages Policy in the Great Stagflation

It was precisely workers' expectations, and trade union power, that featured prominently in post-Keynesian explanations of the great stagflation of the 1970s and early 1980s. They objected strongly to the monetarist

account, which was most influential in this period. Again some simple algebra will help to clarify the issues that were at stake (Smithin 2003). The equation of exchange can be written (1.21.2)

$$MV = PY,$$

$MV = PY,$

(p. 517) where *M* is the stock of money, *V* is the velocity of circulation, *P* is the price level, and *Y* is real GDP. Assuming *V* to be constant, and using lower case letters to represent rates of change, we have the fundamental monetarist equation: (1.21.3)

$$p = m - y,$$

$p = m - y,$

where the rate of price inflation (*p*) is equal to the rate of growth of the money stock (*m*), minus the rate of growth of real output (*y*). Crucially, in equation (1.21.2) causation runs from left to right, while in equation (1.21.3) it runs from right to left: money growth causes inflation.

Weintraub's alternative to equation (1.21.2) is (1.21.4)

$$P = k(W/A),$$

$P = k(W/A),$

where *k* is the share of profits in GDP, *W* is the aggregate wage bill, and *A* is average labor productivity. The interpretation of equation (1.21.4) is that firms set prices (the left-hand side) by marking up their average labor costs (the right-hand side, where the constant *k* now represents the average profit markup). By definition, (1.21.5)

$$Y = AN,$$

$Y = AN,$

where *N* is total employment. Combining equations (1.21.3), (1.21.4), and (1.21.5) and continuing to assume that both *V* and *k* are constant, we obtain (1.21.6)

$$m = w + n,$$

$m = w + n,$

where *n* is the rate of growth of employment. This is the labor market equivalent of equation (1.21.3). For the Monetarists, causation in equation (1.21.6) runs from left to right: the rate of increase in money wages is determined by the rate of growth of the money stock. Like price inflation, wage inflation is a monetary phenomenon, and it can be eliminated only by restricting the rate of growth of the stock of money. Wages policy deals only with effects, and not with causes. It can do no good, and if it distorts wage differentials and impairs the efficient allocation of labor it may do serious harm (Friedman 1966).

This assumes that the stock of money is itself exogenous, and is determined by the decisions of the monetary authorities. The post-Keynesian analysis of *endogenous money* (see Fontana in this volume), however, leads to a quite different conclusion. If the stock of money is demand-determined and thus depends on the decisions of individual economic agents (especially capitalists), it cannot be controlled by central banks. It follows (p. 518) that the Monetarists are wrong about the direction of causation in equations (1.21.2), (1.21.3), and (1.21.6). If money is the dependent variable, causation runs from right to left in equations (1.21.2) and (1.21.6), and from left to right in equation (1.21.3). Higher rates of price or wage inflation cause the stock of money to grow faster; the rapid rates of monetary growth in the 1970s were the *effect* of accelerating inflation, not the cause.

What, then, caused inflation to accelerate in the first place, if it was not lax monetary policy? The post-Keynesian explanation centered on cost pressures, from both wages and primary product prices. Here union power, and the expectations of union members, played a central role. After a full quarter of a century of continuous peacetime full employment, memories of the mass unemployment of the 1930s had faded and trade union members had become more militant in their pursuit of higher wages. Also important, from the early 1960s onward, was the increasing marginal rate of income taxation imposed on the average wage- and salary-earner. This growing "tax wedge" meant that a given percentage pretax wage increase yielded a continually decreasing post-tax increase.

Alternatively put, to achieve a given post-tax pay rise, employees needed larger and larger pretax increases. Once price and wage inflation began to accelerate, an extra factor came into play, and the process began to feed upon itself: fear of falling behind other groups of workers generated a new emphasis on maintaining relative wages, and a "wage-wage spiral" was added to the existing wage-price (or price-wage) spiral. Even in northern and central Europe, where trade unions were highly centralized and a coordinated wages policy had always been relatively easy to obtain, discipline eventually broke down. Governments responded to accelerating wage inflation with contractionary fiscal and monetary policies, which led to increased unemployment, lower growth rates, and the emergence of *stagflation* (Cornwall and Cornwall 2001).

Thus post-Keynesian accounts of stagflation emphasized the politics and sociology of wage determination rather than economics, narrowly defined. Their analysis overlapped to a considerable extent with the "varieties of capitalism" literature in the emerging academic discipline of comparative political economy (Hall and Soskice 2001; Carlin and Soskice 2006). At least in the early stages of stagflation, the post-Keynesians suggested, "corporatist" countries like Sweden and Austria had fared better than "liberal" countries such as the United States and Britain. The Scandinavian countries, in particular, enjoyed a relatively high degree of social cohesion and a centralized system of wage determination that allowed them to avoid the worst of the class conflict, and intra-working-class struggle over relative wages, that had afflicted the Anglo-Saxon countries in the 1970s and early 1980s. This had kept unemployment low, at least for a time. Accordingly post-Keynesians reacted to the great stagflation by reiterating the need for wages policy, even if they became increasingly pessimistic about the prospects of success. In Australia the Swedish model provided the inspiration for the centralized wages policy known as the Accord, adopted by the incoming Labor government in 1983 in response to the country's serious stagflation problem (see Harcourt 2001, part 5, for the intellectual background to the Accord).

But the post-Keynesians never saw wage increases as the only source of cost inflation. Nicholas Kaldor, in particular, continued to stress the role of primary product prices as a (p. 519) cause of the accelerating inflation of the early 1970s, and to assert the necessity for international agreements to stabilize commodity prices as a means of reinforcing any future wages policy (Kaldor 1996).

Wages Policy in a Neoliberal World

The decline of union power since 1980 took almost everyone by surprise, except, perhaps, in the United States, where it was merely the continuation of a process dating back to the late 1940s, and where less than one private sector employee in twelve is now a union member. Most if not all post-Keynesians outside the United States would have agreed with Kaldor when he told the House of Lords, at the beginning of the Thatcher era, "There is no way of restoring the situation to what it was before the unions were first established" (Kaldor 1983, 61). But this is precisely what happened (Fernie and Metcalfe 2005). A very similar story can be told for New Zealand, where the unions never recovered from the overnight halving of their membership in 1991 when the (conservative) government introduced the Employment Contracts Act. In Australia the withering away of the unions began in 1983, and ironically it was partly the result of their enthusiastic support for the Labor government's wages policy (the Accord) that overcame stagflation by reducing real wages and making unions seem irrelevant, or worse (Bramble 2008). The collapse of trade union power was not confined to the Anglo-Saxon countries. A similar story can be told for much of central and northern Europe, including the supposed corporatist stronghold of Germany. Only in Scandinavia has union membership, and union influence, held up, and even here the centralized tripartite wage policy mechanisms of the golden age have atrophied.

Thus union activity no longer has the macroeconomic significance that post-Keynesians once attributed to it. Trade unions still increase the earnings of their individual members, *ceteris paribus*, thereby exerting some influence over the wage structure and also affecting employment and labor productivity. But these are *microeconomic* effects. Cost inflation is still a problem, but it comes now from the markets for energy, raw materials, and food, not from the labor market. This became very clear in the great commodity price boom of 2007–8, when wages lagged behind the acceleration in prices that was caused by an explosion in the costs of energy and basic foodstuffs. Wages policy, it seems, is no longer a central part of a post-Keynesian anti-inflationary strategy (but see Harcourt 2006, chap. 8 and Setterfield 2009 for the alternative view).

It may, however, still be needed in the fight against *deflation*. Before the oil price explosion of 2007–8 revived the

inflation dragon, some post-Keynesians had begun to worry about the consequences of a declining price level (Herr 2009). This was a feature of the Japanese economy throughout the 1990s, and early in the twenty-first century Germany seemed to be following the same path. In both cases, weak unions had failed to keep money wages rising at the rate specified by the Kaldor-Russell-Salter Law. The profit share in GDP therefore tended to rise, with a depressing effect on consumer spending, (p. 520) and since productivity growth was continuing the price level stabilized and began (very gradually) to fall. The objections to deflation are still those specified by Keynes, and they remain compelling (Palley 2008). A declining price level makes expectations more pessimistic, reducing both investment and consumption expenditure. It also increases real interest rates, since nominal interest rates cannot be negative; again investment is discouraged. The real value of both corporate and individual debt increases, making insolvency more likely. Even the International Monetary Fund began to advocate the adoption of a (positive) inflation target for Japan, tacitly conceding that downward price flexibility is part of the problem, not part of the solution, and this position was generally adopted by mainstream economists and policymakers in the aftermath of the global financial crisis of 2008–9.

A post-Keynesian wages policy would reassert the validity of the Kaldor-Russell-Salter Law: money wages should rise at a rate at least equal to the sum of productivity growth and the acceptable minimum rate of price inflation (and perhaps a little faster for several years, given the case for restoring the wage and salary share in GDP to something approaching its 1980 level). Exactly how such a policy might be implemented in what has become a largely nonunion labor market is another question (see Briggs, Buchanan, and Watson 2006 for some detailed proposals). A statutory minimum wage, set relatively high and increased annually in line with the Kaldor-Russell-Salter Law, would be a good start. Two of the world's three largest economies (Germany and Japan) have no such mechanism, and in the United States the federal minimum wage has always lagged behind the (relatively slow) growth in average earnings, giving rise to a broad community-based campaign for a "living wage" to be introduced by state and municipal governments (Pollin et al. 2008). For post-Keynesians the macroeconomic advantages of labor market reregulation should be added to the microeconomic benefits (which include less poverty, reduced inequality, and greater pressure on inefficient employment in low-wage industries). Needless to say, this is all a very far cry from the mighty unions and the accelerating wage inflation of the 1970s. But it will continue to distinguish post-Keynesian macroeconomics from the New Neoclassical Synthesis, in which inflation is a purely monetary phenomenon and wages policy plays absolutely no role.

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[–] Abstract and Keywords

A "flexible labor market" has been a central policy objective of British governments for thirty years. In 1992, the OECD defined a "flexible labor market" as one "where employment is little regulated (in terms of pay, working hours, restrictions on dismissal, etc.) the creation of low-paid, part-time, short-term or otherwise non-standard jobs is unconstrained, and there is a high level of job turnover, employers screen less intensively before hiring." This definition gives the game away; what is being advocated is demand-side flexibility. However, employment segregation suggests supply-side inflexibility. Research on employment discrimination has concentrated on three main areas: wages, success in obtaining jobs, and job classifications. Economists attempt to explain observed differences in wages, success in obtaining jobs, and occupational/job distribution between groups on the basis of age, race, and sex.

Keywords: flexible labor market, supply-side inflexibility, demand-side inflexibility, wages, job classifications, employment segregation, employment discrimination

A "flexible labor market" has been a central policy objective of British governments for thirty years. It is a mantra that has also been taken up elsewhere in Europe, for example, Spain experienced a general strike in September 2010 in response to government proposals to weaken employment protection legislation. In 1992 the Organisation for Economic Co-operation and Development defined a "flexible labor market" as one "where employment is little regulated (in terms of pay, working hours, restrictions on dismissal, etc.), the creation of low-paid, part-time, short-term or otherwise non-standard jobs is unconstrained, and there is a high level of job turnover, employers screen less intensively before hiring" (OECD 1992, 207). This definition gives the game away; what is being advocated is *demand-side* flexibility. The neoclassical proselytizers have overlooked that markets have two sides and neglected to make recommendations for improving the labor market flexibility of sellers. This may be explained by their faith in a Becker/Darwinian process by which employers with a penchant for discriminatory hiring practices are eliminated by the competitive process. Unfortunately the facts do not support this faith; substantial employment discrimination in Britain on the bases of age, race, and sex is confirmed by recent experiments: see Riach and Rich 2010; Wood et al. 2009; and Riach and Rich 2006a.

Labor market segregation certainly suggests supply-side inflexibility. How often do we encounter a female airline pilot? Women were flying Spitfires and Wellington bombers in a noncombat role seventy years ago and delivering them to the front line. How often do we encounter gray hair among bank staff? Can it be that women do not want to fly passenger aircraft, or the over-fifties not want to work in banks? It is argued that racial groups and women are deliberately segregated into occupations (Bergmann 1971).

There is an important distinguishing characteristic of the labor market; when one is buying a new washing machine or a kilo of bananas it is obvious what one is getting. When an employer hires labor (*Homo sapiens*) this is not the case; qualifications and experience can be documented objectively but judgments about integrity, diligence, (p.

524) intellectual agility, equability, and so on, are necessarily subjective and based on incomplete information at the point of hiring. Samuel Brittan's notorious assertion could not be further from the truth: "Workers do sell their services just as banana producers sell bananas" (*Financial Times*, September 16, 1982). Workers face buyers who have to make subjective assessments about them, and workers are distinguished by personal characteristics such as age, race, size, and sex; bananas can be assessed objectively and they all have yellow skins.

Research on discrimination in labor markets has concentrated on three main areas, wages, success in obtaining jobs, and job classifications. Employers could pay some groups less than other groups, hire fewer employees from a particular group, and structure jobs such that workers from different groups do not do the same work. Therefore economists attempt to explain observed differences in wages, success in obtaining jobs, and occupational/job distribution between groups on the basis of age, race, and sex. The discussion that follows surveys the research undertaken in these areas.

Employment Discrimination

One neoclassical explanation for employment discrimination is that it reflects the "tastes" of employers or customers in wishing to deal only with a preferred category of employees (male, white, young, heterosexual, etc.). This is the theory of Becker (1971). According to this theory, discriminatory employers, who incur a cost disadvantage by eschewing a category of labor that is available at a wage discount, relative to its productivity, will be eliminated by the competitive process. An alternative neoclassical explanation is that it is "statistical," in that employers use age, race, sex, and so on, as a screening device when coping with the incomplete information they have about job applicants. This theory was put forward by Arrow (1973) and Phelps (1972) and is analogous to the higher car insurance premiums levied on all young drivers.

The conventional approach to testing for the existence of labor market discrimination was developed by Oaxaca (1973) and Blinder (1973) with further refinements by Juhn, Murphy, and Pierce (1991) and Oaxaca and Ransom (1994). Their technique relies on regression analysis to infer the existence, and extent, of wage discrimination; any wage differential between women and men, or racial minorities and whites, that cannot be explained by productivity-determining characteristics, such as education or length of employment, is attributed to discrimination. These researchers control for variables denoting human capital to estimate an earnings function. They explain the dependent variable, the observed wage (*w*), by independent variables representing the characteristics of an individual that denote productivity (X_i), such as amount of schooling, qualifications, experience at work, and so on. The beta coefficient, *w*–, represents the amount that the variable contributes to the wage that the individual earns. If there is no wage difference, let us say, on the basis of sex, the male wage minus the female wage will equal zero. If there is a wage difference (women earn less than men), then if all the difference (p. 525) is explained by different characteristics (which proxy productivity differences) such as less education, less working experience, and so on, no unexplained part of the wage difference exists, and it is concluded that no discrimination has been found. It is only when there is an unexplained part, due to females receiving a lower reward than males for the same characteristic (that is) that it is concluded that discrimination may exist.

The standard wage decomposition is as follows:

$$\underset{\text{male wage}}{\overline{W}_m = \alpha_m + \widehat{\beta}_m \overline{\mathrm{X}}_m} \qquad \underset{\text{female eage}}{\overline{W}_f = \alpha_f + \beta_f \overline{\mathrm{X}}_f}.$$

Oaxaca decomposition:

$$\overline{W}_m - \overline{W}_f = \widehat{\beta}_m(\overline{\mathrm{X}}_m - \overline{\mathrm{X}}_f) + \alpha_m - \alpha_f + (\widehat{\beta}_m - \widehat{\beta}_f)\overline{\mathrm{X}}_f,$$

$\bar{W}_m - \bar{W}_f = \hat{\beta}_m(\bar{X}_m - \bar{X}_f) + \alpha_m - \alpha_f + (\hat{\beta}_m - \hat{\beta}_f)\bar{X}_f,$

where

α is the constant and *w*– is the mean wage.

$$\overline{W}_m - \overline{W}_f \qquad \widehat{\beta}_m(\overline{\mathrm{X}}_m - \overline{\mathrm{X}}_f) \qquad (\alpha_m - \alpha_f) + (\widehat{\beta}_m - \widehat{\beta}_f)\overline{\mathrm{X}}_f$$

raw wage gap explained component unexplained component

$$\bar{W}_m - \bar{W}_f \qquad \hat{\beta}_m(\bar{X}_m - \bar{X}_f) \qquad (\alpha_m - \alpha_f) + (\hat{\beta}_m - \hat{\beta}_f)\bar{X}_f$$

raw wage gap explained component unexplained component

Altonji and Blank (1999) provide a comprehensive discussion of the method and findings from research applying this technique to analyze wage differences for race and sex. This research investigates not only whether discrimination exists but also the contribution of changes in productivity characteristics to changes in the wage differential. Studies of racial or sexual wage differentials in Australia, Europe, UK, and United States all find persistent unexplained components (Altjoni and Blank 1999; Blau and Kahn 2006; Kidd and Meng 1997; Lai 1995; Manning and Petronoglo 2008; Meng and Meurs 2004). Studies in developing and newly industrialized countries such as South Korea, Taiwan (Seguino 2000; Zveglich, van der Meulen Rodgers, and Rodgers 1997), and Turkey (Kasnakoğlu and Dayıoğlu 1997; Tansel 2005) all concluded that discrimination against women explained their respective findings. Empirical studies of wage differences that have specified broad occupational classifications in their models have found that in the United States between 10 and 40 percent of the racial or sexual wage difference is accounted for by "horizontal occupational segregation," that is, African Americans (women) working in occupational groupings separate from whites (men) (Altonji and Blank 1999; Miller 1987, 1994; Mumford and Smith 2009; Treiman and Hartmann 1981). Furthermore, some studies identify "vertical segregation," where women are overrepresented in the lower ranks of occupations (called a sticky floor) or underrepresented in the higher ranks of occupations (called a glass ceiling) as the central explanation for the persistent wage differential between women and men (Bayard et al. 2003; Black, Trainor, and Spencer 1999; McNabb and Wass 1997; **(p. 526)**

Table 1.22.1 Selected Studies of Decomposition of Wage Differentials

Country/Study	**Basis of test**	**Year of data**	**Raw wage gap %**	**Proportion of the wage gap unexplained %**
Australia				
Kidd and Meng (1997)	Sex	1990	20.1	91.6
Meng and Meurs (2004)	Sex	1990	15.7	88.2
Miller (1994)				
Productivity variables only	Sex	1989	14.4	98.6
Productivity and segregation variables	Sex	1989	14.4	63.9
Lai (1995)	Race	1988	14.0	67.9
Taiwan				
Zveglich, van derMeulen Rodgers, and Rodgers (1997)				
Productivity and segregation variables	Sex	1992	43.1	57.8
UK				

UK				
Miller (1987)	Sex	1980	39.0	34.4
Mumford and Smith (2009)[a]				
Productivity variables only	Sex	2004	14.0	69.1
Productivity and segregation variables	Sex	2004	26.5	42.0
USA				
Altonji and Blank (1999)[b]				
Productivity variables only	Race	1995	14.0	82.2
Productivity and segregation variables	Race	1995	14.0	69.7
Altonji and Blank (1999)				
Productivity variables only	Sex	1995	28.6	97.6
Productivity and segregation variables	Sex	1995	28.6	73.8
Blau and Kahn (2006)	Sex	1998	22.7	92.1

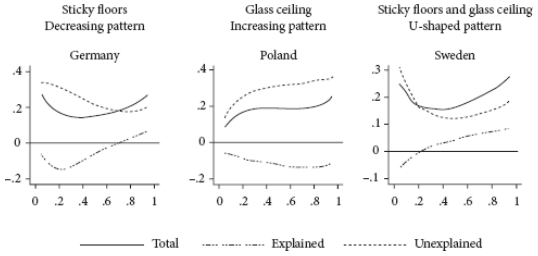
Note: Productivity refers to human capital variables; segregation refers to variables for occupational or workplace classifications.

([a]) Results are for full-time employees.

([b]) Results for race are for African Americans.

Sources: Kidd and Meng (1997, table 5, 39); Meng and Meurs (2004, table 2, 197); Miller (1994, 368–70); Norris, Kelly, and Giles (2005, 154); Zveglich, van derMeulen Rodgers, and Rodgers (1997, table 3, 602); Miller (1987, table 1, 892); Mumford and Smith (2009, table 5, 69); Altonji and Blank (1999, table 5, 3159); Blau and Kahn (2006, table 3, 57).

Ransom and Oaxaca 2005; Ward-Warmedinger 2000). Vertical segregation is also present on a racial basis, for example, between African Americans and whites (Hamilton, Algeron, and Darity 2011). Bayard et al. (2003, table 5, 905–6) found 23.9 percent of the racial wage gap was explained by vertical segregation when 491 occupational groups were specified.



Click to view larger

Figure 1.22.1 Quantile regression analysis of sexual wage differentials.

Source: Christofi des, Polycarpou, and Vrachimis (2010, 24–25).

Table 1.22.1 provides details of the wage gap and the unexplained component for a selected sample of studies in Australia, Taiwan, the UK, and the United States. Large unexplained components are a feature of these studies when they have controlled only for human capital (productivity) variables. Unexplained components of the wage gap within a range of 82.3 percent to 98.6 percent have been estimated. The contribution of **(p. 527)** occupational segregation to the wage gap can be identified in a number of these studies. In the Mumford and Smith UK study, for example, the decline in the unexplained component from 69.1 percent to 42.0 percent when productivity and segregation variables are included in the estimation indicates that occupational segregation contributed 27.1 percent to the wage gap between women and men in 2004. A comparable level for sexual wage differences was found by Altonji and Blank for the United States (23.8 percent), whereas a higher level was found by Miller for Australia (34.7 percent). other results can be identified from the studies in the table.

In a further attempt to identify whether vertical segregation exists, the wage decomposition approach has been modified to analyze sexual wage differences across the wage distribution using quantile regression analysis (Fortin, Lemieux, and Firpo 2011; Melly 2005). Technically, this allows the beta coefficient in the earnings function to vary across the wage distribution rather than being fixed at the mean value. A glass ceiling occurs when the wage gap at the ninetieth percentile is at least two percentage points higher than in any of the other lower percentiles. This means that the wage gap at the upper end of the wage distribution is greater than at lower percentiles of the wage distribution. A sticky floor occurs when the wage gap at the tenth percentile is at least two percentage points higher than in any of the other higher percentiles. This method has been applied to study Europe and the UK in studies by Arulampalam, Booth, and Bryan (2007) (eleven countries) and Christofides, Polycarpou, and Vrachimis (2010) (twenty-four countries). Figure 1.22.1, compiled from Christofides et al., shows the findings for Germany, Poland, and Sweden, indicating three different outcomes. For most countries analyzed in these studies there was more evidence of glass ceilings than sticky floors: nine of the eleven in Arulampalam et al. and fourteen of the twenty-four in Christofides et al.

Despite these modifications to the wage decomposition method, the continuing problem with this technique is in the specification of the model and the choice of independent variables. Doubt arises as to the variables controlling for human capital because data are not available on aspects such as ability or quality of schooling. There is also a **(p. 528)** "chicken or egg" problem, as acquisition of human capital may well be influenced by past and expected discrimination, that is, an awareness of discriminatory attitudes in employment and lower wage outcomes. This means that the critical comments of Blau and Ferber (1987, 318) are pertinent: "In the light of the sensitivity of the magnitude of discrimination to plausible alternative specifications of the underlying regression equations, and the fact that neither productivity nor discrimination itself is directly observable, some scepticism has arisen about the adequacy of this technique for measuring discrimination." It would be wise if an overreliance on published data and statistical inference were abandoned, and, in particular, it would be preferable if there were available a technique to measure discrimination *directly*.

It was sociologists, who have a long tradition of collecting their own data, who first developed procedures for measuring employment discrimination directly. In the 1960s Daniel sent matched pairs of actors to interviews as job applicants in England and discovered significant racial discrimination (Daniel 1968). Later Jowell and Prescott-Clarke made paired, *written* job applications in England and also detected significant racial discrimination (Jowell and Prescott-Clarke 1970). In essence, what is involved here is a "field experiment": all characteristics, such as education and experience, that determine job performance, are carefully controlled to be identical, so that the only characteristic that distinguishes the two applicants is age, race, sex, and so on. In the case of tests conducted in person or over the telephone (called audits in the United States), carefully matched testers apply in person for advertised jobs. The matching of applicants controls for all aspects of an individual that would affect their work productivity and their personal appearance such as attractiveness, height, weight, and so on. The testers are then trained in job-specific requirements and interview technique. The end result is that the matched pair of testers are to all intents and purposes presenting for a market transaction as identical, except for the basis that the researcher is investigating. In the case of written tests (correspondence testing), curricula vitae are constructed that are carefully matched for socioeconomic background, educational qualifications, and work experience, so that the curricula vitae are essentially identical except for the discriminatory characteristic that the researcher is investigating. The in-person technique has been criticized because of the difficulty of controlling for motivation

where personal interaction with an employer is involved (Ward 1969; Heckman 1998). The technique of correspondence testing, on the other hand, enables the researcher to exercise strict control and ensure that the only difference between the applicants is the discriminatory characteristic under investigation (Riach and Rich 2002). Correspondence testing produces an unequivocal, direct measure of discrimination in employment, and tests over the past forty years confirm that this discrimination is extensive and enduring. Significant levels of racial discrimination have been detected by tests in Australia, England, France, Germany, the Netherlands, Spain, Sweden, and the United States. Significant levels of sexual discrimination have been detected by tests in Australia, Austria, England, and the United States. Significant levels of age discrimination have been detected by tests in England, France, and Spain. Racial discrimination in England was detected in the 1960s by Daniel and by Jowell and Prescott-Clarke (1970), in the 1980s by **(p. 529)**

Table 1.22.2 Broad Range of Net Discrimination Levels Detected in Field Experiment Studies Conducted in the Labor Market

Basis of test/country of test	**Minority group**	**Range of net discrimination %**
Race tests		
Australia	Vietnamese	27.4***
Australia	Greek	8.8**
England	Asian / West Indian	24.0*** to 50.0***
France	Moroccan	40.9** to 54.4***
Germany	Turkish	18.9***
Netherlands	Moroccan	41.6*** to 44.4***
Spain	Moroccan	42.3** to 47.0***
Sweden	Middle Eastern	5.7 to 68.4***
United States	African American	2.8 to 70.8***
United States	Hispanic	21.4*** to 25.1***
Sex tests		
Australia	Female	−5.6 to 16.1*
Austria	Female	−50.0** to 18.7
England	Female	−43.1**to 23.1*
United States	Female	−75.0** to 75.0***
Age tests		
England	Older	−29.6* to 59.6***

France	Older	58.1***
Spain	Older	64.5***
United States	Older	31.4***

Note: A minus sign indicates discrimination against the majority applicant. Chi-squared tests were conducted on the response rates and the results are indicated as

(*) significant at the 0.05 level;

(**) significant at the 0.01 level;

(***) significant at the 0.001 level.

Sources: Riach and Rich (2002, F497–506; 2006a; 2006b, 7; 2007; 2010); Cediey and Foroni (2007); Carlsson and Rooth (2007).

Brown and Gay (1985), and in 2009 by Woods and coauthors (2009). Racial discrimination in Australia was detected in the 1980s by Riach and Rich (1991) and in 2007 by Booth, Leigh, and Varganova (2012). Racial discrimination in the United States was detected in the early 1990s by Bendick, Jackson, and Reinoso (1994) and Turner, Fix, and Struyk (1991) and early in the twenty-first century by Bertrand and Mullainathan (2004).

When paired applications are made, there are four possible outcomes: neither invited to interview, both invited, only the expected "preferred" group (for example, white, male, young, etc.), and only the expected "nonpreferred" group (for example, black, female, old, etc.). "Net discrimination" is defined as the responses where only the "preferred applicant" was invited to interview minus the responses where only the "nonpreferred" applicant was invited to interview. The "rate of net discrimination" is this figure divided by the number of occasions when one or both applicants received a positive response. Table 1.22.2 provides details of the range of net discrimination found by many of these field experiments of the labor market. The net discrimination levels reported in (p. 530) table 1.22.2 refer to the range of net discrimination that has been found across a number of studies that have been conducted by various researchers in the respective countries. Statistical significance is indicated by asterisks and usually refers to a chi-square test. A finding of negative net discrimination indicates that overall, the "preferred" applicant was discriminated against; for example, in a study on the basis of sex, a finding of negative net discrimination means that males were discriminated against. In the United States the tests on race in the labor market have found discrimination against African Americans in a range from 2.8 percent to 70 percent (Riach and Rich 2002, F497). In Europe, tests for hiring discrimination against Moroccans have found levels of net discrimination between 40 percent and 54 percent. Tests for hiring discrimination on the basis of sex have recorded net discrimination levels across various occupations of between −75 percent and 75 percent in the United States, −43 percent and 23 percent in Australia, and −50 percent and 19 percent in Austria. These studies found that the level of discrimination against men applying to female-dominated jobs was approximately twice that experienced by women applying to male-dominated jobs (Riach and Rich, 2002, F501–F502; Riach and Rich 2006b, 7). Tests for age discrimination have recorded net discrimination levels across various occupations of between −30 percent and 64.5 percent. These levels of discrimination against the older applicant are among the highest recorded in any field experiments of hiring in the labor market. This may be explained by the relatively recent and ineffective nature of legislation outlawing age discrimination in European countries. Just as women were considered less suitable for many employments prior to the 1970s, older workers still face similar social mores nowadays. In 2011 the Conservative/Liberal-Democrat coalition in the United Kingdom did finally legislate against age discrimination (abolishing mandatory retirement ages); therefore it will be important to replicate these correspondence tests in the future to monitor the effectiveness of the legislation.

These findings suggest that entrepreneurs are not as rational and profit-seeking as the neoclassical model assumes; nor is the competitive process as "Darwinian" as predicted.

Employment Segregation

Many researchers in the social sciences have commented that the stalled improvement in the racial and sexual differential in wages over recent decades is due primarily to continued occupational segregation, both across major groups and within occupations (Bergmann 1986, 86; OECD 1985, 88). The earlier discussion on the wage regression approach provided estimates of this contribution calculated in a number of studies. Occupational segregation refers to the unbalanced distribution of racial groups or the sexes across occupations in a manner inconsistent with their overall shares of employment, irrespective of the nature of job allocation (Jonung 1984, 45; Watts 1992). Segregation can change from a combination of factors such as changes in the participation of blacks (females)/whites (males) in the workforce; variations in the (p. 531) occupational structure of employment; and changes in the race (sex) ratios of individual occupations. Legislative changes, such as antidiscrimination laws and removal of restrictions to black (female) employment in certain occupations, could be expected to have the greatest impact on the last factor mentioned. As well, changes in individual choice (perhaps influenced by legislative reforms) would also have an impact, particularly if blacks, whites, women, and men choose to invest more in human capital and gain training in skills that are generally regarded as nontraditional for their race or sex.

Numerous studies of occupational segregation have used indexes to measure the level of segregation of a workforce and how it has changed over time. Index measurement is used to calculate the extent to which different groups (females/males; black/whites; Hispanics/whites) work together and do the same jobs. The conventional measure is the Duncan-Duncan index, called the index of dissimilarity, *ID*, and is calculated as follows in the case of sex segregation:

$$ID = (1/2)\sum|\mathrm{F_i}/\mathrm{F} - \mathrm{M_i}/\mathrm{M}|,$$

$ID = (1/2)\sum|\mathrm{F_i}/\mathrm{F} - \mathrm{M_i}/\mathrm{M}|,$

where F_i and M_i represent, respectively, female and male employment in occupation i, F represents total female employment, and M represents total male employment.

ID denotes the sum of the minimum proportion of women (African Americans) plus the minimum proportion of men (whites) who would have to change their occupation in order for the proportion female (African American) to be identical in all occupations.

Flückiger and Silber (1999) and Watts (1992, 1998) provide a comprehensive critical discussion of the different indexes that have been used in these studies and conclude that the index of dissimilarity is not appropriate for the measurement of occupational segregation. They argue persuasively that the Karmel-Maclachlan index is a preferred measure. Only the Karmel-Maclachlan index *IP* clearly identifies each of the factors (mentioned above) that cause segregation to change. The Karmel-Maclachlan index is calculated as follows for the case of sex segregation:

$$\begin{aligned} IP &= (1/T)\sum|\mathrm{M_i} - \mathrm{a}(\mathrm{Mi} + \mathrm{F_i})| \\ &= (1/\mathrm{T})\sum|(1-\mathrm{a})\mathrm{M_i} - \mathrm{a}\,\mathrm{F_i}|, \end{aligned}$$

$$\begin{aligned} IP &= (1/T)\sum|\mathrm{M_i} - \mathrm{a}(\mathrm{Mi} + \mathrm{F_i})| \\ &= (1/\mathrm{T})\sum|(1-\mathrm{a})\mathrm{M_i} - \mathrm{a}\,\mathrm{F_i}|, \end{aligned}$$

where F_i and M_i represent, respectively, female and male employment in occupation i, a is the male share of total employment, F represents total female employment, M represents total male employment, and T represents total employment.

The index *IP* denotes the proportion of employed people who would have to change jobs to achieve a sex ratio for each occupation equal to the male/female ratio for total employment (that is, to achieve no segregation). The occupational structure of employment of the workforce and the overall sex shares of employment are kept constant. The (p. 532) important contribution of this measure is the analysis of the change in segregation over a specified time period through a complex decomposition procedure. (Full details of the decomposition procedure are provided in Karmel and Maclachlan 1988, 189–90). The procedure identifies a composition effect and a mix effect, the latter comprised of three parts, the occupation, gender, and gender/occupation (interaction) effects. The

composition effect (also referred to as net segregation) isolates the impact of changing sex ratios in individual occupations on the total change in the level of sex segregation. This effect can indicate if the improved position of women or racial groups in the workforce is their higher (lower) representation in occupations in which they are currently underrepresented (overrepresented).

An extensive body of work has analyzed occupational sex segregation in industrialized countries (examples being Anker 1997, 1998; Bergmann 1986; Blau and Ferber 1992; England and Folbre 2005; Reskin 1984; Reskin and Roos 1990; Watts and Rich 1993). While most find sex segregation has decreased over time, the growth in part-time work in some of these countries has reinforced existing patterns of segregation. There has been, however, less study of sex segregation in developing countries (examples being Anker 1998, Humphrey 1987, Jacobs and Lim 1992, and Rich and Palaz 2008). In contrast to the findings for developed countries, most of these studies find sex segregation has increased in developing countries. Jacobs and Lim's study of fifty-six countries found that, from 1970 to 1980, occupational sex segregation increased in Brunei, the Dominican Republic, Ecuador, India, Syria, Thailand, and nine of the fourteen European countries analyzed (Jacobs and Lim 1992, 465–66, table 2). Anker (1998, 321) found a clear increase in sex segregation in Hong Kong and China over the 1980s for the nonagricultural group of occupations. Rich and Palaz found an increase in sex segregation in Turkey over the period 1975 to 2000.

There have been some studies of racial segregation in the United States. Albelda (1986) and King (1992) found that although racial segregation had decreased over the period they studied, 1958 to 1981 and 1940 to 1988, respectively, it remained a persistent feature of the workforce. Using a very large data set on establishments in 1990 for the United States, and applying their own coworker segregation measure, Hellerstein and Neumark (2008) also analyzed racial segregation in the workplace. In the case of Hispanics, poor English language proficiency and lack of skills explained a large proportion of Hispanic/white segregation. In marked contrast, they found compelling evidence of segregation of African Americans that could not be explained by educational differences.

The studies covered in the three areas of discussion on differences in wages, success in job applications, and occupational/job distribution between groups find the following for race and sex: first, large unexplained components of wage gaps; second, statistically significant levels of discrimination in hiring; and third, persistent occupational segregation. These findings place the issue of discrimination in stark relief. No matter what the approach or focus of research, endemic discrimination remains a feature of labor markets across the world. This certainly suggests that a fresh look at tackling discrimination in employment is warranted.

(p. 533) Policy for Labor Market Discrimination

It is generally the case that employment equality legislation requires a rejected job applicant to initiate action and produce evidence to prove that discrimination has occurred in the hiring process. Experimental research of the hiring process, however, has repeatedly demonstrated the uninformative, and sometimes dishonest, nature of rejection letters. For example, in an experiment concerning age discrimination the thirty-nine-year-old graduate applicant for a traineeship in chartered accounting received the following reply: "I regret to advise you that we have no vacancy for a trainee chartered accountant. We have now filled all our vacancies." Five days later, the twenty-one-year-old graduate applicant received the following reply from the same firm: "Due to holiday commitments we are unable to offer you an interview until early September. If this is of interest to you, please contact … to arrange an appointment" (Riach and Rich 2010).Similar responses have been reported by the International Labour Office studies and other researchers. It follows that, in most cases, rejected applicants would not be aware that they had encountered discriminatory treatment, and, even if they did suspect it, they would lack evidence to demonstrate, before a legal tribunal, a prima facie case of discrimination. This has been acknowledged by the OECD: "age discrimination legislation may not be very effective since it is often easier to prove discrimination in dismissal than hiring" (OECD 2004, 99).

In view of the extent of employment discrimination detected by experimental studies it is appropriate to strengthen employment equality legislation. Instead of playing a passive role, merely responding to complaints, equal opportunity bodies should perform an *active, investigative* role in the recruitment process. Such bodies should have power to conduct random audits of hiring and personnel practices. If employers were required to retain all records of job applications for a period of twelve months and obliged to justify decisions on short-listing for

interview and final choice of candidate, in the event of a random audit, it would create pressure for scrupulousness in the hiring decision. An appropriate analogy can be drawn here with the capital market. Public corporations have various duties with respect to shareholders, potential shareholders, and the business community at large. They are also subject to independent financial audit, and they are usually required to satisfy an independent commission about various aspects of their financial activities. In effect, capitalist economies provide a range of regulations and checks to protect the owners of financial capital against unscrupulous practices and guard against the waste of this resource. It seems entirely appropriate that similar protection be afforded the owners of human capital, and that steps be taken to prevent it being wasted through employers using screening devices, such as age, race, or sex, for purposes unrelated to job performance. Barbara Bergmann has advocated a similar policy (1986, 158).

A complementary recommendation is that the approach to combating *age* discrimination in recruitment should be one of affirmative action. Affirmative action inevitably invokes fierce controversy and opposition from the privileged group—usually white, **(p. 534)** middle-class, "prime-age," Protestant men. Age discrimination can be singled out for positive action for two reasons: first, because the demographic profile of most Western nations shows imminent aging of the population as the postwar baby boom generation heads into its seventh decade, and second, because experimental results show that age discrimination is particularly severe.

In an investigative, or audit strategy, the recommendation is that employers should be required to justify why *appropriately qualified* post-forty/post-fifty/post-sixty applicants have not been appointed. If the proportion of post-forty/fifty/sixty *appointments* is less than (say) 50 percent of the proportion of appropriately qualified post-forty/fifty/sixty *applications*, then the employer should be required to review personnel policies and an auditor would be involved in future selection procedures until significant improvement occurred. In other words a form of affirmative action for the middle-aged and elderly is recommended. As Bergmann has explained: "The selection process often does have important subjective elements, allowing plenty of leeway for making mistakes as well as for decision-makers' attitudes about race and gender to influence outcomes. Thus, it is wrong to assume that the candidate chosen in the absence of affirmative action is always or almost always better than all those sent away" (Bergmann 1986, 104).

Age-based affirmative action would not incur some of the opposition traditionally directed at race- or sex-based affirmative action. It advocates that older applicants be given proportionate treatment in *jobs which they have already been doing*, or perhaps, at most, one step up in the hierarchy. The predictable charge that they "only got the job because of their age" could not be sustained as they have already demonstrated they have done the job. The other side of this coin is that the aged will not react, as some blacks and females do, in opposing affirmative action, because of their concern that it suggests they did not get the job on their merits. In this case their "merits" have previously passed muster.

Another significant distinction in respect of age-based affirmative action is that, whereas whites never become black, and only rarely do males become female, the young *do* become old. In other words we should expect lesser hostility from the "majority" group, as in this case they stand to benefit in their turn. Moreover in the current demographic environment the alternative to ensuring a fair employment deal for "older" workers are increased taxes to finance the growing pension bill.

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[–] Abstract and Keywords

As history, institutions, and social and political forces specific to any economy have a profound effect on that economy's dynamics, it is important to understand how these have evolved with the development of capitalism. The classical economists analyzed economies with labor surpluses, which kept wages at subsistence levels, encouraging profits and therefore economic growth. Lewis extended this model to developing economies, with the labor surplus coming from the agricultural sector. With growth and development, the labor surplus becomes absorbed into the labor force, eventually leading to upward pressure on wages This is associated with the Keynesian era, when the level of effective demand becomes an important determinant of employment and growth. As a result of further development, competitive capitalist economies have evolved to the monopoly capital stage, where oligopolistic corporations influence the dynamics of the economy. More recently, we have seen the increased prominence of the financial sector, which has both led to and been influenced by globalization.

Keywords: economic development, history of economic thought, post-Keynesian, economic history, industrialization, monopoly capitalism

> The institutional framework of a social system is a basic element of its economic dynamics.
>
> Kalecki 1970, 111

Introduction

The fundamental feature of the post-Keynesian understanding of economic development and growth is that the history, institutions, and social and political forces specific to any economy have a profound effect on that economy. As a result, "institutions and political forces are important in shaping economic events" (Holt 2007, 93).

Each economic system, in fact, each economy, will have different institutional frameworks, which manifest themselves in differences in mediating economic behavior. Obviously these institutions will have profound effects on the economies concerned. As a result, most post-Keynesians deny the usefulness of general, universal theories to describe actual economies. They do not subscribe to a general theory with modifications to allow some role for institutions and social phenomena,[1] but instead incorporate these into the essence of their models. It is therefore no surprise to learn that the post-Keynesian analyses of capitalist, socialist, and developing economies fundamentally differ from each other (and from mainstream analyses) on the grounds that each reflects differing institutional frameworks, as well as other differentiating characteristics. This may be contrasted to modern neoclassical theory, where the same general (p. 540) economic theory is used to analyze developed and developing economies and is also utilized to analyze "noneconomic" aspects of social life.[2]

As the economy develops, so will its underlying structures, and these will both influence and be influenced by the underlying economic relations. A major development that has profoundly influenced the institutional structure of

economies has been the evolution of capitalism from its early phase through to its current manifestation. Clearly it is still evolving, and many fundamental economic relations are still changing. However, post-Keynesians have identified some fundamental changes, particularly in the factors that determine employment and the level of output, as a result of the development of the economy from early capitalism to the later stage, sometimes called monopoly or mature capitalism. In other words, less-developed economies and early capitalist ones behave, for a variety of reasons, in a number of important respects quite differently from the more developed capitalist economies.

It is important to realize that what we now call developing economies are often in the early stages of capitalist development and share characteristics similar to the early stages of development of the now advanced capitalist economies, and are also entering into the phase of multinational oligopolistic capitalism, although the international economic environment is fundamentally different, in particular influencing intercountry trade, capital flows, and technological transfers. As a result, the important problems faced by developing economies have some similarities to those faced by early capitalist ones, although the current international environment requires different industrial structures.

The Role of the Surplus

The emergence of a surplus is a necessary, though not sufficient condition, for an economy to grow and develop. In the case of an economy that is producing at subsistence level, it is just producing enough to reproduce itself, to survive. Such an economy cannot grow by definition, as it has nothing that will enable it to provide resources to expand, to invest in such a way as to increase productive capacity. In order to grow, it needs to produce a "surplus" or "net product," that is, a physical excess of goods produced over the goods that have to go back into the production process in the next period, including replacement of the means of production, in other words, the surplus over subsistence. This concept of a surplus was developed in the work of the Physiocrats, the classical political economists, and Marx, and later, especially explored by Piero Sraffa, and has taken an important role in the work of post-Keynesian economists. The concept of "the surplus" was derived from the idea that if an economic system is to reproduce itself, a part of output has to be put back into production. This includes the necessary replacement of the means of production as well as the subsistence consumption of workers.

It s important to note that the disposal of the surplus does not influence the survival of society. Once a society produces at least its subsistence, it will survive, regardless of what it does with its surplus. However, its distribution between competing claims, only **(p. 541)** some of which will use the surplus in productive activities, influences the ability of an economy to grow and develop. If the surplus is used for productive purposes, such as for investment (accumulation), it will allow the economy to grow. However, if it is used for unproductive purposes, such as consumption by landlords, to finance wars, and so on, the economy will stagnate. An economy needs to produce a surplus in order to grow, but, whether or not it actually grows depends on what happens to that surplus. In history, many countries have stagnated because the surplus has not been used productively (Baran 1957, 21; Meek 1977, 160; and Walsh and Gram 1980, especially chap. 1)

The manner in which the surplus is distributed will depend on the social institutions within that particular country. These will vary, often dramatically, between countries with different social, political, and economic histories, and within counties at different stages of their history.[3] This indicates an important reason why post-Keynesian economists believe that there cannot be a unique theory of economic development. While many countries have been able to produce a surplus, some have not been able to grow and develop beyond that stage due to the manner in which that surplus was distributed. Importantly, then, a country's level of development is closely tied to the existence and disposal of the surplus. This explains the focus of the classical economists and Marx on the question of distribution.[4]

Stages of Development

Once the surplus is generated, and the growth process kick-started, an important question is the following: what is the difference between the causes of growth in developing economies and in developed capitalist economies? The distinct problem of developing economies is the shortage of productive capacity, rather than its underutilization. There are not enough capital goods to fully employ the labor force. To increase employment as well as to improve the standard of living requires a high level of investment that will accelerate growth in productive capacity as well

as in national income.

Kaldor and Kalecki, among other post-Keynesian economists, identify important differences in the stages of development, which they explore by utilizing Keynesian and Kaleckian economics. They argue that developed economies behave fundamentally differently than less-developed ones in the earlier stages of capitalist development. In the more developed stage, the factors determining output, growth, and employment are different from the factors that determine them in the earlier phases of capitalist development.

According to Kalecki:

> The problem of unemployment in underdeveloped countries differs fundamentally from that in developed economies. In the latter, unemployment arises on account of inadequacy of effective demand. During periods of depression unemployed labour coexists with underutilized equipment. The situation may, therefore, be tackled by (p. 542) measures designed to stimulate effective demand, such as loan financed government expenditure.
>
> Unemployment and underemployment in underdeveloped countries are of an entirely different nature. They result from the shortage of capital equipment rather than from deficiency of effective demand.
>
> (Kalecki [1960] 1993, 3)
>
> This is not to deny that in an underdeveloped economy there may be a deficiency of effective demand. There are many instances of countries whose capital equipment, meagre though it is, will nevertheless be underutilized. However, as contrasted with developed economies, even if this equipment is fully utilized, it is still not capable of absorbing all available labour, as a result of which the standard of living is very low… the main problem here being the deficiency of productive capacity rather than the anomaly of its underutilization…. The crucial problem facing the underdeveloped countries is thus to increase investment considerably, not for the sake of generating effective demand, as was the case in an underemployed developed economy, but for the sake of accelerating the expansion of productive capacity indispensable for the rapid growth of the national income.
>
> (Kalecki [1966] 1993, 15–16)

This last quote, in particular, highlights the important difference, for Kalecki, between advanced capitalism and underdevelopment. For advanced capitalist economies, investment is a double-edged sword. In the short run it increases effective demand, which is important in reducing today's unemployment, but, at the same time it increases capacity, which can increase tomorrow's unemployment. In contrast, as Kalecki indicates, insufficient effective demand in developing economies is less of a problem, so the effect of investment is unambiguously positive in its ability to increase capacity, and by increasing the size of the stock of capital, enables the economy to employ more workers.

Kaldor, in a number of places, makes a similar distinction, between what he calls Marxian and Keynesian unemployment. For Marx, the market always generates an excess supply of labor, which he called the "reserve army of the unemployed" and which continually exerted downward pressure on wages. In the early stages of the development of capitalism, competition forces capitalists to reinvest most of their profits, as otherwise they would lose out in the competitive struggle—they have no choice if they wish to survive. As Marx stated, "Accumulate, accumulate! That is Moses and the prophets!" (Marx [1867] 1990, 141). At this stage of development, employment depends on capital accumulation. As capitalism develops, both the demand for and the supply of labor grow. As the pace of accumulation increases, the demand for labor grows at a faster rate than its supply, eventually "extinguishing" the reserve army. Labor becomes scarce. When this happens, downward pressure on (real) wages is halted, and they rise, causing the share of profits to fall. This reduces growth and demand. According to Kaldor, this happens in the later stages of capitalism, when the Keynesian explanation of unemployment comes into its own.

As a result of capital accumulation outpacing the growth in the labor force, excess capacity becomes built into the economy, becoming a major factor within the further development of capitalism. According to Kalecki and Kaldor, capitalist economies have reached a stage of capital accumulation where the existing stock of capital goods is more than sufficient to employ all the economy's labor, and this has changed the nature of underlying economic

relations. Unemployment in this stage is associated with unused (p. 543) capacity resulting from insufficient effective demand. For both Keynes and Kalecki the major problem with advanced capitalist economies is the underutilization of capital. The solution to the problem is to increase effective demand via some exogenous means, such as government expenditure, investment, or exports. In contrast, developing economies have not reached that stage of capital accumulation. The size of the capital stock is not sufficient to employ all the labor. In other words, even if there was no excess capacity, there would not be full employment of labor. Their crucial problem is the shortage of productive capacity.

Joan Robinson reached the same conclusion when she compared Marx and Keynes on the causes of unemployment, although she was not as explicit in acknowledging that their difference related to different stages in the development of capitalism.

> For in Marx's system…[c]ompetition and technical progress set up an urge to accumulate, for each capitalist fears to fall behind in the race if he does not continuously invest in new capital equipment embodying the latest developments. Thus the problem of effective demand does not arise…. In his view, the amount of employment offered by capitalists depends upon the amount of capital in existence, and there is unemployment because there is insufficient capital to employ all potentially available labour…. Now, unemployment of this type, in the world at large, is a phenomenon of the greatest importance. It exists in the backward, over-populated countries of the east, and, indeed, everywhere except amongst the most developed industrial nations.
>
> (Robinson [1948] 1951, 140–41)[5]

This discussion highlights the fact that for post-Keynesian economists, differences in their economic structure and institutions mean that developed economies behave in many significant ways differently from less-developed ones. In the early stages of development, the imperative on capitalists to invest is strong, and so, as noted, there is a strong tendency for profits to be reinvested. As capitalism develops to a more mature stage, the problem of effective demand becomes prominent, and the factors acting on capitalists change, for a number of reasons discussed below, so that capitalists no longer have the same compulsion to invest.

Chakravarty used this as a means of distinguishing between developed and developing economies:

> But more precisely, what we mean by a developing economy is one where the following conditions hold: (i) it is "capital stock" rather than available labour that sets the upper limit to output and employment in those sectors wherever the concept of capacity output can be defined, even if in a rough way; (ii) while the economy is capable of generating some "surplus" over "current consumption," output per head is not significantly in excess of subsistence consumption; (iii) where wage employment exists, wage bargain is conducted in money terms and (iv) there are no savings out of wage income.
>
> (Chakravarty [1979] 1993, 17)

As a result, Chakravarty argues, Keynes's major insights are "largely…inapplicable to such situations" (1979] 1993, 17), although because demand and investment deci (p. 544) sions are important in developing countries, there is some role for Keynesian analysis. A similar conclusion was reached by A. K. Dasgupta:

> The limiting factor in the growth of employment in [a developing] economy…is not so much a shortage of money as a shortage of real capacity. With the existing capital equipment, even if we have "full employment" in the Keynesian sense, a large volume of unemployment will still remain in a physical sense. … [This] is a phenomenon which is not connected in any way with a fall in effective demand, nor does it go along with excess capacity in capital resources. It is there because the maximum capacity of capital equipment is inadequate to fully employ the available labour…. In Keynes's model surplus labour is accompanied by excess capacity in capital equipment; in underdeveloped economies reserve capacities are deficient, if not nonexistent…. In underdeveloped economies…the current real rate of wages even in the urban sector, not to speak of the rural sector, is about the minimum necessary for physical existence.
>
> (Dasgupta [1954] 2009, 308–9)

This distinction helps explain why, in many less-developed economies, extreme poverty coexists with low levels of

unemployment—it is the employed who are poor. This is due to the fact that the value of what they produce must be extremely low. This is related to low levels of skill and low productivity, caused by the shortage of capital in the capitalist sector, side by side with employment in the "traditional" sector, which is not capitalist employment in the sense that it is not for wages, but, rather for subsistence produce and services. This is reinforced by multinational activities in the capitalist sectors of most developing economies, which leads to further duality within the capitalist sector, with multinational firms operating with relatively high capital-labor ratios compared to domestic firms: "In the rural sector, there is surplus labour pressing on a limited stock of land. And since the mode of production is family-oriented and pre-capitalistic, the labourer enjoys a living which is set by average productivity, even though the marginal productivity may turn out to be zero" (Dasgupta 1958, 337).

The Path of Economic Growth

An important question relates to the path the economy takes in moving from the early capitalist/less-developed stage to that of a mature capitalist economy. The analysis of the classical economists and of Marx in describing the growth path of early capitalist economies is of great relevance and has been used as the basis of more recent growth models. For all of these economists, the "iron law of wages," according to which wages tended toward subsistence levels, was an important aspect of capitalist economies, though the reason for that tendency varied substantially between them.

In Ricardo's model of capitalist growth, output is distributed to workers in the form of the subsistence wage and to capitalists and landlords who share in the surplus. Capitalists invest their profits, which provide the engine of growth and accumulation. (p. 545) As the economy grows, due to diminishing returns in agriculture, the share of the surplus accruing to capitalists falls, while the share accruing to landlords increases. This eventually leads to a rate of profits so low that there is no further accumulation and the economy reaches a stationary state. Of course, as Ricardo admitted, technical progress can postpone the stationary state by increasing the productivity of agriculture and, therefore, reducing the proportion of the surplus accruing to the landlord (Harcourt 2006, 94).

Marx's analysis of capitalism is more relevant to the contemporary circumstances than that of Ricardo. Marx changed the focus of analysis from the agricultural sector at center stage to the manufacturing sector as the engine of growth. As a result, the role of the landlord was minimized, with most of the surplus in Marx's analysis accruing to the capitalist as profits and being used to generate growth and accumulation. Although Marxian analysis is relevant in describing the early stages, it needs to be modified to provide insight into the transition path. For Marx, the reserve army of the unemployed put downward pressure on wages, keeping them near subsistence. This allowed capital accumulation without pressure on profits, which were then automatically invested due to competitive pressures.

In the early stages of the development of capitalism, as in Ricardo's analysis, the agricultural sector dominates. This is true both historically and in contemporary times. This has led to a new understanding of the Marxian process associated with the idea of "dual" labor markets, which emphasizes the difference between conditions in agriculture and in manufacturing, that is, between precapitalist and capitalist modes of production.

The modern version of this model is most associated with Arthur Lewis in his classic paper, "Economic Development with Unlimited Supplies of Labour" (Lewis 1954), which extended the classical model to incorporate problems associated with modern economic development.

His analysis was based on a dual economy model, where the economy consists of a "noncapitalist" or traditional/subsistence sector, usually agriculture, and a modern "capitalist" sector, "that part of the economy which uses reproducible capital, and pays capitalists for the use thereof" (Lewis 1954, 407). The capitalistic sector, usually manufacturing, operates under a system of wage employment, producing an output that is sold for a profit. The subsistence/traditional sector has little, if any, access to reproducible capital and maintains production and consumption in precapitalist social institutions. There are no labor markets; labor tends to work for food, so there is a only a very limited form of markets for output, and the sector is not capitalistic. This sector is regarded as "traditional" because of the way in which production in it is organized (Bhaduri 2003, 222). The traditional sector is well described by the classical model of labor surplus in the agricultural sector, that is, with the marginal product of labor near zero, while wages tend toward subsistence. In this case, labor can move out of the agricultural sector into manufacturing with little or no loss of output in the former. So when the capitalist sector expands, it can draw

on the labor reservoir from the traditional sector, with the labor supply infinitely elastic at the existing wage, just enough above the subsistence wage to induce labor to move. This is analytically the same as Marx's analysis of the reserve army of the unemployed that also keeps wages at subsistence and labor (p. 546) supply infinitely elastic. However, because Marx was analyzing a "pure" model of the capitalist mode of production, with no remnant of feudalism, his main difference from Lewis's model, is that, for the latter, labor comes from another (traditional) sector rather than from the unemployed.

The capitalist sector is relatively competitive, so that profits on capital tend to be equalized. Due to the availability of finance and greater information, almost all investment will be in the capitalist sector, which means that "inevitably what one gets are very heavily developed patches of the economy surrounded by economic darkness" (Lewis 1954, 409).

Accumulation occurs through the reinvestment of the surplus in the capitalist sector, fueling its expansion. This expansion is associated with the movement of labor from the traditional sector to the capitalist sector, with little if any effect on wages in the latter sector. With an elastic supply of labor to the capitalist sector, this process will continue, at the same time increasing the surplus, until the labor surplus in the traditional sector disappears.

Lewis follows the classical economists in assuming that, since wages are at subsistence, workers' saving is trivial, while most of profits are reinvested and go into accumulation, so that "the major source of savings is profits" (Lewis 1954, 417). With wages given at subsistence, capital accumulation is associated with a higher proportion of national income accruing to profits: "The model says, in effect, that if unlimited supplies of labour are available at a constant real wage, and if any part of profits is reinvested in productive capacity, profits will grow continuously relatively to national income, and capital formation will also grow relatively to national income" (Lewis 1954, 418).

As a result of his analysis, Lewis concludes that the main factor determining the growth and development of less-developed countries is the size of their capitalist sector, as this is the source of profits, and therefore the source of investment and accumulation. In addition, he acknowledges the importance of "the sociological problem of the emergence of a capitalist class, that is to say of a group of men who think in terms of investing capitals productively" (Lewis 1954, 420).

The process described by Lewis naturally ends when "capital accumulation has caught up with population, so that there is no longer surplus labour" (Lewis 1954, 431). Once this happens, the process of accumulation and growth changes to that which the writers discussed above call Keynesian. However, Lewis argues that the process may be terminated while there is still surplus labor if real wages increase so as to reduce profits significantly. In general, it is only when the supply of surplus labor is exhausted, or nearly so, that there is no longer a reserve army effect and wages rise above subsistence.

With wages at subsistence, workers consume all their wages, so saving can only come from capitalists. If productivity is increasing along with growth, then a constant real wage allows capitalists to generate reasonable and increasing profits in the manufacturing sector, which would be reinvested. In other words, during this process, effective demand (realization) is not a problem. Again, this depends on the distribution of the surplus, and the behavior of capitalists who are assumed to save and invest rather than consume. The rate of growth of the capitalist sector will equal the rate of profit in that (p. 547) sector, multiplied by the capitalists' saving ratio. The share of profits in national income is, therefore, of great importance. The agricultural sector is not assumed to grow, so the economy will become increasingly more capitalistic. Eventually, the capitalistic sector will have exhausted all the surplus labor from the agricultural sector, leading to labor shortages. This will cause rising wages, which will reduce the share of profits and, therefore, the growth rate. In other words, capital accumulation will have caught up with the excess supply of labor.

The model can be explained in terms of the Kalecki/Kaldor distinction between Marxian and Keynesian unemployment. Recall that for Marxian unemployment, there is a reserve army of the unemployed that is absorbed as capital accumulates, and which exerts downward pressure on wages. In the Lewis model, agricultural labor takes over the role of the reserve army. Now, the unemployed labor is in the agricultural sector, where, instead of being unemployed, it is underemployed. If the marginal product of these laborers is near zero, then they are effectively unemployed. The accumulation of capital absorbs them. Eventually, when the dual nature of the economy is overcome and these laborers are absorbed, we are in the Keynesian regime, as now the capital stock is fully able to employ all the labor.[6] So the Lewis model is closely related to that of Kaldor and Kalecki.

Lewis's model of the dual economy was utilized by many economists, including Kalecki, to stress the structural problems associated with development, that is, the problems resulting from intersectoral relations, in other words, the structural relations between different sectors. As a country develops, it will move from a Marxian regime, where employment is limited by the size of the capital stock, to a Keynesian one. The process requires an expansion of the "productive capacity of the capital-goods sector." This means that as the process of development continues, we have to move beyond the simple two-sector model, à la Lewis, and look at a three-sector model that separates the manufacturing sector into consumption goods and capital goods sectors. At this stage, it is no longer simply the size of investment that is important, but also its composition. That is where the analysis takes off.

So what we see is the importance of structure and institutions for the development process. Development is associated with changes in the structure of economies, as they become more capitalistic and begin to develop capital goods sectors. However, the main features that will determine the ability of an economy to develop are its institutional framework. In particular, the property/land ownership arrangement will have important implications for the potential for the surplus generated in the agricultural sector to be used for expansion of the manufacturing sector. So, for example, if this increased surplus accrues "to landlords, merchants, or money lenders, then…[it] will not be spent at all, or will be spent on luxuries" (Kalecki [1954] 1993, 29). Associated with this is the development of the financial institutions required to facilitate such transfers as well as to mediate between capitalist saving and investment decisions. In addition, there needs to be a range of institutions to allow the increased surplus generated in the agricultural sector to be used to pay the wage demands of the newly emerging manufacturing sector, as well as institutions that give the agricultural sector some access to the manufacturing (p. 548) output. Of course, underlying all of this are the institutions that determine the distribution of the surplus between productive and unproductive uses.

The importance of institutional changes helps explain Kalecki's skepticism with respect to the ability of markets to solve developmental problems in an acceptable way. Problems with generating sufficient investment, with structural imbalance causing inflation, and with the general need for change to the financial and land tenure institutions mean that changes could not be achieved by markets except at great social costs:

> In general, then, the development of agriculture requires government intervention to overcome institutional obstacles. The measures by government range from land reform and cheap bank credit for peasants to improvements in the method of cultivation, small scale irrigation and cheap fertilizers.
>
> (Sawyer 1985, 218)
>
> The constraints on development posed by the existing social and political order were seen as particularly severe in the rural sectors. As well as the problems of simply providing material resources for the development of agriculture, there are still fundamental social and political constraints, already referred to in the nature of semi-feudal land relations and the domination of merchants and money lenders. These vested interests represent powerful restrictions on development which would have to be removed for the development process to proceed. However, it is clear that overcoming the resistance to such institutional change by the privileged classes is a much more difficult problem than curing the problem of insufficient effective demand in developed economies.
>
> (Sawyer 1985, 221)

Mature Capitalism?

Once the development process has reached the stage at which the labor surplus has been absorbed, economic growth and development proceed along the lines suggested by Kalecki and Kaldor discussed above. Keynesian/Kaleckian unemployment becomes important, with effective demand the main determinant of the levels of output and employment and therefore, of the growth rate. With the development of the productive sectors of the economy, there is an associated development of the financial and credit institutions. It is the development of these institutions that frees private sector investment from the requirement of an existing stock of loanable funds (savings) and allows investment to generate the saving necessary to finance it. In other words, as both Keynes and Kalecki have shown, with the development of the financial system, it is no longer increased saving that causes increased investment; rather the causality runs from investment to saving (see Chick 1983, chap. 9).

With the development of capitalism and the increased importance of investment comes the advent of large-scale capital. The effect of these changes is to expand output considerably while increasing the productivity of labor. However, with downward pressure on wages, demand may not increase sufficiently to purchase the increased output. (p. 549) This leads to a new structure of capitalism, reinforcing problems associated with insufficient aggregate demand.

Post-Keynesian economists have identified further structural transformations that occur with the subsequent development of capitalism influencing both the dynamics of competition and of accumulation. In particular, the role of investment changes from being a purely benign generator of increased capital with which to employ the labor force, to having the dual role identified by Kalecki. In later capitalism, the role of investment in generating sufficient demand to fully employ the labor force is paramount. However, at the same time, increased investment increases both productive capacity and productivity, requiring even higher levels of aggregate demand in the future to maintain full employment. "The tragedy of investment is that it causes crisis because it is useful. Doubtless many people will consider this paradoxical. But it is not the theory which is paradoxical, but its subject—the capitalist economy" (Kalecki [1937] 1990, 318).[7]

This expansion of capacity also influences the nature of competition. The competitive phase of capitalism, as has been so cogently analyzed in Rothschild (1947), Steindl ([1952] 1972), Sylos-Labini ([1962] 1993), and Galbraith (1967), has within it the seeds of its own destruction. The competitive process leads to the emergence of large corporations and to what is often referred to as the monopoly capitalism phase of the economy. This, in most mature capitalist economies, is associated with excess capacity, oligopolistic market structures, and problems with aggregate demand. This phase in the development of capitalism has its own logic of competition and growth, as has been well analyzed, inter alia, by Kalecki, Steindl, J. K. Galbraith, Hymer, and Baran and Sweezy. Essentially, the analysis of all of these writers demonstrates that "monopoly capitalism is characterized not only by 'normal' business cycles but also by a powerful tendency to secular stagnation" (Sweezy [1971] 1972b, 8). As a result, monopoly capitalism requires continuous exogenous shocks, such as innovation (associated with Schumpeter's creative destruction), sales promotion, or increased state intervention (sometimes in the form of military expenditure) in order to avoid stagnation. "It can be concluded that semi-exogenous factors, such as innovations, enable the capitalist system to break the impasse of the stationary state and to expand at a rate dependent on the importance of these factors" (Kalecki [1962] 1991, 430).

The important change is not in the degree of competition, but, as Sweezy notes, in its nature: "what is at issue in the transition from competitive to monopoly capitalism, therefore, is not at all the *elimination* of competition, but rather a change in the *forms* and *methods* of competition. In the earlier period when each individual firm supplied only a small share of the market, the main weapons of competition were lowering costs and improving quality.… competition was perceived as coming from all other firms in the industry.… As concentration and centralization proceeded, however, this situation changed. The number of firms in industry after industry…declined to the point where each one supplied a considerable share of the market" (Sweezy 1981, 61–62; emphasis in original). "[C]ompetition inevitably gives way to monopoly via the concentration and centralization of capital, and monopoly retards the accumulation process giving rise to ever more powerful tendencies to stagnation" (Sweezy [1971] 1972a, 42). Clearly, this (p. 550) discussion applies not only to the manufacturing sector, but also to much of the service sector, which exhibits the same monopolistic tendencies. In addition, globalization is associated with the internationalization of these tendencies (Hymer 1972).

"[T]he *normal* state of the monopoly capital economy is stagnation.… This means chronic under-utilization of available human and material resources.… Left to itself—that is to say in the absence of the counteracting forces, which are no part of what may be called the 'elementary logic' of the system—monopoly capitalism would sink deeper and deeper into a bog of chronic depression" (Baran and Sweezy 1966, 113–14 emphasis in original). "Under monopoly capitalism…the normal condition is less than capacity production. The system simply does not generate enough 'effective demand' (to use the Keynesian term) to ensure full utilization of either labour or productive facilities" (Baran and Sweezy 1966, 146).

Firms in these concentrated oligopolistic industries, from practical experience, realize that price-cutting is not a successful strategy, and rely increasingly on nonprice competition, which changes the nature of the competitive process:

> [M]onopoly capitalism represents a particular historical phase of capitalist society which is a phenomenon unique to that stage, and requires a "new" explanation. There emerge, for example, new forms of competition which may counteract any tendency towards uniformity in rates of profit[;] the earlier importance of price competition breaks down, with nonprice competition becoming the norm.
>
> (Halevi and Kriesler 1991, 81)

These new forms of competition are associated with the emergence of strong barriers to entry that inhibit the mobility of capital and allow firms to make profits even in the long run.

The idea that competitive capitalism has within it the seeds of its own destruction, has been analyzed by a number of post-Keynesian authors. Of particular importance are Steindl's *Maturity and Stagnation in American Capitalism* and Sylos-Labini's *Oligopoly and Technical Progress*, which both show how the competitive process operates so as to reduce the number of firms within an industry, increasing concentration, with the result being a tendency to stagnation.

Both Steindl and Sylos-Labini build on Kalecki's analysis by examining the relationships between profit margins, excess capacity, investment, and industrial concentration. Their starting point is recognition of the existence of cost differentials between firms, due to technological differences in production methods. Lower-cost firms have greater profit margins that allow them to invest in the latest plant and equipment, increasing industry capacity and further lowering their costs. This gives them cumulative advantages over the high-cost firms in the industry. If the growth in industry capacity exceeds growth in demand, then unplanned excess capacity will emerge. In this case, the lower-cost firms may attempt to secure a greater share of the market at the expense of other firms. This can be achieved either by reducing price and, therefore, profit margins or by increasing expenditures on sales efforts. In both cases, smaller, less advantageously placed firms may be forced to leave the industry, leading to an increase in industrial concentration. **(p. 551)** As this process continues, industries will become dominated by a few large producers. Due to the cost of price wars in concentrated industries, firms will turn to other forms of competition. If accumulation in these industries is faster than the growth of sales, then the degree of excess capacity will increase —so industrial concentration and excess capacity are the outcomes of the process of competition between capitalists (of which investment is one aspect).

This process is also associated with social and political change. The emergence of large corporations is related to their power to influence the environment in which they operate through a number of means, including political. "[M]onopoly capitalism signals that stage of development where capitalism, once progressive, has become retrograde due to its immanent inability to realise the potential surplus output of the economy. Hence the growing tendencies towards unproductive, but not necessarily socially useful activities, including the hypertrophic development of the financial superstructure" (Halevi 1985, 112).

Further shifts in the nature of capitalism are apparent, with the rise of the financial sector and of financial capital often at the expense of the manufacturing sector.

Various post-Keynesian authors have attempted to describe the current developments in capitalism. James Galbraith has written of the peculiarly American phenomena of the "predator state," where the state actively intervenes in the economic realm to increase the space for large corporations. Whereas his analysis concentrates on the developments of the state in America, it is clear that elsewhere the state's role has evolved in different ways, as is evident by comparing America with northern Europe or Asia. In each of these areas, institutional differences have led to very different relationships between the state and the economy. Other post-Keynesians have documented the increased importance of the financial sector and the related phenomena of globalization, especially of finance and of corporate power. Others have highlighted the dominance of domestic markets and governments by multinational oligopolies in the current situation.

Chick (1986) discussed "the evolution of the banking system." Importantly, in the latter stages of this evolution, "banks develop 'liability management'" where they react to increased financial competition by actively seeking both deposits and "lending outlets" (198). Since the breakup of Bretton Woods and the associated deregulation of international and national financial systems, there have been further developments to the world system. The deregulation of both domestic and international capital, in addition to the general push for financial liberalization, has resulted in increased volatility in financial prices, particularly interest rates, share prices, and exchange rates.

There have been substantial movements of large holdings of funds into positions outside the banking system as a result of "the rise of 'managed money'" (Wray 2011, 8). This refers to the placing of private savings, such as pension and insurance funds, with professional managers. There has been a resultant blurring of the distinction between banking and nonbanking activities (the rise of "shadow banks" Wray 2011, 9), as well as substantial increases in cross-border financial dealings and "the internationalization of financial business" (Studart 2002, 73). Associated with these changes has been substantial growth in capital markets of all types, including derivative markets. These have provided increased (p. 552) "sources for funding for corporate investors," with the downside being increased financial fragility (Studart 2002, 74).

The net impact of this has been to substantially increase the proportion of economic activity related to the financial sector and unrelated to real activity. This, in turn, has increased the divergence of the interests of financial capital from those of real capital and led to the former dominating not only the economies of the developed world, but also both domestic and international policy.

Conclusion

The discussion in this chapter has been in terms of some general representations of variables and concepts that have been relevant for the development of capitalism, although it should also be noted that many developing countries are taking a different route.[8]

Capitalism has developed as an economic and social system from its earliest stages until the present. It continues to develop and evolve, with the current domination of international policy by financial capital a symptom of the latest stage of capitalist development. The importance of this for post-Keynesian economic theory is that underlying economic relations are constantly evolving, so that the analysis most appropriate for a particular stage in the development of capitalism may cease to be a relevant consideration as the economy develops. Far from there being a general theory of economic behavior, economic theory itself has to constantly be changing and evolving in order to maintain its relevance—it is a "horses for courses" discipline! This carries through to the policy area, where simple policy rules must be rejected, in favor of examining the particular problems facing economies at a particular point of time and taking into consideration the current international economic environment.

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Notes:

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(1.) Institutions include not only the economic institutions associated with, for example, finance and banking and with property rights, but also political, cultural, and other social institutions. They include class structure, race

relations, religion, family, the nature of government, and cultural factors. Clearly all of these will have extremely important roles in the development process and will themselves evolve during it. Although this chapter will concentrate on economic institutions, the others play important roles during development.

(2.) See also Harcourt (1978)

(3.) Economic sociologists and anthropologists, like Weber and Polanyi, look at the emergence of capitalism in term of the interrelation of economic forms with state and cultural forms. In particular, a strong state or church may levy the surplus, preventing it from being used productively and postponing the development of capitalism.

(4.) See, for example, Ricardo's famous statement to this effect in the preface to his *Principles of Political Economy* ([1817] 1951, 5).

(5.) She also notes that this type of unemployment may have been be relevant for Europe in the immediate aftermath of World War II, as a result of the destruction of much productive capacity. Interestingly, in discussions with Kalecki, Robinson tried to use the argument of the imperative to invest to justify the importance of "animal spirits" as a determinant of investment, despite Kalecki always regarding them as "irrational"; see, for example, Robinson ([1977] 1979, 196).

(6.) Lewis assumed that at this point the neoclassical model, rather than the Keynesian one, took over (Harcourt 1984, 33).

(7.) This dual relationship played important roles in the work of both Harrod (1939, 1948) and Domar (1948) and underlies their famous growth models.

(8.) An important example of this is India, where the role of service sector in the growth of the economy has been at least as important as the role of manufacturing and promises to continue to be so, in terms of both its impact on economic growth and its importance in providing employment (Government of India 2009, Balakrishnan 2010, and Eichengreen and Gupta 2011).

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[–] Abstract and Keywords

John Maynard Keynes was not a development economist as the description is used today. He did not address directly issues of national or international poverty and income distribution; only indirectly through his focus on unemployment, which has always been, and remains, a major cause of poverty in both developed and developing countries. Nevertheless, Keynes's theoretical apparatus and thinking about what drives capitalist economies, formalized in his magnum opus, *The General Theory of Employment, Interest and Money* (1936), and his proposals at the Bretton Woods Conference in 1944 for a new international monetary order (which were largely ignored), do have relevance for the debates that take place today in development economics. This chapter attempts to get into Keynes's mind and to try to guess what he might have said and recommended on economic development and other pressing issues facing developing countries (and the world economy) today. In particular, it examines the Keynes-Harrod growth theory and the determinants of actual growth performance.

Keywords: John Maynard Keynes, development economics, developing countries, Keynes-Harrod growth theory, poverty, unemployment, economic development

Introduction

Keynes was not a development economist as the description is used today. He did not address *directly* issues of national or international poverty and income distribution; only *indirectly* through his focus on unemployment, which has always been, and remains, a major cause of poverty in both developed and developing countries. It is no accident that the one billion workers identified by the International Labour Organisation (ILO) in Geneva as unemployed and underemployed matches almost exactly the one billion people measured by the World Bank as living in extreme poverty on less than $1 a day. They are more or less the same people.

Even though Keynes was not a development economist in the conventional sense, his theoretical apparatus and thinking about what drives capitalist economies, formalized in his magnum opus, *The General Theory of Employment, Interest and Money* (1936), and his proposals at the Bretton Woods Conference in 1944 for a new international monetary order (which were largely ignored), do have relevance for the debates that take place today in development economics. In this chapter, I attempt to get into Keynes's mind and to try to guess what he might have said and recommended on some of the pressing issues facing developing countries (and the world economy) today.

Keynes-Harrod Growth Theory

When I teach growth and development economics, one of the first things I do is to teach the simple Harrod (1939) growth model and ask the students where they think less-developed countries (LDCs) fit into the picture. Harrod

distinguished three (p. 557) different growth rates: the actual growth rate (g); the warranted growth rate (g_w), and the natural growth rate (g_n).

The actual growth rate is defined as (1.24.1)

$$g = s/c,$$

$g = s/c,$

where s is the savings ratio (S/Y), and c is the actual incremental capital-output ratio (dk/dY) = (I/dY). Equation (1.24.1) is a useful identity expressing the *ex post* equality between saving and investment in the national accounts. In other words, any country's growth rate is by definition equal to its savings ratio divided by the ratio of new investment (including inventory investment) to the change in output.

The warranted growth rate is defined as (1.24.2)

$$g_w = s/c_r,$$

$g_w = s/c_r,$

where c_r is the *required* incremental capital-output ratio; that is, the required amount of investment to produce an additional flow of output (I_r/dY), given the prevailing technology and the rate of interest. The warranted growth rate is therefore the growth rate required for planned investment to match planned saving to keep the economy on a steady growth path so that investors do not revise their investment plans upward or downward, thereby ensuring a moving equilibrium through time.

The natural rate of growth is defined as (1.24.3)

$$g_n = l + t,$$

$g_n = l + t,$

where l is the rate of growth of the labor force and t is the rate of growth of labor productivity determined by technical progress. This is the maximum growth rate achievable, or the "social optimum" growth rate, as Harrod called it.

Let us ignore for the moment the actual growth rate (g) and focus on the relation between the warranted (g_w) and natural (g_n) growth rates. Almost certainly for most LDCs, $g_n > g_w$ because labor force growth is high; labor productivity growth is relatively high; the savings ratio is low, and the capital-output ratio is relatively high (reflecting a low productivity of investment). Let us give an example: suppose l = 2 percent per annum (p.a.); t = 3 percent p.a.; s = 10 percent, and $c_r = 4$; then $g_n = 2 + 3 = 5$ percent and $g_w = 10/4 = 2.5$ percent. This gives a serious imbalance between the growth of the effective labor force and the rate of capital accumulation, which Keynes would have recognized as a major cause, or source, of unemployment and underemployment in LDCs—not of the involuntary variety as defined in *The General Theory*, but of the structural variety caused by a lack of capital for labor to work with (at least without a change in the techniques of production).

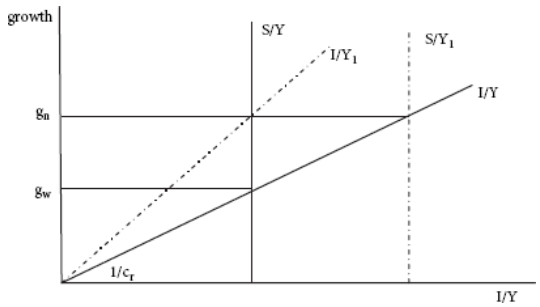

Figure 1.24.1 The relation between the natural and warranted growth rates

He would have recognized this serious imbalance because in 1937, in a paper to the Eugenics Society titled "Some Economic Consequences of a Declining Population," he first identified the opposite imbalance in rich countries of $g_w > g_n$, thus anticipating (p. 558) Harrod's 1939 model (see Thirlwall 1987, 2007). Keynes didn't use the terms "natural" and "warranted" growth rates, but he expressed the worry that if population growth in developed

countries fell to zero (as it was predicted to do in the future because the net reproduction rate in the 1930s had fallen below 1), there would not be enough induced investment to match planned saving; that is, the "natural" growth rate might be only, say, 1 percent due to productivity growth (or technical progress) while the supply of capital, due to saving (i.e., the "warranted" growth rate) might be, say, 3 percent. Planned saving would exceed planned investment ($g_w > g_n$), which would be a recipe for stagnation. In the event, secular stagnation and population decline was allayed by war and its aftermath.

This simple Keynes-Harrod framework turns out to be a very useful pedagogic device for understanding the various policy options open to governments in LDCs faced with a growth of the effective labor force in excess of the growth of capital accumulation, which is illustrated in figure 1.24.1.

The warranted growth rate (g_w) is defined where the planned investment schedule (I/Y) and planned saving schedule (S/Y) cross; and the natural growth rate (g_n) is composed of $l + t$. If $g_n > g_w$ (as depicted), or $l + t > s/c_r$, there are two policy options on the left-hand side of the equation. The first is to reduce l, the rate of growth of the labor force, but this is not feasible in the short run. It gives a justification, however, for population control policies to tackle the problem of excess labor supply in the longer run. The second policy option is to reduce t, the rate of growth of labor productivity, but this would reduce the growth of living standards for those in work and impair the competitiveness of the economy. For a given growth of output, there is always a conflict between the growth of employment and the growth of living standards.

On the right-hand side of the equation, attempts can be made to increase the saving ratio (S/Y) by monetary and fiscal policy, but Keynes would surely have been a severe critic of the financial liberalization paradigm that prior saving is necessary for investment to take place. One of Keynes's most fundamental messages is that what drives a **(p. 559)** capitalist economy is the decision to invest, not the decision to save. Saving must ultimately *fund* investment, but it is not the function of saving to finance investment. That is the role and purpose of the banking system, and the provision of credit. This important consideration has implications for interest rate policy in developing countries. The financial liberalization school argue for higher real interest rates to raise the savings ratio, but high real interest rates discourage investment. Keynes would want low real interest rates to encourage investment and to keep down operating costs. Credit rationing, if necessary, would be a small price to pay.[1] But what is the optimum real rate of interest? There is no easy answer to this question, but even within the financial liberalization model, it could be negative if liquidity preference is high and the desire to invest is weak. Research on the rate of interest below which the relation between the interest rate and investment is positive (because investment might be constrained by saving), and above which it is negative, shows a switch-point close to zero (see Warman and Thirlwall 1994 and references cited there). This is what Maxwell Fry (1997) also implicitly finds in a large study across countries of the relation between GDP growth and real interest rates. The relation is a quadratic, with GDP growth highest in countries where the real interest rate is close to zero.

Keynes would also have had something to say about tax policy and tax reform in developing countries, that is, about compulsory saving to raise the overall savings ratio. Tax effort, as measured by the differences between actual tax revenue and taxable capacity (predicted on the basis of per capita income, the distribution of income, and the share of trade and industry in GDP), is weak in many LDCs (see Thirlwall 2005, table 14.3).

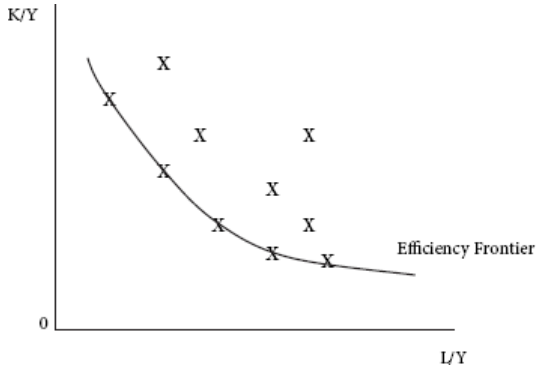

Figure 1.24.2 The choice of techniques.

There is also the possibility of forced saving, that is, governments investing on society's behalf and financing the expenditure by expansion of the money supply. This is sometimes known as the "inflation tax," which Keynes

described in his *Tract on Monetary Reform* (1923) as "a tax which the public finds hard to evade and even the weakest government can enforce when it can enforce nothing else." This is not an apologia for inflation, but there is little doubt where his preference curve would lie compared to today's orthodoxy, preached by all the major international financial institutions and central banks around the world, that a precondition for growth and development is price stability. In his *Essays in Persuasion* (1931), Keynes described unemployment as unjust and inflation as inexpedient, *but* "it is worse in an impoverished world to provoke unemployment than to disappoint the rentier." In practice, there is no scientific evidence that price stability is a precondition for faster growth (see later), but, in any case, inflation is not the inevitable result of monetary expansion if an economy is growing, and the demand to hold money per unit of income is increasing as monetization of an economy takes place. The simple quantity theory of money (based on the equation of exchange) tells us that if an economy is growing at 3 percent p.a., and the demand to hold money per unit of income is growing at, say, 5 percent p.a., the supply of money can grow at 8 percent p.a. without prices rising. This can be appropriated by governments for investment purposes. Moreover, if the public expenditure finances projects that help the poor, such as irrigation and infrastructure projects in the rural sector and housing in the urban sector, the "inflation tax" can be egalitarian. Poor countries, with high unemployment, **(p. 560)** desperately need government investment in labor-intensive public projects that not only absorb labor but also increase the supply capacity of the economy at the same time.

Finally, on the right-hand side of the inequality between $I + t$ and s/c_r, there is the issue of the incremental capital-output ratio, c_r. A reduction in c_r will move g_w toward g_r by pivoting upward the I/Y curve to I/Y_1 (see figure 1.24.1). The capital-output ratio is a measure of the capital (or labor) intensity of production techniques. The question for poor countries is, can they move toward the use of more labor intensive techniques without reducing output and the level of saving? There is evidence from the work of Pack (1982) (and others) that firms can substitute capital for labor and stay on the "efficiency frontier," provided other cooperating factors of production are available, as illustrated in figure 1.24.2.

Take, for example, a fairly homogenous commodity, such as paint. The scatter points in figure 1.24.2 show the combinations of capital per unit of output (K/Y) and labor per unit of output (L/Y) that firms use in different countries to produce paint. Joining up the points closest to the origin (which are clearly the most efficient firms) gives the "efficiency frontier" and shows that there is a spectrum of techniques that countries can choose from given the knowledge and "know-how." It is sometimes argued, however, that moving down the efficiency frontier to more labor-intensive techniques will reduce national saving because the share of wages in national income will increase, and the marginal propensity to save out of wages is less than out of profits. This is not necessarily the case for a number of reasons. First, the propensity to consume out of wages and profits may not differ much; second, the alternative to more employment of unemployment reduces personal and family saving; third, consumption itself can be "productive" by improving nutrition and stimulating effort, and last, governments can prevent consumption from rising using tax policy. As Amartya Sen (1969) argues in his discussion of the choice of techniques in LDCs: "the total amount of income to be saved can be determined by the planner in any way he likes—. If this is true then the link snaps **(p. 561)** between choice of techniques and the proportion of income saved. The technical choice may be made with the main purpose of maximising output [and employment], and the proportion of the output to be invested can be decided at a separate stage."

The Determinants of Actual Growth Performance

Faster growth of national income is absolutely essential for poverty reduction and for achieving the Millennium Development Goal of halving world poverty by the year 2015 compared with its level in 1990. The question is whether faster growth is demand-constrained or supply-constrained or a combination of both. This is where the debate between "old" and "new" (neoclassical) growth theory and Keynesian growth theory starts. In orthodox growth theory for the closed economy (Swan 1956; Solow 1956), supply creates its own demand. There is no independent investment function. Long-run growth is determined by the exogenously given growth of the labor force in efficiency units (Harrod's natural rate of growth). Because of the neoclassical assumption of diminishing returns to capital, investment does not matter for long-run growth; and there are no demand constraints either. In "new" (endogenous) growth theory, investment does matter for long-run growth because the assumption of diminishing returns to capital is relaxed, but there are still no demand constraints. Growth is endogenous in the sense that it is not simply exogenously determined by the effective labor supply, not in the sense that growth is endogenous to demand. When the neoclassical growth model is extended to the open economy, the balance of

payments is ignored. It is somehow assumed to look after itself without income adjustment. There is no foreign exchange constraint recognized.

Likewise in orthodox trade theory, the balance of payments is ignored. The gains from trade are measured from the supply side, that is, by how much trade augments a country's real resources through the pursuit of comparative advantage. The monetary consequences of trade, or the balance of payments effects of different patterns of resource allocation, are forgotten. Trade is always mutually beneficial between countries whatever the structure of production and the pattern of trade dictated by comparative advantage. Continuous full employment is assumed, so that there are no welfare losses from unemployment in the process of resource reallocation.

One of the things that I have tried to do in my own writing on growth in developing countries (Thirlwall 1974, 1986, 2002, 2005) is to put demand into development theory as a driving force; and to argue that demand constraints may operate long before countries reach full capacity utilization. The evidence for this is the massive surplus of labor and the fact that capital capacity is rarely fully utilized, often because countries lack the foreign exchange to buy spare parts. Developing countries certainly suffer from supply bottlenecks of various kinds, including poor infrastructure and lack of skills and (p. 562) knowledge, but this does not mean that demand is not also important in determining the growth performance of nations. In particular, in the open economy, foreign exchange is a major constraint on the growth of output. There are not many developing countries (apart from China and those flushed with oil) that could not grow faster given the greater availability of foreign exchange.

Over the last thirty years, I and colleagues (e.g., Thirlwall and Hussain 1982; McCombie and Thirlwall 1994, 2004) have developed a balance-of-payments-constrained growth model, both in a simple form, and including capital flows and terms of trade effects, as an alternative model to the neoclassical supply-side model for understanding differences in the growth performance of nations. The extended model permits the disaggregation of the growth of national income into four component parts: (1) the effect of the growth of exports driven by world output growth and the income elasticity of demand for exports; (2) the effect of terms of trade, or real exchange rate, changes on the balance between export and import growth; (3) a pure terms-of-trade effect, and (4) the effect of the growth of real capital flows (in or out). The model turns out to be a very versatile one, with a lot of explanatory power (for a collection of papers, see McCombie and Thirlwall 2004). For many countries the simple rule holds that long-run growth can be predicted by the rate of growth of export volume divided by the income elasticity of demand for imports. This turns out to be the dynamic analogue of the static Harrod trade multiplier result derived by Harrod in 1933, that if long-run balance–of-payments equilibrium on current account is a requirement, and the real terms of trade or exchange rate remain constant, national income is a linear multiple of the level of exports relative to the marginal propensity to import.

In an open economy, within a balance-of-payments framework, demand fluctuations and demand constraints come in a variety of forms, triggered by different factors. One is terms-of-trade fluctuations, which affect the balance of payments directly, and also government revenue and private investment. Before and during World War II, Keynes had a lot to say about the detrimental effects on the world economy of commodity price fluctuations, and he wanted a "Commod Control" scheme to be established at Bretton Woods to stabilize the price of primary commodities within, say, a 10 percent band around an agreed "normal" price. In a paper presented at the British Association for the Advancement of Science in 1938, published in the *Economic Journal* (Keynes 1938), Keynes noted that for the four commodities of rubber, cotton, wheat, and lead, the price had fluctuated by 67 percent in the previous ten years, and was led to remark: "assuredly nothing can be more inefficient than the present situation whereby the price is always too high or too low and there are frequent meaningless fluctuations in the plant and labour force employed" (Keynes 1980, 114). Then in a memorandum in 1942 (Keynes 1980), Keynes remarked: "one of the greatest evils in international trade before the war was the wide and rapid fluctuations in the world price of primary commodities—it must be the prime purpose of control to prevent these wide fluctuations" (Keynes 1980, 138). Keynes believed, with some justification, that a "Commod Control" scheme would make a major contribution to curing the international trade cycle. Indeed, the injection and withdrawal of purchasing power by buying up commodities when prices are more (p. 563) than say, 10 percent below their agreed level and selling when prices are more than, say, 10 percent above the agreed level would operate much more immediately and effectively than public works. Keynes remarked:

> at present, a falling off in effective demand in the industrial consuming countries causes a price collapse which means a corresponding break in the level of income and of effective demand in the raw material

> producing countries, with a further adverse reaction, by repercussion, on effective demand in the industrial countries; and so, in a familiar way, the slump proceeds from bad to worse. And when the recovery comes, the rebound to excessive demands through the stimulus of inflated price promotes, in the same evil manner, the excesses of the boom.
>
> (Keynes 1980, 121)

This sentiment has recently been reiterated in a major study by Cashin and McDermott (2002) at the International Monetary Fund of fluctuations in real commodity prices over the last 130 years. They say:

> although there is a downward trend in real commodity prices, this is of little policy relevance, because it is small compared to the variability of prices. In contrast, rapid, unexpected and often large movements in commodity prices are an important feature of their behaviour. Such movements can have serious consequences for the terms of trade, real incomes and fiscal position of commodity-dependent countries, and have profound implications for the achievement of macroeconomic stabilisation.
>
> (196)

They identify thirteen occasions since 1913 when the annual price change was more than 20 percent in one year. This is serious volatility. They also find that average price slumps last longer than price booms: 4.2 years compared to 3.6 years.

Kaldor (1976) adopted Keynes's position and argued that primary product price fluctuations cause deflationary bias in the world economy because when prices fall, this reduces the purchasing power of primary product producers and lowers the demand for industrial goods; and when commodity prices rise, this also causes industrial goods' prices to rise and governments then deflate demand. Kaldor (1996) also showed in a two-sector model of agriculture and industry that unless the terms of trade between the two sectors are in equilibrium, industrial growth will either be supply-constrained if agricultural prices are "too high," or demand-constrained if agricultural prices are "too low." The role of the terms of trade is to equilibrate supply and demand in both markets simultaneously, but there is no guarantee in a free market that the terms of trade will not overshoot either upward or downward following an autonomous shock to supply or demand in either market. Kaldor supported Keynes's idea of a "Commod Control" scheme for important primary products, financed by the use of Special Drawing Rights (SDRs).

Another source of deflationary bias in the world economy are the programs of the IMF and World Bank in developing countries. IMF conditionality and World Bank Structural Adjustment Programs in poor countries were always euphemisms for deflation because both institutions misunderstand the nature of balance-of-payments difficulties and inflation in these countries. Balance-of-payments deficits are associated with countries **(p. 564)** "living beyond their means," whereas, in practice, the deficits are inherent in the structure of production and trade (Thirlwall 2006). Because the income elasticity of demand for LDC exports is relatively low (primary products are subject to Engel's Law), and the income elasticity of demand of their imports is relatively high, deficits are inevitable if the LDCs attempt to grow as fast as developed countries. Under the present international economic order, it is deficit countries that are penalized, never surplus countries. Keynes wanted *symmetry* of adjustment with both deficit and surplus countries treated equally, but oppositely. In his "Proposals for an International Clearing Union" (Keynes 1943) he described the aim of his plan as "the substitution of an expansionist, in place of a contractionist, pressure on world trade—we need a system possessed of an internal stabilizing mechanism, by which pressure is exercised on any country whose balance of payments with the rest of the world is departing from equilibrium in *either direction*, so as to prevent movements which must create for its neighbours an equal but opposite want of balance" (emphasis in the original) (5). Keynes's proposal was therefore that each member country should pay to the Reserve Fund of the Clearing Union 1 percent of its debits *or* credits in excess of 25 percent of its quota, and a further 1 percent if its debits or credits exceeded 50 percent of its quota. Keynes referred to his system as looking on "excessive credit balances with as critical an eye as excessive debit balances, each being indeed the inevitable concomitant of the other" (7). "The objective is that the creditor should not be allowed to remain entirely passive" (17). Indeed, the Governing Board of the Clearing Union should be empowered to discuss with countries credit measures to expand demand; appreciate the currency; reduce tariffs; and to give international development loans, with the board having the ultimate discretion. If the Keynes plan had been adopted at Bretton Woods, all this would have applied to the oil-exporting countries in the 1970s, which would have avoided the unloading of such large surpluses on the private capital markets and the subsequent debt

problems of the recipients, and also it would have applied to countries in the developed world persistently in surplus, notably Japan and Germany, and now China. Penalizing surplus countries would be a sensible and effective way of tackling global imbalances that have plagued the world economy for decades, and which contributed to the world financial crisis and recession in 2008.

Likewise, inflation in LDCs is regarded by the IMF and World Bank as demand inflation to be "cured" by monetary and fiscal stringency, whereas in practice much inflation in developing countries is of the structural variety caused by bottlenecks in the productive system and by structural change (with prices much more flexible upward than downward). Attempting to control structural inflation (or a cost-push inflation for that matter) using deflationary aggregate demand policies simply slows growth, causes more unemployment, and thwarts the development process. Structural bottlenecks (and costs) need to be addressed directly.

But in any case, there is no convincing scientific evidence that price stability is a necessary condition for more rapid growth and development. On the contrary, research from a variety of sources across large samples of countries for different time periods by Bruno (1995), Sarel (1996), Ghosh and Phillips (1998), and Pollin and Zhu (2006) shows growth to be maximized in the range of 5 to 10 percent inflation for LDCs. The price of **(p. 565)** financial conservatism may well be stagnation (which has been evident for some time in the core countries of the European Union (see Thirlwall 2007).

In retrospect, it is a great pity that Keynes's plan for an International Clearing Union was not adopted at Bretton Woods in 1944, which would have had the power to create money for international, collectively agreed, purposes.[2] Some of these purposes would have been intervention in commodity markets to stabilize the price of primary commodities; aid to poor countries that need resources, to be spent in developed countries with spare resources (there is such a thing as a "free lunch"); and "aid for trade" to enable countries to seek out new areas of comparative advantage, because ultimately structural change is the only solution to poverty and underdevelopment.

Conclusion

In 1980 Robert Lucas pronounced the death of Keynesian economics. He wrote: "one cannot find good under-forty economists who identify themselves or their work as Keynesian. Indeed, people often take offence if referred to as Keynesians. At research seminars, people don't take Keynesian theorising seriously any more; the audience starts to whisper and giggle at one another" (Lucas 1980, 18). For a future Nobel Prize-winner in economics, this was a silly thing to say. Not only is the Keynesian model of how capitalist developed economies function alive and kicking (witness the fiscal and monetary response of the United States and Europe to the financial and economic crisis of 2008), but his ideas concerning the functioning of the world economy are as relevant today as they ever were when he articulated them before and during World War II. Lucas should read and digest the thirty volumes of Keynes's *Collected Writings* before poking fun at those who draw inspiration from their insights. Commodity price instability continues to plague developing countries and the world economy, as does the free movement of short-term speculative capital, which Keynes believed served no useful economic or social purpose. Keynes recognized the difficulties posed by global imbalances and foreign exchange constraints, which led to the inclusion of a "scarce currency clause" in the Articles of Agreement of the IMF (although it has never been used against surplus countries). If there was ever a new Bretton Woods to serve better the needs of poor countries, it would need to pay attention to all the things highlighted by Keynes in his 1943 plan, which still need to be addressed for a fairer and more stable world international economic order.

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Notes:

(1.) In any case, even in "free" markets, there is likely to be credit rationing because of asymmetric information and adverse selection (Stiglitz and Weiss 1981).

(2.) Keynes used to joke that his proposal for a bank was called a Fund (the IMF), and what is, in fact, a fund is called a Bank (the World Bank).

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Post-Keynesian Economics and the Role of Aggregate Demand in Less-Developed Countries

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[–] Abstract and Keywords

Although post-Keynesian economics, like John Maynard Keynes's own analysis in *The General Theory of Employment, Interest and Money*, mostly deals with advanced capitalist economies, in the last several decades it has also been used for analyzing the problem of less-developed countries (LDCs). This chapter provides a brief overview of post-Keynesian contributions to the study of the economic problems of LDCs, also known as development economics. Post-Keynesian economics is the approach to economics that stresses the role of aggregate demand in the analysis of the determination of output and employment and the rate of growth of the economy. This approach has roots in the writings of Keynes, Michał Kalecki, and other economists such as Joan Robinson and Hyman Minsky. This chapter discusses a number of theoretical issues in the post-Keynesian analysis of development, focusing on models that stress the role of aggregate demand. It also considers a number of implications of post-Keynesian analysis for broad strategies of development and for economic policy.

Keywords: post-Keynesian economics, less-developed countries, development economics, aggregate demand, economic policy, output, employment, Michał Kalecki, Joan Robinson, Hyman Minsky

1. Introduction

Although post-Keynesian economics, like Keynes's own analysis in *The General Theory*, mostly deals with advanced capitalist economies, in the last several decades it has also been used for analyzing the problem of less-developed countries. The purpose of this chapter is to provide a brief overview of post-Keynesian contributions to the study of the economic problems of these countries or, for short, development economics.

For the purposes of this chapter we will understand by post-Keynesian economics the approach to economics that stresses the role of aggregate demand in the analysis of the determination of output and employment and the rate of growth of the economy, and which examines the interactions of uncertainty, expectations, and financial factors with aggregate demand in determining growth and distribution. The approach has roots in the writings of Keynes, Kalecki, and other economists such as Harrod, Domar, Robinson, Kaldor, Pasinetti, and Minsky. Post-Keynesian contributions that do not directly stress the role of aggregate demand, such as economies constrained by foreign exchange, saving, and other supply constraints, or which examine the world economy as a whole, are not examined.[1]

We also note at the outset that development economics, which studies the economics of less-developed countries (LDCs), examines a broad range of countries, from primary-producing countries to semi-industrialized ones, from small countries with (p. 569) a million people or less to very large ones like China and India, from countries with extremely low levels of income to middle-income ones, from postsocialist countries to countries that have long had

market or mixed economies. For the purposes of this chapter we will cast our net widely, to discuss issues that may be of relevance to all countries that may not be described as high-income countries with advanced capitalist systems, but we will not discuss specific types of less-developed countries.

The rest of this chapter proceeds as follows. Section 2 examines whether Keynesian economics, which emphasizes the role of aggregate demand and, therefore, post-Keynesian economics in the sense examined in this chapter, has any relevance for LDCs, in view of the fact that many early development economists explicitly argued its irrelevance for them. It argues that it is indeed relevant, and for a variety of reasons and in a number of senses. Section 3 then discusses a number of theoretical issues in the post-Keynesian analysis of development, focusing on models that stress the role of aggregate demand. Section 4 comments on a number of implications of post-Keynesian analysis for broad strategies of development and for economic policy. Section 5 concludes.

2. The Relevance of Post-Keynesian Economics for Development Economics

Despite the fact that the rise of Keynesian economics may have provided some methodological support to development economics during its rise after World War II—by questioning the validity of the notion of mono-economics (see Hirschman 1981), by shifting the focus of inquiry from the *allocation* of resources to their *mobilization* as well as allocation, and by legitimizing the use of activist state policies to cure the ills of free-market economies (see Singer 1985, 1987)—it made little or no substantive contribution to the subject in its early years.[2] Keynesian economics, which was considered to be relevant for the short run, was generally perceived as being inapplicable to the long-run problems of development. Keynes (1936) himself had little to say about LDCs in *The General Theory* other than his reference to the preference for liquidity in India (337) and to land having a high liquidity-premium in the minds of owners of wealth in agricultural economies (241).

The dominant theories in development economics in its early days stressed the need for state intervention to correct for market failures due to externalities and increasing returns, the interaction between advanced and backward sectors, using a classical approach in which aggregate demand played no role (Lewis 1954), the problems of saving constraints, balance-of-payments constraints, and deteriorating international terms of trade (Furtado 1964), and the problems caused by surplus transfers from LDCs to advanced economies (Baran 1957). The so-called Harrod-Domar growth equation, which was used extensively by development planners and has clear Keynesian roots, was used to justify higher saving rates and lower capital-output ratios, **(p. 570)** rather than measures to stimulate aggregate demand. When demand factors were stressed at all, as by Rosenstein-Rodan (1943) and other balanced-growth proponents in their proposals to coordinate investment decisions in different firms and industries, the ideas were derived more from intersectoral coordination problems due to market failures than from Keynesian aggregate demand considerations. Some planning models, such as open and semi-closed and even some dynamic Leontief models, which were widely used in development planning exercises, had Keynesian features in their analysis of intersectoral linkages in the absence of supply constraints and in their focus on material balance equations. However, the popularity of these models at that time can perhaps be explained more by the inadequacy of computers to deal with nonlinear, general equilibrium models than by a recognition of the relevance of Keynesian ideas.

Development economists in fact argued explicitly that Keynesian economics was not applicable to LDCs, which were often portrayed as subsistence economies not fitting the institutional characteristics of capitalist economies, in which hired labor is used for production for making profits and in which savers and investors are different people and institutions (see Rao 1952; Dasgupta 1954); thus for them, the distinction between aggregate demand and aggregate supply was irrelevant. Moreover, it was argued that supply constraints due to shortages of wage goods (consisting mainly of agricultural products, that is, food), capital goods, working capital, skilled labor, government controls, and foreign exchange, rather than demand constraints, limit production and growth in LDCs (see Rao 1952). It is interesting to note that Kalecki, who arguably provided an earlier and better (at least for modern capitalist economies) theory of demand-determined output than did Keynes, and who wrote extensively on the economics of developing countries (see Kalecki 1976), stressed supply (such as capacity constraints and the problem of inflation due to wage goods constraints) rather than demand constraints for LDCs. Demand constraints were argued to be irrelevant because of high levels of population in LDCs, and because of low levels of per capita income, which implied that most consumption “needs” were unmet (Dasgupta 1954). Finally, Dasgupta (1954) argued that while Keynes’s theory took the money wage to be fixed (which he did only as a preliminary

assumption), unemployment in LDCs was due to a fixed real wage that was determined by minimum subsistence, and was hence of a classical, rather than the Keynesian, variety.

In the 1970s and 1980s, partly perhaps as a result of changes in the structures of many LDCs, especially semi-industrialized countries, partly because of the perceived failures of earlier development theories to deal with the problems of LDCs, which seemed to be facing demand-side problems (see Bagchi 1970, and Chakravarty 1979), and partly because of the growing popularity of formal nonorthodox macroeconomic theories drawing on the work of Marx and Kalecki, in addition to that of Keynes, Keynesian aggregate demand made its way into the development economics literature (see Bell 1979; Bharadwaj 1979; Rakshit 1982, 1989a; Taylor 1983, 1991; Dutt 1984; and FitzGerald 1993). Some in fact argued that the fragmented nature of commodity markets and credit markets (Rakshit 1989b), the uncertainty generated by the instability of the growth process caused by the existence of a multiplicity of constraints (Bagchi 1988), and the importance of assets such as land, gold, and precious metals (see (p. 571) Rakshit 1989a; Taylor 1983), which induce potential investors in LDCs to divert their assets to unproductive channels in the face of this uncertainty, arguably made aggregate demand issues highly relevant for LDCs.

The claim that the institutional characteristics of LDCs made Keynesian economics irrelevant for them is rejected outright in this new approach, given that these economies have developed industrial sectors that produce with hired labor with the objective of making profits, and since firms make investment decisions based on market prospects and profitability and constrained by the availability of finance, while savers (households as well as firms) save to hold financial and other assets. LDCs, including semi-industrialized countries, can also have large subsistence primary sectors, but that merely implies that we should explicitly incorporate such sectors in macromodels for LDCs and not simply reject the relevance of the distinction between aggregate demand and aggregate supply.

The resurgence of the neoclassical approach to development economics from the 1980s had two branches, one microeconomic in nature, and the other macroeconomic.

The first branch, with precursors in Lal (1985) and Little (1982) and others, and which is reflected recently in World Bank (1991), argues that excessive state intervention in LDCs explains the poor performance of LDCs. While this branch takes its aims at many kinds of state intervention in LDCs, including policies regulating financial and labor markets, and trade and international capital flows, and is not specifically directed at Keynesian policies, it does have implications for the relevance of Keynesian policies in LDCs. As Srinivasan (1993) argues, Keynesian demand problems cannot arise for a small economy that can export any amount it wants to at the price given in world markets. He then argues that if LDCs are small economies and if they cannot increase their exports, it must be due to the fact that government policy-induced distortions prevent them from increasing exports.

The second branch points out that expansionary fiscal and monetary policies result in inflation (and sometimes even hyperinflation) and in explosive internal government and external debt situations, with drastic implications for growth in LDCs. This branch is reflected repeatedly in the policy advice given to LDC governments by the International Monetary Fund, advice that makes LDCs cut government spending and subsidies, put curbs on money supply growth, and undergo devaluation. Such contractionary policies, of course, are recommended in periods in which particular LDCs experience balance-of-payments problems (which make them turn to the IMF in the first place). The general policy advice of the Bretton Woods institutions (see World Bank 1991) is to maintain macroeconomic stability and not indulge in “populist,” expansionary policies.

3. Post-Keynesian Theoretical Considerations and Models

To fix ideas about the post-Keynesian approach to LDCs, and to address some of the issues raised in the previous section, we consider a basic model that has become a (p. 572) standard workhorse in post-Keynesian analyses[3] and then modify it to take into account additional relevant features on LDCs.

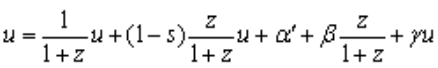
3.1. A Basic Model

Take a closed economy with one sector,[4] which produces an industrial good with capital and labor with fixed coefficients of production. There are two classes, capitalists who receive nonwage income and save a constant

fraction of their income (firms may also be interpreted as saving for them), and workers who earn wage income and do not save. Industrial firms are assumed to set their price as a fixed markup on unit labor costs and normally to hold excess capital. Firms invest paying attention to profitability, market prospects, and the interest rate, which is fixed by the monetary authorities.

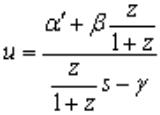
In the short period output varies to equate demand and supply in the goods market.[5] Short-period equilibrium thus implies (1.25.1)

$$u = \frac{1}{1+z}u + (1-s)\frac{z}{1+z}u + \alpha' + \beta\frac{z}{1+z} + \gamma u$$



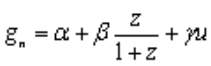
where u is the rate of capacity utilization measured as a ratio of output to capital stock, z is the markup charged by firms, s is the saving rate of capitalists, and the last three terms denote investment and government expenditure as a ratio of capital stock as a linear function of profitability, measured by the profit share, and markets, measured by the capacity utilization rate. Autonomous expenditure is measured by α' (which depends on the given rate of interest, the state of business confidence not affected by current profitability and capacity utilization and government expenditure), and β and γ are positive constants. The last two terms show the dependence of investment on expected profitability and the buoyancy of aggregate demand.[6] The short-period equilibrium value of the capacity utilization rate is therefore given by (1.25.2)

$$u = \frac{\alpha' + \beta\frac{z}{1+z}}{\frac{z}{1+z}s - \gamma}$$



In the short period the capital stock, K, is given, so that the level of output is determined as uK, and the level of employment is determined as $b_n uK$, where b_n is the fixed labor-output ratio in the industrial sector. In the long period capital accumulation is determined by the investment rate. Assuming away depreciation of capital, the rate of growth of the economy is given by (1.25.3)

$$g_n = \alpha + \beta\frac{z}{1+z} + \gamma u$$



(p. 573) where u is determined in equation (1.25.2) and where α denotes autonomous investment. This simple framework shows that the rate of growth of capital and output, measured by g_n, can be increased by expansionary fiscal and monetary policies, and by reducing uncertainty; all of these will have a positive effect on u and g_n by increasing α or α'. It is to be noted that long-period growth depends on aggregate demand as in numerous other post-Keynesian growth models; unlike what early development economists argued, the relevance of demand is not confined only to the short period.[7]

An important feature of this model is that a shift in the distribution of income toward wages, for instance, due to a reduction in the exogenously given markup rate, z, may increase the rate of growth of the economy. It does so because the reduction in the markup and the consequent increase in the real wage redistributes income from capitalists to workers and increases aggregate demand because the latter consume a higher proportion of their income at the margin than do the former. This increase in aggregate demand increases capacity utilization and can increase investment and the rate of accumulation and growth because of the positive influence of capacity utilization on investment shown by the term involving γ. However, this increase in growth need not necessarily occur, because the fall in the markup also reduces the profit share, which directly reduces investment because of the term involving β. If the effect of the profit share on investment is weak and that of capacity utilization is strong, growth will be wage-led in the sense that an increase in the wage share will increase the rate of growth of the

economy, while if the opposite is true, growth will be profit-led in the sense that a reduction in the wage share (or a rise in the profit share) will increase growth.

A problem with this model is that it abstracts from all supply constraints that were argued to be relevant for LDCs, because it assumes that excess capacity always persists; that there is only one input, and no skilled labor, working capital, and infrastructure; that there is only one sector, thereby ruling out agricultural constraints; and that we have assumed a closed economy, which makes foreign exchange constraints irrelevant. However, there is nothing in our definition of LDCs that suggests that these assumptions are generally valid; indeed, an important strand of the argument against the relevance of Keynesian policies for LDCs made by early development economists stressed the role of supply constraints. To evaluate the relevance of the post-Keynesian model when supply-side factors are taken into account, we can modify the model to introduce supply constraints into it. We do so, for simplicity, one at a time, considering in turn capital, agricultural, balance of payments, and fiscal constraints, which have been quite extensively dealt with in the literature. It may be noted that the argument that labor supply as a whole may be a constraint on growth was not made for LDCs, because of the presence of what was considered to be surplus labor.

3.2. Capacity Constraints

Regarding capital constraints it is often pointed out that the basic problem of LDCs is the shortage of capital, not effective demand. Although it is no doubt the case that LDCs (p. 574) suffer from a shortage of capital as measured by the stock of capital per capita or per worker, it is not clear that this shortage is due to low levels of saving supply or low levels of investment demand; if the latter is the case, aggregate demand is obviously of relevance.

There is, however, an alternative definition of the shortage of capital, one that takes the economy to be at full capacity; in terms of our model this implies that the equilibrium level of u determined by equation (1.25.2) exceeds the technologically feasible maximum, which we denote by u_K. In this case, since output is capacity constrained, demand and output can be equalized through variations in the price level in response to an excess demand for goods. If the money wage is fixed, the price level and hence the markup, z, will adjust so that the equilibrium real wage will be given by (1.25.4)

$$V^* = \frac{(s-\gamma)u_k - (\alpha+\beta)}{b_n(su_k - \beta)}$$

$V^* = \frac{(s-\gamma)u_k - (\alpha+\beta)}{b_n(su_k - \beta)}$

and the equilibrium growth rate by (1.25.5)

$$g_n + \alpha + \beta(1 - V^* b_n) + \gamma u_k.$$

$g_n + \alpha + \beta(1 - V^* b_n) + \gamma u_k.$

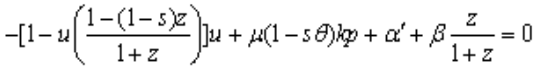
Aside from the fact that it is not very clear what is precisely meant by “full” capacity, several things may be noted about this model. First, if we allow for substitution between capital and labor in the relevant range, there is no reason why the “full” capacity level should be fixed. Second, even if sometimes such equilibria prevail, it is an empirical question whether it is always the correct model to use for LDCs. If autonomous demand happens to be high, the economy may be driven to some “full” capacity level, but there is no reason—at least not in the model given in equations (1.25.1) and (1.25.3)—why this must necessarily be the case: even if there are population pressures in many such economies and per capita incomes are low (so that there are many unsatisfied consumption “needs”), as noted by some critics, demand depends on real income and effective demand, and not on numbers of people and their “needs.” Finally, even if the LDC economy is better described by the model of equations (1.25.4) and (1.25.5), when Keynesian policies increase α, equation (1.25.4) implies that this reduces V^* (as long as the money wage does not rise equiproportionately with the price level), and this increases the rates of growth of capital and output.[8]

3.3. The Agricultural Constraint

Regarding the agricultural constraint, critics of Keynesian policies have argued that demand expansion may simply increase the price of agricultural goods since the supply of such goods is constrained by institutional barriers. To examine this issue, following Taylor (1983) (see also Rakshit 1982), we add an agricultural sector to our model. Assume that in this noncapitalist sector sharecroppers pay a fraction Θ of their (p. 575) production to landlords. Assume further the following: the level of agricultural output, X_a, is given in the short period, and its growth rate is given exogenously by institutional factors, such as conditions of land tenure; s also denotes the saving rate out of agricultural rent income and sharecropper farmers do not save; there is no investment in the agricultural sector; and all consumers spend a fixed fraction μ of their consumption expenditure on the industrial good and the rest on the agricultural good.

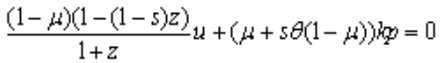
If we maintain all of the other assumptions of our basic model, short-period equilibrium in the economy, where both agricultural and industrial markets clear, by price and output changes, respectively, implies (1.25.6)

$$-[1-u\left(\frac{1-(1-s)z}{1+z}\right)]u+\mu(1-s\theta)kp+\alpha'+\beta\frac{z}{1+z}=0$$



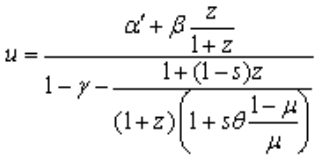
and (1.25.7)

$$\frac{(1-\mu)(1-(1-s)z)}{1+z}u+(\mu+s\theta(1-\mu))kp=0$$



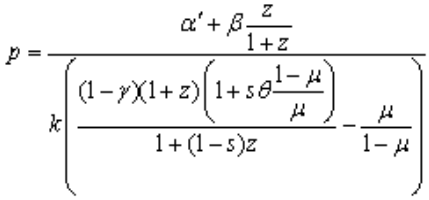
where $p = P_a/P_n$ and $k = X_a/K_n$. In this model with a fix-price industrial sector and a flex-price agricultural sector, equation (1.25.6) clears due to variations in u and (1.25.7) due to variations in p. In the short period, given the level of k, the equilibrium level of u is given by (1.25.8)

$$u=\frac{\alpha'+\beta\frac{z}{1+z}}{1-\gamma-\frac{1+(1-s)z}{(1+z)\left(1+s\theta\frac{1-\mu}{\mu}\right)}}$$



and the equilibrium value of p is given by (1.25.9)

$$p=\frac{\alpha'+\beta\frac{z}{1+z}}{k\left(\frac{(1-\gamma)(1+z)\left(1+s\theta\frac{1-\mu}{\mu}\right)}{1+(1-s)z}-\frac{\mu}{1-\mu}\right)}$$



In the long period k changes according to the equation (1.25.10)

$$\hat{k}=g_a-g_n,$$

$$\hat{k} = g_a - g_n,$$

(p. 576) where the hat over a variable denotes its time-rate of growth and where g_a is the exogenously given rate of agricultural growth. Since u is independent of k, as shown by equation (1.25.8), and as equation (1.25.3) still applies, g_n is also independent of k. Depending on the levels at which the parameters of the model, including α and g_a, are fixed, g_n may exceed or be less than g_a. If g_n exceeds g_a so that k falls over time, the terms of trade move in favor of the agricultural sector (that is, p goes up), but by our assumption that the total consumption of agricultural goods remains the same for a given amount of total expenditure (implying a unit price elasticity of demand for both goods), there is no effect on the real demand for the industrial good, so that u and g_n remain unaffected.

In this case, when Keynesian policies are used to increase α', as equations (1.25.8) and (1.25.9) show, equilibrium u and p both increase in the short period, given k, so that, by equation (1.25.3), g_n increases. Over the long period the average rate of growth rises both because g_n rises and because the share of the industrial sector in total output at constant prices rises.

It may be objected that the assumption that the demand for agricultural goods has a unit price elasticity is unrealistic in LDCs; it is more likely that a rise in p will imply that the share of total consumption expenditure spent on agricultural goods will rise, implying a price-inelastic demand for agricultural goods. To take this into account we assume that μ depends inversely on p. In this case, it can be shown, under plausible conditions, that $du/dk > 0$ (since a higher agricultural output depresses p and increases μ, thereby raising the real demand for the industrial good), so from equation (1.25.3) it follows that g_n now depends positively on k. Now, if we continue assuming that g_a is exogenously given by institutional forces, the long-period equilibrium value of k will be found when $g_n = g_a$, and it can be shown to be stable. Expansionary Keynesian policies that increase α will, in the short period, increase both u and g_n. In the long period this will reduce k, increase p, and shift consumption expenditure toward the agricultural sector, thereby reducing u and g_n; in long-period equilibrium, since g_a is unchanged, g_n will return to its initial level, and so will u, as seen from equation (1.25.3). Thus agriculture does constrain industrial growth, but this is not to say that no industrial gains are being made: there is a short-period rise in industrial growth and the economy is, in the new long-period equilibrium, more industrialized.

We may take the discussion a step further by asking whether it is appropriate to assume that g_a is given exogenously by institutional factors. Though the determinants of agricultural growth in LDCs are complex, we consider two possibilities that have been discussed in the literature. If we assume that more favorable relative prices induce farmers to increase agricultural production more rapidly (due to the quicker adoption of new techniques and labor-based capital accumulation in the form of, say, irrigation), as k increases, since p falls, g_a falls. This implies that a rise in α will have the long-period effect, as before, of reducing k, but since at the new long-period equilibrium g_a will be higher (due to p being higher), g_n will also be higher. Alternatively, assume that agricultural growth is constrained by the provision of infrastructure (in the form of, say, irrigation and technological extension services) by the government. Assume also that government spending on such infrastructure is constrained by government revenues, (p. 577) which depend in major part on industrial production. In this case it can be shown that expansionary Keynesian policies that increase industrial demand, capacity utilization, tax revenues, and hence government infrastructural investment in agriculture, can raise the long-period growth rate of the economy (see Dutt 1991; Rao 1993). In both cases, then, increasing the aggregate demand for industrial goods increases the long-period rates of growth of both industrial and agricultural sectors.

3.4. The Open Economy

We have noted that it has been claimed that if we allow for the fact that LDCs are small, open economies, the problem of aggregate demand disappears entirely. However, it is not clear that all LDCs are small, open economies in the sense that they can export any amount they wish to (if there is enough supply) at the going world price. LDCs, as mentioned above, may export some primary products but have diversified into the export of manufactured goods. While there may be supply constraints for primary products, as well as demand constraints if individual LDCs export a large share of total world exports, for manufactured goods it is arguably more appropriate to think in terms of models of monopolistic competition and oligopoly than in terms of price-taking competitive behavior: the problems of breaking into distant foreign markets are well known even in the absence of trade restrictions. Thus, aggregate demand issues remain relevant for open economies.

International trade and balance-of-payments issues can readily be introduced into our framework by assuming (see Taylor 1983, 1991) that the LDC imports intermediate goods as a fixed proportion of output, capital goods as a fixed proportion of investment, and consumption goods for capitalists and agricultural rent receivers. Furthermore, assume that the LDC exports industrial goods and that exports (as a ratio of capital stock) depend on world demand and on competitiveness: that is, domestic price, the exchange rate, and the price of foreign substitutes. It can then be shown that if the economy has a maximum possible level of trade deficit as a proportion of capital stock or output (determined, for instance by prudent capital inflows), its growth can be constrained in one of three ways: one, by a demand constraint in which excess capacity prevails and when the maximum trade deficit is not reached; two, by a saving constraint in which full capacity utilization prevails and the maximum trade deficit is not reached; or three, by a foreign exchange constraint when there is excess capacity and perhaps excess demand and the maximum trade deficit is reached. This model is a variant of the structuralist two-gap model, but one in which demand factors play a role that they did not in the structuralist framework (see Taylor 1991).

In an economy depicted by this model it is not always the case that the foreign exchange gap is binding. When it is not, demand factors may be relevant in promoting growth if excess capacity prevails and the economy is demand constrained. If the economy is capacity constrained, expansionary policies may increase growth but be inflationary, and possibly worsen the balance-of-payments situation by reducing exports and possibly by increasing imports; but this may not be a problem if the economy is not balance-of-payments constrained. If the economy is balance-of-payments constrained, (p. 578) demand factors are still relevant in at least two ways. First, it is not as if the economy "hits" a physically given balance-of-payments constraint; various things can be done in the short period that prevent it from "hitting" it—running down foreign exchange reserves, getting access to new sources of financing in an active way, and what is more relevant for our purposes, pursuing contractionary policies. Here again, Keynesian demand management becomes of crucial importance, not only in the obvious sense that contractionary policies have to be pursued to reduce balance-of-payments deficits, but also in the sense that such policies can be used in ways that can have the lowest cost to the economy in terms of growth potential and social effects. Second, some of the parameters that affect the balance-of payments-constraints are themselves affected by demand factors. Exports, which can be argued to depend on competitiveness, which in turn depends on productivity growth in a broad sense, can be linked at least partly to Kaldor-Verdoorn-type demand effects. Regarding imports, it is arguable that economic growth and higher levels of learning will be associated with lower import coefficients. Foreign capital flows, which depend on business confidence, make Keynesian uncertainty highly relevant. Policies that are credible and stabilizing will presumably lead to greater investor confidence and lead to great capital inflows. Direct foreign investment—arguably the most stable kinds of foreign capital flows—have been found quite generally to come to economies that have experienced sustained growth, which can be achieved, among other things, by demand expansion.

3.5. Fiscal Constraints

Finally, to incorporate fiscal constraints, the basic model can be extended by introducing government taxes and expenditures, including capital expenditures that have crowding-in effects on private investment (see Taylor 1991). If we assume that there is a maximum feasible public sector borrowing requirement (PSBR), the economy can be shown to be constrained by an additional, fiscal constraint: when the maximum PSBR constraint is hit, the government cuts capital expenditures and this reduces private investment and hence the growth rate.

Although it is no doubt the case that some LDCs may have unsustainable government deficits, maximum limits to PSBR ratios should be viewed with some skepticism. Expansionary Keynesian policies can make economies grow out of government debt problems both by expanding aggregate demand, income, and tax receipts (You and Dutt 1996) and also by increasing government investment (see Dutt 2013), unless the economy is balance-of-payments constrained; and financial crowding out can be prevented with the use of financial "repression" as well.

3.6. Concluding Remarks

The models discussed in this section suggest that there are a number of distinct but related ways in which aggregate demand is relevant for the growth process for LDCs. (p. 579) First, our models show that aggregate demand can affect output in the short period even when it leaves long-period growth unaffected. Second, in a number of cases aggregate demand will affect the long-period equilibrium rate of growth, in addition to level of

output and employment. Third, even if the long-period rate of growth of the economy is actually constrained by factors other than aggregate demand, including foreign exchange constraints, agricultural bottlenecks, infrastructural shortages, and fiscal problems, it is necessary to take into account the role of aggregate demand in the growth process for at least two reasons. One is that many of the factors determining these constraints are affected by aggregate demand, including agricultural supply and export competitiveness. Another is that when there is a reduction in growth due to adverse changes (other than aggregate demand) in the determinants of these factors, the policy responses to them have to take into account the role of aggregate demand: for instance, the appropriate response to international financial crises may well require strengthening aggregate demand, rather than contraction, as recommended by many orthodox approaches. Fourth, many of the other constraints are not decisive in the sense that the economy precisely "hits" them as suggested by some of the models discussed in this section, since they often have their influences felt through inflationary tendencies, increasing foreign borrowing and increasing government debt, which may create the beginnings of crisis situations (and, occasionally, such crises may occur). This makes aggregate demand and policy regarding it more of a direct determinant of growth and suggests a need for the careful management of aggregate demand. Finally, the *possibility* that growth can be constrained by a number of factors, each of which can be influenced by a variety of shocks, introduces more uncertainty in the growth process. This multiplicity of constraints implies that when exogenous parameters are changed by shocks (say, from the world economy, by weather conditions, or by internal political disturbances), the economy can switch from one constraint to another. As Bagchi (1988, 256–58) has argued, exogenous shocks affect a number of constraints, which, directly and indirectly through government policy responses, introduces greater uncertainty into the economy. This, in turn, can reduce private investor confidence, the confidence of foreign investors, as well as that of the government in its attempt to negotiate the dangerous curves along its desirable growth path. Thus, in the presence of the multiplicity of potential constraints and of exogenous shocks affecting them, aggregate demand may be more depressed than it would have been in their absence, which may make it likely that the economy will be demand constrained more often than in the absence of the multiplicity of supply constraints (as, for instance, if only the capital constraint were relevant).

4. Some Implications for Development Strategy and Policy

Recognition of the role of aggregate demand in the growth process in LDCs has a number of important implications for development strategy and policies. Because of the wide (p. 580) acceptance of the neoclassical approach to development policy, which does not take into account the role of aggregate demand, it is useful to compare the neoclassical approach to the post-Keynesian approach. We begin with the general approach to growth analysis and policy and then examine some more specific issues concerning stabilization and financial policies, labor market policy, and policies regarding international trade and capital flows.

4.1. Growth Analysis and Strategies

The most important implication of the post-Keynesian approach to development is the recognition that the rate of long-period economic growth is determined at least in part by aggregate demand growth, and that growth policy needs to keep aggregate demand buoyant. This is in contrast to the orthodox neoclassical approach, which, while sometimes accepting the relevance of aggregate demand for short-run fluctuations, focuses on the aggregate supply as a determinant of long-run growth.

The Solow-Swan neoclassical model assumes that resources are always fully utilized and that all saving is always invested,[9] so that there is no aggregate demand problem and output growth is determined by saving and the rate of growth of effective labor supply (the labor force and the rate of labor-augmenting technological change).[10] In long-period steady-state equilibrium, however, diminishing returns to capital imply that the contribution of capital accumulation to growth falls till per capita output growth is determined only by the rate of technological change, which depends on exogenous factors. In the new or endogenous versions of the model, which maintains all the other assumptions of the old neoclassical model, diminishing returns to capital are countered by externalities and endogenous technological change, so that endogenous forces such as saving behavior and government policies promoting technological change affect the long-period rate of growth of per capita output.

Growth accounting econometric exercises empirically separate out the effects of capital deepening (due to saving and hence investment) and technological change (usually as a residual unexplained by capital deepening). While

neoclassical economists interpret these empirical results as supporting the neoclassical supply-side approach to growth, they may merely represent income accounting identities. Moreover, cross-country growth regressions show that long-run growth depends on saving rates, contrary to the implications of old neoclassical growth theory. While they may seem to support new endogenous growth theory, they are also consistent with the post-Keynesian approach, because empirically it is not possible to distinguish between the effects of changes in saving behavior and in incentives for investment that increase aggregate demand, given the close correlation between domestic saving and investment rates observed across countries (a finding known as the Feldstein-Horioka puzzle, on which, see Harcourt 2006). Finally, a large empirical literature tends to give support to the claim that real output levels feature a "unit root" and are therefore nonstationary, implying that aggregate demand shocks to real output have permanent effects, and this literature is thus inconsistent with the view that departures from the normal path of output are transitory fluctuations around a deterministic trend that represents the natural level of growth. Although (p. 581) most of the unit root literature refers to developed countries, the literature on developing countries has been expanding in recent years with results for Latin American countries (Thornton 2001; Libanio 2009), Argentina (Sosa-Escudero 1997), Brazil (Cribari-Neto 1990, 1993), India (Dua and Mishra 1999; Dawson and Tiffin 1998), and Mexico (Moreno-Brid 1999). It should be noted that these empirical findings do not unequivocally prove that aggregate demand has long-run growth effects, since the results are also consistent with supply-side technological shocks, as pointed out in real business cycle theory, the proponents of which pioneered this literature (Nelson and Plosser 1982).

More direct evidence on the growth effects of aggregate demand changes has been provided with a number of different methods. First, econometric tests have been used to examine whether estimated natural rates of growth respond to aggregate demand pressures and whether actual output growth is caused by input growth or the other way around. Leon-Ledesma and Thirlwall (2002) applied this method to data from OECD countries over the period 1961–95 to show that their estimated natural rate of growth responds positively to aggregate demand pressures, and that input growth is Granger-caused by output growth even when there is no bidirectional causality (as is usually present) between input and output growth. Libanio (2009) applies Leon-Ledesma and Thirlwall's method to Latin American LDCs and finds that the estimated natural rate of growth is more responsive to actual output growth than it seems to be in developed countries. Libanio attributes this stronger response, among other factors, to the existence of pools of unorganized workers and to technology transfers and catch-up. Similar results are obtained for Latin American countries by Vogel (2009). Second, econometric evidence suggests that LDCs that follow countercyclical aggregate demand policies in the face of exogenous shocks to growth, including negative aggregate demand shocks caused by foreign capital inflow reversals, experience not only less output volatility, but also higher rates of growth (see Ocampo and Vos 2008). Factors other than aggregate demand may be at work, such as the supply-side effects of government investment, but the role of aggregate demand in influencing long-run growth is strongly suggested by these results. Third, less formal empirical analysis of the recent experience of a number of LDCs also suggests the importance of aggregate demand in improving growth. Although it is often argued that India's liberalizing reforms since the early 1990s were primarily responsible for India's improved growth rate, the empirical evidence suggests that the growth rate increased beginning in the mid-1980s and was largely due to increasing government expenditures, paradoxically due to political economy problems that were not necessarily intended as a policy stance, consistent with the aggregate demand view (see Dutt 1996). This view is consistent with explanations of earlier stagnation in India's growth since the mid-1960s attributable to lower levels of aggregate demand due to low levels of government spending because of a fiscal crisis (see Bardhan 1984) and an unequal distribution of income (Bagchi 1970, and Nayyar [1978] 1994). If liberalization had a role in the subsequent expansion, it was by helping to boost investment demand by increasing investment by removing the constraints arising from the complex industrial licensing system, and by boosting exports and capital inflows, thereby allowing growth to increase without creating a foreign exchange crisis like the one India faced following the growth spurt of the late 1980s (Dutt 1996). The (p. 582) examination of sectoral labor productivity changes comparing industrial productivity growth to that in agriculture or informal sector services (which were falling in relative terms) also suggests that slower growth in industry resulted in the movement of labor to low productivity sectors that served as repositories of surplus labor when employment growth was low (see Dutt 2006, for India, and Ros 2010, for Latin American economies).

The implication of the idea that aggregate demand has an important influence on growth has a number of general implications. First, it may be counterproductive to overstress supply-side policies that aim to increase efficiency and productivity, because such policies may imply low employment growth rather than higher output growth. Even

if output growth increases, employment growth may be slow, or we may have jobless growth. It is more likely that higher productivity growth will result from higher output growth through buoyant aggregate demand, due to dynamic increasing returns and learning by doing caused by Verdoorn-Kaldor effects. The importance of these effects for Latin America has been analyzed by Ros (2010). Second, the importance of countercyclical fiscal and monetary policies, contrary to what is suggested by stabilization policies of the type espoused by the IMF, is strongly indicated. Third, it may be counterproductive to allow increases in inequality in the hope of increasing growth by increasing incentives for the rich and expecting it to trickle down. An improvement in income distribution by increasing aggregate demand, however, is likely to generate faster growth in some cases. Of course, the fact that aggregate demand affects long-run growth does not imply that distributional improvements will necessarily raise growth—because of the possibility, noted earlier, that growth may be profit led—but since growth can be positively affected by higher equality for reasons affecting the supply side—including mechanisms such as higher productivity growth due to improved education and growth, and by reducing asset market imperfections—and since development is not identical with growth but also involves improvements in distribution and in what Sen (1999) calls functionings and capabilities, the importance of aggregate demand strengthens the possibility that development and distribution are positively related. All of this is not to imply that all that is necessary for improvements in growth and development is to expand aggregate demand indefinitely. Clearly, growth and development require much more than just expansionary aggregate demand policies, because of the existence of other constraints including agricultural, fiscal, and external constraints, which are likely to be affected by complex institutional factors. But the importance of aggregate demand implies that growth and development can be helped by keeping aggregate demand buoyant, by the proper management of aggregate demand, and by strengthening the connections between aggregate demand and the resolution of other constraints, rather than by an excessive focus on increases in saving rates, efficiency, and general supply-side policies.

4.2. Stabilization, Financial, and Interest Rate Policies

When LDCs run into inflationary episodes or balance-of-payments problems, the standard policy advice that is meted out to them by international institutions like the (p. 583) International Monetary Fund, and by many mainstream economists, is to follow contractionary fiscal and monetary policy. Such policies involve cutting government budgets mainly by reducing expenditures, reducing money supply growth and raising interest rates. Reducing aggregate demand through these measures is expected to bring down inflationary and balance-of-payments pressures. Another policy that is often recommended to LDCs is to do away with what is called "financial repression," and to bring about financial liberalization and thereby increase saving and attract more funds into the financial sector, which are argued to have a positive effect on economic growth.

We may discuss some aspects of both these policies together because one element of them both is an increase in interest rates. Monetary contraction implies higher interest rates, and one aspect of financial liberalization is to remove ceilings on interest rates, which often has the effect of raising interest rates.

The effects of such as change can be examined by amending the basic post-Keynesian growth model with one sector of section 3 to incorporate inflation and an interest rate (see Dutt 1990–91). To introduce inflation we follow the post-Keynesian approach to inflation as resulting from conflicting claims of income, in this case between workers and capitalist firms. Assume that the money wage changes according to the equation[11] (1.25.11)

$$\widehat{W} = \xi_w (V_w - V),$$

$\hat{W} = \xi_w(V_w - V)$,

where $\widehat{W}$ is the rate of growth of the money wage, W, and V_w is the (for now exogenously given) real wage targeted by workers, and $\xi_w > 0$ is a speed-of-adjustment constant; the equation states that the rate of growth of the money wage depends positively on the gap between the real wage targeted by workers and the real wage workers actually receive, with the money wage becoming constant when the targeted and actual real wage are equal. Assume that firms have a desired markup of z_f, which implies a target real wage they wish to pay, $V_f = 1/a_0(1+z_f)$, and that, given the labor-output ratio a_0, the rate of inflation is given by (1.25.12)

$$\widehat{P} = \xi_f (V - V_f),$$

$\hat{P} = \xi_f (V - V_f),$

where P is the price level and $\xi_f > 0$ is a speed-of-adjustment constant. Since the real wage is $V = W/P$, using the equations (1.25.11) and (1.25.12), we obtain (1.25.13)

$$\widehat{V} = \xi_w (V_w - V) - \xi_f (V - V_f)$$

$\hat{V} = \xi_w (V_w - V) - \xi_f (V - V_f)$

Equation (1.25.13) implies that the equilibrium value of the real wage, at which $\hat{V} = 0$, given fixed values of all the other parameters, is (1.25.14)

$$V = \frac{\xi_w}{\xi_w + \xi_f} V_w + \frac{\xi_f}{\xi_w + \xi_f} V_f \cdot$$

$V = \frac{\xi_w}{\xi_w + \xi_f} V_w + \frac{\xi_f}{\xi_w + \xi_f} V_f \cdot$

(p. 584) The equilibrium rate of inflation can then be obtained by substituting this value of the real wage in equation (1.25.12). To introduce the role of the rate of interest, we may assume that this rate affects several parameters of the model described by the equations just noted and equations (1.25.1) and (1.25.2), noting that $V = 1/a_0(1+z)$, and that the interest rate is given, with the money supply adjusting to the demand for it due to the horizontalist endogenous money view. The demand for money includes credit, with the demand in this case reflecting credit approved by lenders as meeting their criteria for credit availability (which makes the endogenous money view consistent with credit rationing). If the interest rate rises (due to contractionary monetary policy or financial liberalization), it will have a number of effects in the model. First, it will reduce desired investment by increasing the cost of borrowing, although actual investment may increase if credit rationing is reduced. Second, it will increase the saving rate if saving is positively affected by the interest rate. Third, it will increase the markup desired by firms to cover higher costs of borrowing, which will reduce their desired real wage and, therefore, the equilibrium real wage. The effect of these changes, other things constant, will be to raise the rate of inflation (by increasing the markup desired by firms), reduce consumption demand by redistributing income toward profits and by increasing the saving rate out of profits, and very likely reduce the rate of investment, despite the increase in the profit share, because there is likely to be a fall in the profit share net of interest payments that is more likely to influence investment. Thus, contrary to what is expected by orthodox economists, in this post-Keynesian model the rise in the interest rate is likely to be stagflationary and have a regressive distributional effect. The resulting slackening of the labor market may reduce the real wage targeted by workers and thereby reduce the real wage even further, and possibly reduce aggregate demand even more. The effect of all of this may be to reduce inflationary pressures, but it comes at the high price of lower growth and greater income inequality.

Contractionary macroeconomic policies and financial liberalization, of course, have additional effects beyond the ones just discussed. For instance, fiscal contraction reduces aggregate demand by reducing overall spending and also has adverse effects by reducing government investment, thereby reducing growth and by reducing "social" spending on poverty removal, education, and health, with adverse effects on distribution, human development, and possibly growth.

4.3. Labor Market Policy

A major component of the orthodox neoclassical approach to development policy is increasing labor market flexibility. The degree of labor market flexibility may refer to a variety of things, such as the regulations governing hours of work, wages, overtime pay, and occupational health and safety, and especially, the ease of firing workers and closing down firms. In many LDCs wages in the organized sector are either controlled or regulated by the government, and orthodox policy reformers are concerned about the restrictions on employers firing workers and closing down firms, which are viewed as (p. 585) reducing profitability (by making it necessary to continue employing workers no longer required and by reducing the productivity of workers), and therefore reducing investment and growth in the economy, especially in the organized sector to which the restrictions apply. It is also argued they perversely and adversely affect those that the legislation intends to help, reducing labor demand and

wages, encouraging higher capital intensity and labor-saving technological change, and encouraging the informalization of labor. It is further argued that the protection given to labor in the organized sector amounts to pampering a labor aristocracy at the expense of the unemployed and those employed in the unorganized sector or as casual workers, who do not have such protection. Thus, in addition to reducing growth, labor market regulation can also worsen income distribution by increasing the informalization of labor, thereby reducing wages and job security and worsening working conditions, and also by increasing inequality among workers.

Taking the view that aggregate demand affects output and its growth has implications that are very different from those of the neoclassical one (see Dutt 2006). Suppose that market-friendly economic reforms exert competitive pressures (especially due to foreign competition) on firms to reduce costs, including labor costs. This can induce them to replace formal labor (which is more costly) with informal labor and contracting to the informal sector. The speed at which they can do so, however, is limited by labor market regulations, which make it costly to fire formal sector workers. Greater labor market flexibility, by allowing firms to shed workers more easily, will reduce the bargaining position of formal-sector workers and reduce wages (in relation to productivity) as well as formal employment. Workers who are fired will not find jobs easily, and with very little available in terms of government provision of social safety nets, they may lose their income and benefits for an extended period, only to find work at much lower wages and worse conditions later on. It also leads to greater competition for jobs in informal labor markets, reducing earnings in that sector as well and, to the extent that earnings in this sector affect wages in the formal sector, all of this shifts the distribution of income from wages to profits. If there is a higher propensity to save out of wages than out of profit income, this may reduce consumption, aggregate demand, output, and capacity utilization. A decline in capacity utilization, which also reduces the rate of profit, can be expected to dampen investment incentives, reduce investment demand, and reduce output and capacity utilization further, and in fact reduce the rate of capital accumulation. To the extent that capital accumulation leads to learning by doing, this can reduce the rate of technological change as well.

These results are possible, but not guaranteed. First, they are more likely if growth is wage led, but not if it is profit led, which can occur if a redistribution of income toward profits raises the profit share and this affects investment positively to offset any consumption-reducing effect of the lower wage share. Which case holds is, of course, an empirical matter. Second, if lower firing costs induce employers to increase high-wage formal employment (rather than using more low-wage informal arrangements), greater labor market “flexibility” may increase aggregate demand and hence, the rate of growth. However, the demand for formal labor by firms is likely to depend not only on the costs of firing workers with formal arrangements, but also on the expected and actual growth **(p. 586)** of output. If it is easier to fire such workers, and if this leads to actual firing when there are negative demand shocks, there will be a stronger negative impact on aggregate demand, which may reduce formal employment growth. Whether or not it will do so is an empirical matter, and empirical evidence on LDCs is not conclusive. For the Indian case, while Fallon and Lucas (1993) have shown that the effect of laws that increase the difficulty of laying off workers is to reduce the long-run demand for employees, subsequent work by Dutta Roy (2004), using more recent data, finds that job security legislations did not reduce employment growth.

Taking aggregate demand issues seriously does not prove definitively that greater labor market flexibility will have adverse consequences for the economy. But it does imply that the issues are much more complicated than the simple-minded neoclassical approach suggests. It is very possible that greater labor market flexibility reduces employment and wages of formal sector workers, reduces informal sector wages, worsens income distribution, and also has an adverse growth effect if we take into account the aggregate demand effects of these policies. Ignoring such issues, as is done in the debates of labor market flexibility and labor reforms more generally, is likely to lead to serious policy mistakes. The aggregate-demand view implies that it may be much more prudent to generate higher growth by improving conditions for unorganized workers. Not only will this have the effect of boosting aggregate demand, but it can do so without necessarily raising labor costs in the organized sector, which could reduce growth if in fact the profit-led regime discussed earlier prevails.

4.4. Trade Policy

A major element of orthodox policy advice given to LDCs, for instance as a central feature in the World Bank’s structural adjustment programs, is the policy of trade liberalization through the removal of quantitative restrictions of, and reduction of tariffs on, imports. Trade liberalization, it is argued, improves the intersectoral allocation of

resources by removing trade policy-induced distortions and reducing distortions due to imperfect competition, and increases production efficiency by encouraging competition between firms, thereby increasing overall efficiency. Trade liberalization, it is also argued, has the effect of allowing LDCs to increase their exports of labor-intensive products, increasing wages, improving the distribution of income. Many economists have interpreted the empirical evidence—using both econometric and case study methods—to imply that trade liberalization has the effect of improving economic growth, income distribution, and economic performance in general.

The theoretical analysis and the way the empirical evidence is interpreted usually follows a neoclassical approach, often making the Heckscher-Ohlin-Samuelson (HOS) assumptions of full employment, perfect competition, constant returns to scale, and balanced trade. Recognition of the relevance of aggregate demand implies that we depart from at least the assumption of the full employment of labor and possibly other resources. The relevance of aggregate demand affecting output and its rate of growth (p. 587) has a number of implications for trade policy. First, if output is demand determined, and trade liberalization increases imports and does not increase exports sufficiently (through lower price of intermediate goods imports and greater efficiency in general), the reduction in net exports will have the effect of reducing aggregate demand and resource utilization, and as a result, slow down growth. With unemployed resources, the workers who lose employment in import-competing sectors find it difficult to obtain employment in other industries for which demand is deficient. In particular, the unemployed resources are not automatically redeployed in exporting industries, as in the traditional orthodox trade theory approach. Exports, of course, can increase due to greater efficiency, and higher imports allow higher export production at more competitive costs, but to the extent that exports use imported intermediate goods, there may be limited value added and aggregate demand effects. Second, lower growth may slow down Verdoorn-Kaldor-Arrow learning by doing and productivity growth effects and render the economy less competitive, exacerbating the balance-of-payments problem. These macroeconomic effects may overturn whatever microeconomic efficiency gains we may expect from trade liberalization. Third, recognizing the existence of unemployment due to deficient aggregate demand implies that it is possible for countries to pursue export promotion policies while maintaining import protection, increasing exports, and reducing imports at the same time. This is not possible in a two-good, full-employment model with balanced trade, as is used in the HOS approach, in which promoting both exports and imports at the same time merely leads to offsetting incentives that cancel each other out, making it similar to the case of no trade interventions, missing entirely the positive role trade intervention has played in countries such as South Korea and Japan (see Chang 2008). Fourth, the importance of domestic aggregate demand implies that it may be important to increase production levels to reap scale economies, both for secure markets (not affected by international fluctuations) and to build up export markets (which may require prior learning by doing). Large economies like China and India may find it easier to reap such advantages to generate enough aggregate demand, but such benefits may elude small economies with small domestic markets. To prevent such problems, forming trading blocs with neighboring LDCs may be called for. Finally, we need to examine trade liberalization issues in conjunction with other macroeconomic issues that affect trade, including the balance of payments, exchange rate policy, and capital flows. For instance, to the extent that trade liberalization is accompanied by the liberalization of capital flows and the exchange rate is allowed to float, exchange appreciation due to capital inflow surges can erode whatever improvements in competitiveness that trade liberalization brought about and result in sharp fluctuations in capital flows, an issue to which we now turn.

4.5. Policies about International Capital Flows

Orthodox economists usually recommend policies that ensure that international capital flows freely across national borders. The stated benefits of such policies is that they (p. 588) will increase capital flows into LDCs and increase output and its growth and will allow an enhancement in social “welfare” through consumption smoothing, by allowing borrowing when output contracts and repayment when output expands. Unfortunately, these benefits have by and large been elusive. For many periods of time the inflow of foreign capital from developed countries to LDCs has been small or negative, and capital inflows have proved to be generally procyclical rather than countercyclical. While these empirical findings have been explained by a variety of approaches, including new Keynesian ideas of asymmetric information, post-Keynesian analysis in terms of fundamental uncertainty (as opposed to risk) and the role of aggregate demand is particularly enlightening in explaining the facts and in developing suitable policies for financial capital flows.

The larger number and importance of underlying factors creating volatility and uncertainty in LDCs (for instance,

due to the existence of many constraints between which economies can switch, as discussed earlier), and the presence of less reliable institutions and norms that can reduce uncertainty and cushion its effects, can go a long way in explaining why the expected capital flows from rich to poor countries does not materialize when capital markets are liberalized in the latter. As stressed by Keynes and the post-Keynesians, in the presence of fundamental uncertainty investors and wealth holders form expectations by following conventions, such as following the lead of others, which gives rise to herd mentality, and such conventions and expectations are likely to be subject to large changes in reaction to new information. At certain times business optimism is high, and that makes firms invest more, and this expansion leads to an increase in aggregate demand that further fuels investment, which is possible because, unlike the outcome predicted by the neoclassical full employment model, the economy has unemployed resources. As the expansion proceeds, firms may lose their confidence, and investment is curtailed, resulting in a reverse process of contraction and rising unemployment. Stock markets, in which asset holders try to guess what others believe, as in Keynes's famous beauty contest analogy, add to the instability. Keynes's ideas have been extended and refined by post-Keynesian economists, most notably Minsky (1982), who analyzed how the expectations of firms as borrowers and banks as lenders would interact. During the expansion firms borrow more, and this leads them to become more indebted. Increased indebtedness leads lenders and borrowers to perceive greater risks, which leads lenders to increase the interest rate and borrowers to cut down on borrowing and investment. This decline in investment reduces aggregate demand in the standard Keynesian manner and results in a decline in profits that, along with the increase in interest rates, leads to a downward spiral. Matters can be exacerbated when funds flow into real estate and stock markets. Herd mentality can lead to bubbles in these markets during the expansion, and when the bubbles inevitably burst, the price of asset (including those serving as collateral) tumble, which aggravates the financial positions of borrowers and lenders, leading to sharp reductions in lending and economic activity, as well as to bankruptcies (see, for instance, Harcourt 2001). Keynes and Minsky were mainly discussing the financial markets within advanced capitalist economies in which central banks can in principle stabilize the economy, but matters are more complicated when **(p. 589)** we turn to international markets and LDCs, because of added distance, exchange rate fluctuations, the absence of a world central bank (and the fact that the IMF often plays a destabilizing role), the small size of LDC asset markets relative to capital flows, and greater difficulties in regulating financial markets in LDCs.

The post-Keynesian approach suggests that the liberalization of capital flows and even simply improving information and prudential regulation are unlikely to significantly benefit LDCs. The need for strong countercyclical fiscal and monetary policies, which may sometimes require access to external financing, has already been mentioned. More controls on the activities of banks and other financial institutions in LDCs, including having government-owned financial institutions, may also be needed to reduce the effects of the instability of capital flows. Finally, restrictions on international capital flows—which restrict both inflows and outflows—are also desirable.

5. Conclusions

Although post-Keynesian economics has mostly addressed the economic problems of advanced capitalist economies, this chapter has argued that post-Keynesian contributions that stress the role of aggregate demand in affecting output and growth and emphasize the relevance of fundamental uncertainty are also helpful in analyzing the problems of less-developed countries. The chapter has argued that downplaying the importance of Keynesian aggregate demand issues by early development economists is not justified, especially in view of structural changes in many less-developed countries. It has reviewed some theoretical models that analyze the role of aggregate demand and uncertainty in affecting growth and distribution in less-developed countries. Finally, it has examined the implications of post-Keynesian analysis for general growth and development strategies and for specific policies including financial policies, labor market policies, and policies regarding international trade and capital flows.

We may end with three concluding comments. First, our emphasis on aggregate demand does not imply that other constraints on growth and development are not relevant for less-developed countries. In fact other factors, such as those arising from agricultural sectors and open economy considerations, are also of great relevance to these countries. However, we have argued that the role of these other constraints needs to be examined in relation to aggregate demand issues, and that they are likely to underscore the importance of aggregate demand and uncertainty. Second, the existence of great diversity within less-developed countries implies that their economies cannot be suitably analyzed using an approach that takes the view that all economies are essentially the same

(with some differences in parameter values) and can be analyzed with theories constructed for developed economies (as is the implicit view of many mainstream neoclassical economists, something that Hirschman (1981) has called the mono-economics view), but requires what has been called the horses-for-courses approach (see Harcourt 1992). Indeed, some of the theoretical approaches discussed in the chapter were initially (p. 590) developed for analyzing the economies of LDCs and then made their way into general post-Keynesian analysis. Moreover, depending on the specific conditions of particular LDCs and on the particular questions being analyzed, the approaches can incorporate issues such as the existence of additional sectors (including informal sectors), additional constraints, different international economic linkages (such as foreign direct investment), and other considerations (such as environmental issues that interact with production, growth, and distribution). Finally, this chapter, in line with much of post-Keynesian economics, has stressed macroeconomic linkages rather than more microeconomic considerations. The post-Keynesian approach, which takes seriously aggregate demand issues and the role of uncertainty, can also be used to analyze the pricing and financing of firms, as well as the decisions of individuals and groups such as peasant cultivators, informal sector proprietors, migrants, asset holders, and consumers; however, this requires careful context-dependant empirical research.

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Notes:

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(1.) Some of these issue are examined in Thirlwall's chapter in this handbook and in Thirlwall (2004).

(2.) This section draws on Dutt (1996).

(3.) The model follows Dutt (1984) and Rowthorn (1982). It cannot be claimed that this model is faithful to Keynes's analysis in *The General Theory*. Indeed, it is closer to the framework developed by Kalecki (1971), since it assumes imperfect competition, fixed coefficients of production, and class-specific consumption patterns. Nevertheless, the framework is Keynesian in the sense that it takes output and employment to be determined by aggregate demand, and it makes investment depend on expectational factors.

(4.) A self-contained informal sector may be present as well, containing some of the workers not employed by the formal industrial sector considered explicitly in the model. We assume, for simplicity, that there are no other links between this informal sector and the formal sector.

(5.) The term "period" will be used to refer to time horizons in models in terms of what variables are allowed to change in a time period, to distinguish it from the term "run," which will refer to empirical concepts of calendar time.

(6.) This follows the specification of Bhaduri and Marglin (1990), who assume that investment depends positively on the profit share, measured by $z/(1 + z)$ and the rate of capacity utilization, u.

(7.) It may also be noted that in this model the real wage is given at the level $1/b_n(1 + z)$. This undermines Dasgupta's (1954) argument, referred to above, about the incompatibility of unemployment due to insufficient aggregate demand.

(8.) If increases in the price level due to excess demand result in equiproportionate changes in the money wage, so that the real wage does not fall, the goods market cannot be cleared in the way described in the text. Investment demand may have to be rationed, and capital accumulation will be determined by saving. The model then becomes a neo-Marxian one, in which the long-period growth rate is independent of aggregate demand (see Dutt 1990).

(9.) These assumptions were not meant to be representations of the real world, but rather to see if capital-labor substitution could solve Harrod's long-run problem of the divergence between the warranted rate of growth and the natural rate of growth if aggregate demand problems could be assumed away (see Harcourt 2006).

(10.) Increases in aggregate demand will in fact result in inflationary pressures and balance of trade deficits.

(11.) We can make the rate of the money wage also depend positively on the rate of inflation, but the analysis remains virtually the same as long as the money wage does not adjust completely to price changes.

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