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Capitalist Macrodynamics

A Systematic Introduction

David Laibman

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Contents

Preface

In June 1995 I was invited to Argentina to give a series of lectures on 'Accumulation, Technical Change and Crisis in the Capitalist Economy'. The lectures, sponsored jointly by the Argentine Institute for Economic Development (IADE) and the Faculty of Economic Sciences, University of Buenos Aires, are believed to be the first appearance of a Marxist in that venue in at least 20 years.

I worried about the generality and abstractness of the topic. Marx once described the French public as 'always eager to come to a conclusion', impatient with theory and general cases. The prevailing intellectual mood on the left in Argentina, as in many countries, is similarly oriented toward policy, historical specificity, conjunctures. In 'third world' countries, moreover, this mood is enhanced by a suspicion that visitors from the Northern Hemisphere who talk about 'capitalism in general' are distilling that conception more from their own experience than from a genuinely worldwide practice.

I had, nevertheless, to play my own strongest hand; I had been thinking about 'capitalism in general' for some 35 years, and still am. Compounding the problem, I was advised that the audience would be made up of students, faculty and independently interested people, with diverse backgrounds, and that I could not assume any prior familiarity either with the terms of Marxist discourse or with the techniques of economic analysis.

Against all odds, what resulted was, by all reports objective and otherwise, quite well received. I had struggled, apparently successfully, with the problem of explaining the workings of some rather rigorous and abstract models using only intuition, supplemented with numerical examples, illustrative diagrams and other expository tools accessible to the layperson. The editors of *Realidad Económica* (a journal published by IADE) asked me to write up the lectures for publication. This short volume is the result.

My purpose is twofold. First, I hope to present, in as simple a form as possible, a classical Marxist story about capitalism's dynamics: the path of accumulation, the role of technical change and class struggle, the trends in the major macroeconomic ratios, and the incidence of cyclical (short-term) and secular (long-term) crisis. This tradition has seemed to many observers to be either obscure and irrelevant, or long refuted. I hope to show that, its many faults notwithstanding, the Marxist approach to capitalist growth and transformation is both important (perhaps uniquely so), and capable of rigorous statement and further development.

Second, I will argue that a *general* theory of capitalism (or a theory of *general* capitalism) is *alone* capable of grounding a genuine assault on social and historical specifics: differences in particular circumstances, periodization, institutional structures; the diverse ways in which capitalist reality is transmitted to consciousness and experienced by people, in the form of social movements, labor struggles, politics, national identities, culture, etc. The point will not be to 'explain away' difference and multidimensionality, but rather to incorporate these into a broader framework that shows interrelationships and enriches the study and practice of diversity. Experience shows, I think, that if we don't get the general theory right the study of specific situations degenerates into arbitrary *ad hoc* theorizing and inconclusive description.

More about the philosophical premises of this study is set forth in the Introduction. Subsequent chapters (2–4, 8) establish the conceptual tools; the elements of a simple macroeconomic (aggregative) model of the capitalist economy; and the classical theory of accumulation, plus existing critiques and defenses of that theory. I then take up the main story: my own proposal for a rigorous and defensible approach to the structure and dynamics of capitalism (Chapters 5–7, 9–11).

The Introduction (Chapter 1) explains the other premises: combination of political economics with mathematical economics, and a goal of synthesizing diverse insights that are often segregated into disjoint and warring 'schools' of Marxist interpretation. I have already mentioned the purpose of making this material, which is often available only in recon-

dite and specialized forms, accessible to any intelligent reader willing to make the same effort that Marx warned would be required of the French public.

Most of the chapters (4 and 8 excepted) do not refer directly to sources. The general background material for this exercise is the common property of the literature of classical Marxism and all of contemporary Marxist discussion (and, indeed, much non-Marxist discussion; see Chapter 11). I have chosen not to clutter the text with specific references. Each chapter has a set of 'References and Reading Suggestions' at the end. I have tried to indicate the source of any particular idea, when it has indeed been possible for me to extract a particular source from the primordial stew of extant ideas.

I have also refrained, for the most part, from quoting at length from Marx or other authorities. This carries both good news and bad news. The good news: it enables me to come directly to the point, and discourages the practice of establishing legitimacy *via* quotations that has vitiated much writing in this area. Quoting from Marx is a bit like quoting from the Bible: you can prove just about anything with enough persistence. My favorite quote from Marx is in a letter to Engels, from 1862: 'I'm writing on at the book. Am dragging the thing out, as these German dogs judge the value of a book by its cubic contents.' I think we should agree, once and for all, to decide for ourselves what is good social and economic theory, and what isn't.

The bad news, of course, is that my book gives little formal guidance to anyone who wants to know where to place my work in (or outside of) the Marxist endeavor. It is not a work of exegesis; it is a presentation of a theoretical synthesis developed over a number of years. My own view is that it is Marxist in its fundamental conception; but I have no way of proving that, and no idea what Marx himself would think of what I am doing, were he still alive. Non-Marxists who like any of what they see here, but have doubts about whether it should properly be called 'Marxist', are sincerely and urgently invited to make use of the parts they like, without worrying about labels (which we may safely leave to future historians of economic thought).

So, here it is. If anyone finds some of my argument useful, and seeks to build upon its foundations, I will be well satisfied. In the present period of doubt and reassessment on the left, I am more convinced than ever of the inhering vitality of Marxism; of the need for a unified theoretical framework, and for its continuing transformation along lines that are rigorous in both the political–economic and quantitative senses; and of the vital role of work on the theory of capitalism in shaping real movements for alternatives that are worthy of our human potential.

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D.L.

1 Introduction

Recent decades have witnessed a return of capitalism triumphant, in both the developed industrial north and the 'third-world' south.

In the United States and Western Europe, the working class had taken the offensive following the Great Depression of the 1930s and the Second World War – as seen in gains made in industrial union organization and a range of social legislation, from unemployment compensation to various forms of public assistance and compulsory government-run pension plans, to environmental regulation, subsidized heath care, outright nationalization of basic industries (in some countries), and so on. The social-democratic welfare state was an outcome of popular pressure, but it was also to some extent a strategic response to the socialist states of the East, which, despite their authoritarian political cultures and many other deficiencies, did provide their working populations with a degree of stability, security, participation and social equality hitherto unknown.

With the return to normal reproduction in the 1950s, the capitalist ruling classes – which of course had never actually been dislodged from power – have steadily worked to restore their previous hegemony. The percentage of workers organized in labor unions has declined in most countries. Perhaps more important, the capacity of labor unions to act independently on behalf of their members has been eroded by their ever-deeper incorporation into the legal and political structures of regulation, through 'enabling' labor legislation and the governmental structures erected by that legislation. (This is especially true for the United States.) The social-democratic infrastructure has been eroded in most countries. Attacks on the 'social wage' have taken a variety of forms, and have proceeded at different paces; in general, however, there has been a slow return to the classical dynamics of capitalist accumulation, based on the insecurity and market-based dependency of the working class.

The gradual restoration of the classical conditions and structures of accumulation has opened space for new surges of capitalist development in parts of the 'third world'. Paradoxically, the 'second world' of the Soviet Union and the socialist bloc in Eastern Europe and Asia may have provided, both through trade and technological assistance and through political support, the space needed for previously subordinate capitalisms to enter a phase of independent development. It remains to be seen how unequal levels and rates of development in the post-Cold-War world will affect the outcomes of new forms of inter-capitalist rivalry.

The shifts in political and economic power have, of course, been accompanied by ideological transformations as well. Marxism, having been largely removed from its earlier position of influence in the labor movement and other social spheres, has taken refuge in the academy. There, under intense intellectual pressure, a certain fragmentation has taken place, as the formerly unitary Marxist world view has conformed to the disciplinary specializations; thus we have 'Marxist sociology,' 'Marxist economics', and so on. The unifying generalizations of historical materialism have also come under continuous fire, as Marxists have retreated to more 'defensible' positions. Thus, in one recent study influenced by the rational choice paradigm of 'Analytical Marxism' (Wright *et al.*, 1992), the authors distinguish between 'orthodox' and 'weak' versions of historical materialism, with a clear preference for the latter; they nevertheless eventually opt for the *even weaker* 'Marxist class analysis,' which makes no claims whatsoever regarding any general principles or ultimate direction of social evolution.

Among 'Marxist economists', the same pressure has resulted in a proliferation of schools. Some of these pick up a particular insight from Marx's work and develop a theory of capitalist crisis based on that idea. We then have a variety of alternate, and presumably incompatible, theories: falling rate of profit, profit squeeze, underconsumption. Others have attempted to rework and reexamine Marx's theory using modern mathematical methods. In some cases, often as a result of assumptions that are not inherent in the

methods themselves, the conclusion is reached that Marx's positions cannot be sustained by rigorous investigation, calling into question the attempt to defend and develop any theory that posits inherent critical tendencies or structural obstacles to continued economic growth in a capitalist form.

Still others abandon the attempt to theorize capitalist growth and crisis within a unitary framework, and concentrate instead on new approaches to periodization: the identification and description of stages in the history of capitalist development. The main contenders in this field are the French 'Regulation' school, and the US-based 'Social Structures of Accumulation' approach. An enormous variety of stages, and datings of stages, has been proposed, based on a series of labor-process, state, or other institutional factors: Fordism, mass consumption, extensive vs. intensive technological development, the postwar capital – labor accord, and many others. It is singularly unclear whether the stages proposed are for capitalism in general, or for particular historical conjunctures (in most cases, the United States or Western Europe). There appears to be no basis for agreement concerning the timing of the various stages, or the number of stages, or the principles regulating the transition from one to another. The new periodization theories thus provide a useful workup of historical material, and at times carry out valuable statistical tests on data from the countries under study, while failing to offer any means of synthesizing or theorizing; the exercise becomes essentially descriptive, and does not address those aspects of different stages and/or conjunctures that express the common features of capitalist development. Indeed, it becomes unclear whether it is 'capitalism' that is being periodized; the relation to Marxism of some participants in this process, especially among the Regulationists, has become quite attenuated.

Against this background, I will state three general methodological preferences that motivate the present study. I will not try to defend these in detail in this Introduction, but rather leave it to the reader to judge their validity on the basis of the theory emerging from them in subsequent chapters.

1. It is time for the pendulum to swing back to the study of the *general theory* of capitalist development. The ingredients are to hand for new breakthroughs in this study, which can illuminate the general nature of capitalism, and also serve as a foundation for the analysis of particular stages and settings (conjunctures) displaying the general features of capitalist accumulation in historically specific forms.

2. A creative unity must be sought between the tradition of political economy, on the one hand, and the tools and categories of mathematical economics, on the other. The use of formal models means we can know, with reasonable (not absolute) certainty, that arguments derived from the classical political–economic understanding – antagonistic production relations; valorization, exploitation and alienation as central attributes of capitalism; and the forms of accumulation, competition and crisis to which these give rise – are indeed free of logical error and ambiguity. The careful grounding of formal models in political economy, in turn, can guarantee that conclusions are not casually derived from the formal properties of mathematical systems; that *methodological* constructions, such as equilibrium states, do not degenerate into projections of *ontological* (factual) properties onto the socioeconomic system under investigation. In this way, a middle path can be charted, between a fetishistic formalism that deconstructs the original object of study, on the one hand; and an obsolete and unconvincing fundamentalism, on the other.

3. I take it to be a necessary feature of a successful general theory that the several different aspects of Marx's original theorization are brought together into a single, synthesized account of capitalist accumulation. As against the view that the goal should be to single out and 'perfect' one or another 'theory' of crisis (for example) to be found in Marx, my understanding posits that each of these separate propositions – the capitalism–specific path of mechanization, the evolution of the antagonistic class relation (class struggle), the problem of realization (sale) of commodities, transformations arising from concentration and centralization of capital, among others – constitutes a valid strand that must be woven into a single cable: the general theory of capitalist accumulation. In fact, to

continue the analogy, the strength of the cable will depend on the presence, and interaction, of all the various strands. Needless to say, successful integration of these strands requires much more than a mere eclectic juxtaposition of the separate elements.

In this book, I will try to set forth the proposed outlines of a general theory in a manner that is both rigorous, and accessible to the layperson. For the complete mathematical statement of the model of accumulation and crisis the reader is referred to an earlier work (Laibman, 1992). The statement of the argument here, however, will be quite complete, and will require no mathematics beyond the most elementary algebra, plus the ability to work through numerical examples and a few graphical representations.

I will refer to various alternative approaches to the theory of capitalist crisis at various points throughout this study. The emphasis here, however, will be on the development of my own argument, rather than on detailed presentation and criticism of others. My general assumption regarding the alternative views to be found among Marxists and other critical investigators is that any coherent theory has a role to play in the overall picture; each theorist is 'onto something', as we say – somewhat like the proverbial blind men and the elephant. The goal is to find the overall anatomical structure linking trunk to legs to tail, and so on.

I do believe that the synthesis outlined in this essay is the most rigorous formulation of a general theory of capitalist accumulation that has ever been proposed. It is, of course, incomplete, as will become patently clear in the concluding chapters; some of its elements are more in the nature of proposals than completed work. If the foundation is solid, however, it should point the way toward further investigations. I am convinced that without a new assault on the general theory, the conjunctural studies and efforts at periodization will not by themselves provide a firm basis for a political movement that targets the central aspects of capitalist power on a world scale, or focuses the energies of popular struggles into a deepening vision of a humane alternative.

REFERENCES AND READING SUGGESTIONS

Good general surveys of postwar first-world capitalist development will be found in Glyn and Sutcliffe (1972); Armstrong, Glyn and Harrison (1984). McDermott (1991–2) provides a useful discussion of the institutionalization of trade unions and undermining of working-class independence, especially in the United States.

Wrigh *et al.* (1992) exemplify the 'weakening' trend with respect to Marxist theory. Among crisis theorists, Itoh (1978) stands out for his clear preference for perfecting a single strand in the theory of crisis, rather than seeking a synthesis. My own quest for a synthesis owes much to non-Marxist Martin Bronfenbrenner (1965). The modern mathematical Marxist school may be represented by Roemer (1981), and Abraham-Frois and Berrebi (1979).

For the French Regulationist school, see Aglietta (1979); the Social Structures of Accumulation approach will be found in Gordon *et al.* (1982) and Bowles *et al.* (1983). A good summary and comparison of these approaches is Kotz (1990). A typical statement of the earlier 'state-monopoly capitalism' view may be found in Pevzner (1984).

2 A Conceptual Framework

Our attention in this study will be focused on the dynamics of accumulation: the role of mechanization and technical change; the relationship among, and trends of, the major macroeconomic proportions; the source and nature of cyclical behavior and crisis. It is important, however, to begin by emphasizing that these accumulation dynamics are dynamics of *capitalism*. The term 'capitalism' is often used loosely, at times giving the impression that a precise definition is not essential to the argument. In fact, the term is sometimes used as an epithet, to be applied to any reality one wishes to condemn; this is certainly the case with 'radical' characterizations of the former Soviet Union as 'state capitalism', which portray capital as a disembodied evil that can occupy any social form at will.

Capitalism is an advanced – arguably, the *most* advanced – exploitative mode of production. Exploitation is a complex, and central, concept; it occurs whenever there is a significant transfer of labor, or the products of labor, on a social scale, from one class to another, under conditions of antagonism and oppression. In a capitalist society, by contrast with earlier exploitative societies, this transfer takes place mainly (in the pure form, entirely) through commodity production – that is, through exchange of goods and labor services on spontaneous markets. A central insight of historical materialism stresses the connection between forms of exploitation and levels of technological development. When the human interface with the surrounding natural environment – the 'forces of production' – has reached a level at which society's existence and further development are incompatible with any form of direct, forcible subjugation of the producers, then the social structure – the 'relations of production' – comes to assume the indirect form of relations among commodities. Market exchange, which existed for thousands of years on the margins of the core production relations and supplemented those relations, now moves to center stage as the organizing form of economic life.

Without entering into the details of the current debate about the nature of capitalist exploitation, I will simply posit the importance of *valorization* of social relations, especially the relations of exploitation, for the existence and reproduction of the capitalist power to exploit. The term 'valorization' applies when human interconnections take on the outward form of relations among commodities, that is, the form of values. Social realities thus wear a costume, and appear as impersonal market forces. This process, central to Marx's discussions of fetishism and alienation, also makes the power of capital abstract, thereby guaranteeing and reinforcing that power. The abstraction of social relations accomplished by means of valorization becomes both necessary and possible when a threshold in the development of the productive forces is crossed; capitalist exploitation then comes to replace earlier, and more obvious, forms of exploitation.[1]

One may prove abstractly that transfer of labor can occur on the basis of differential ownership of productive assets, assuming the existence of competitive markets, without the purchase and sale of labor services or coercion at the point of production. This, however, fails to account for the legitimation of property relations in general – for the social process that sanctions the assumed differential ownership of assets. Ownership – especially differential ownership – requires sanctions, in the form of military power, legitimating ideologies (including religious ones), or some social process in which all members of society participate and which makes the distribution of assets appear 'right' and 'natural'. The commodity form of economic activities and relations, and the associated independent, individual ownership of commodities, provide the necessary legitimating social process. As Marx long ago explained, relations among people take the form of relations

1. In a brief introductory statement of these principles, there is a danger of implied oversimplification. In particular, evolution of production relations to more progressive form *never* takes place 'automatically', in the absence of human struggle, consciousness and action. It does not even take place 'inevitably', in the sense that it *must* happen in any given place, or within any given period of time – or, indeed, at all. The historical materialist correspondences only indicate required directions of change that will have to emerge eventually from some particular circumstances and histories, *if* further development is to occur.

among commodities. Goods are 'worth' a certain amount and have power to command other goods – properties that appear to 'belong to' the goods themselves – when in fact these properties are masks, outer forms adopted by inner social relations. When this process of valorization is combined with the prior accumulation of productive assets by a minority of private individuals sufficient to function as capital, the force of exploitation – the social process enabling alienation of labor and products from one class for the enrichment of another – appears also as a 'natural' property of things. Without this singular mystification of exploitation, the differential ownership on which the transfer of labor is based would be undermined; exploitation, if it were to continue, would have to revert to cruder forms that are ultimately incompatible with the high level and rates of development of production associated with capitalism.

Capitalist exploitation therefore 'occurs' in the fact of the original accumulation of capital ('differential ownership of productive assets'); in the coercion of labor at the point of production; and in the market forms taken by both goods and elements of production (including the all-important human element). The last of these, captured by the term 'valorization', is essential for the first two, which in turn reinforce each other.

The valorization of the key element in production, labor power, is never complete, owing to working-class resistance against the tendency of capitalism to subject workers completely to the blind laws of the market. Since the cost of reproduction of labor power is inherently variable, labor power is the only commodity whose *valorization* is simultaneously its *devalorization*: to appear as independent commodity owners, workers are invested with a considerable degree of autonomy and self-awareness (in comparison with subject classes in precapitalist societies); this individuation, or independence, is the basis for the challenge they raise to the 'market"s definition of the value of the commodity they sell.

Markets for commodities in general have central benchmark configurations: prices gravitate toward centers, even as fortuitous events continually push them away from those centers.

In a *methodological* construction called 'equilibrium', in which the gravitation process is allowed to proceed on the basis of unchanged underlying determinants, market prices are always converging toward their centers, or equilibrium positions. This methodological conception in no way denies the fact of continual disruption of equilibrium and crisis in the actual working of capitalist economies; we need never assume that prices actually reach their equilibrium targets and remain there in some perpetual tranquil state. The underlying determinants of the equilibrium centers not only change continually; they may change catastrophically, pushing actual prices away from their centers. The methodological equilibrium price concept does reveal properties of price (and other) structures that are immanent in and underlie complex and changing realities, and serves as a platform on which dynamic theory revealing the tension and contradiction of the real world can be constructed.

The price of labor power, however, is crucially different, for reasons explained above. Even on the methodological plane, there is no tranquil position for this price, and for the associated distribution of the net product of labor between the part returned to workers as payment for their labor services (labor power), and the part appropriated as surplus value (return to property ownership). The wage rate or share, and the associated *profit share of the net product*, are *complexly determined* variables. They are not stable (let alone simple) functions of any other quantitative magnitudes; rather, they reflect the balance of class forces governed in part by historical, cultural, psychological and ideological variables. Of course, complex determination of the profit share in capitalism is also *conflictual* determination, the outcome of prior and continuing class struggle. It may be noted in passing that, since the benchmark prices of commodities in general – Marx's 'prices of production' – are partly determined by the level of the profit share, a complex-determination element enters into *all* equilibrium prices (and out-of-equilibrium market prices as well). 'Equilibrium' in general clearly has a different meaning in this framework from the one assigned to it in conventional free-market economics.

Since capital takes the form of commodities, its movement must take the form of competition among capitals. Capitalist competition is a specific social form of competition, which plays a central role in the theory of capitalist accumulation and technical change. The conflictual determination of the profit share, and rate (see Chapter 3 for precise definitions) lends an urgency to *capitalist* competition that is absent from the abstract notion of competition found in textbooks. Capital-in-general can only exist in the form of *many capitals*, in incessant struggle for dominance and survival. Capitalist competition takes the form of efforts to achieve superior forms and rates of exploitation, superior growth rates of productivity, and superior scale and market shares. (It also takes distinct financial forms, as we will see later.) In a word, competition among capitals imposes a stern necessity: the *accumulation of capital*. High and successful rates of accumulation enable individual capitals to survive and grow, at the expense of other capitals (directly or indirectly). Accumulation thus involves combination and merging of capitals as a central tendency (although in some periods, capitals may undergo a secondary process of fragmentation as well).

A final implication may be stated: if capitals need both high productivity and large scale in order to survive, technical change will be embodied in new generations of capital goods working alongside older ones. The decision to scrap older generations of equipment is, like many decisions in the capitalist environment, a strategic one. Given the scrapping decision, however, a typical capital will be composed of component capital stocks embodying different productivities and degrees of mechanization, as well as differing qualitative characteristics (for example, the specific properties of goods produced; the effect of the technological regime on the labor process).

We have identified accumulation as a central moment of the capitalist process. The term has a double meaning. It signifies growth in the size of individual capitals, both internally through reinvestment of profits and externally through financial arrangements and takeover of unsuccessful capitals. It also means continuing accumulation of the power of capital,

to exploit and to grow, in the hands of private capitalists. All aspects of class reproduction in capitalist society must be brought to bear on the central question: at what rate is capital accumulated? Leaving aside financial accumulation for the moment, accumulation is based on the reinvestment of a certain share of profits. What determines the share of accumulation in total profits, or the *accumulation ratio*? I will defer the answer to this question until a later chapter, except to indicate here that a certain level of capitalist consumption, or consumption out of profits, is essential to class reproduction and not merely a by-product of the accumulation decision. Capitalist consumption must support upper-class lifestyles: these serve to symbolize ruling-class power, and to provide the structure through which talented individuals from lower classes and intermediate strata are motivated to rise into higher social ranks and imbued with the required social and political attitudes.

Given the necessity for levels and qualities of consumption that can only be achieved on the basis of property income, and an accumulation ratio therefore less than unity, it is clear that a high rate of accumulation operates in normal periods as a competitive necessity for individual capitals that wish to survive (and we may assume that they all do). The accumulation ratio, then, like the profit share, is a complexly determined variable. It will not emerge as the dependent variable in a stable function of other variables; rather, it is the outcome of a Faustian conflict between the drive for accumulation and the need for consumption, governed in a subtle way by a number of historical, cultural and ideological factors.

I referred above to technical change, and may now state the obvious: given the imperatives of capitalist competition, technical change, like accumulation, is a driving necessity for individual capitals, and therefore central to the motion of a capitalist economy. This means, of course, that capitalism is inherently dynamic, in the sense that it enforces continual transformations in productive power, in a systematic way not achieved by earlier modes of production. It also means that capitalism imparts system-specific qualities to the path of technical change. The topic of technical change is of such

central importance in the theory of accumulation that it has its own chapter (Chapter 5).

Theories of capitalist dynamics may be ranked along a continuum, ranging from least ambitious at one end to most ambitious at the other. Starting from the former: the market process is thought to give rise to cyclical behavior, disproportionality, deficiencies of effective demand, financial crises, and so on, all of which are due to imperfections in the market mechanism that can be ameliorated by timely and effective public intervention. This, of course, is the Keynesian agenda. It has also appeared in Marxist discourse, in the form of the proposition that concentration of capital has as its endpoint a super-centralization of capital in a single unit of control, superseding the competition of individual capitals and the instability resulting from that competition.

Moving along the spectrum, we encounter theories suggesting that cyclical crisis, and/or long-term stagnation, are inherent and necessary in capitalist economies, and *not* ultimately amenable to government intervention. This level of argument suggests that capitalism produces, as an *inevitable* by-product, a range of undesirable outcomes: unemployment, poverty, cyclical distress. When this fact about capitalism is learned by a significant proportion of the population, the political will may emerge to replace capitalism with a superior system. Provided, however, that we are willing to put up with its deficiencies – perhaps because we are convinced that the deficiencies of any other socioeconomic system would be worse – it can continue indefinitely; there are no long-term obstacles or structural barriers to the continued existence of capitalist social relations.

An argument that builds on the central premise of historical materialism, however, must go one step further. Even with the protective shield of valorization in place, further development of the productive forces, especially in the forms dictated by capitalist production relations, presumably comes into increasing conflict with those relations. Imagine a point at which significant increase in human productive power is no longer consistent with the capitalist forms of incentive, motivation and control over labor. The continuing accumula-

tion of capital must imply *progressive worsening* of crises, *increasing* inability of capitalist society to reproduce itself. This is in fact implied by a dynamic view of the impact of recurring crises: crises that are statically cyclical have effects that can be anticipated, and averaged over the course of the cycle. Crises that recur without increasing severity, therefore, would over time cease to play their assigned role in capitalist reproduction: they would not 'hurt'; therefore they would not serve to restore conditions for a new phase of accumulation (by disciplining workers and by shaking out the most inefficient capitals); they would, in a word, become 'nonreproductive.'

We have arrived at the ambitious end of the continuum, and it is at this end that I would like to stake a claim. In the chapters that follow, I will try to lay foundations for a theory that reveals *deepening* crisis in the necessary inner structure of capitalist society. I will not suggest that this deepening process takes place 'automatically' (see footnote 1 above), or in the same way at all times and in all places, or that some sort of mechanical breakdown is implied. I will suggest that the nature of the capitalist system imposes the task of replacing that system on the social forces able and willing to do so, with ever greater urgency.

The argument will be built up around three central concepts, and I will end this chapter with preliminary definitions of these concepts.

First, accumulation sets into motion *immanent critical tendencies*. These, as their name implies, are necessary trends that generate crisis potentials, which in turn are activated in cyclical form, and, eventually, in structural form.

To grasp the structural limits surrounding a process of accumulation in which a given critical tendency is operating (for ease of expression I will drop 'immanent' from now on), I will suggest that the tendency must eventually encounter a *barrier*. This is the second of the central concepts. The nature of the barriers ultimately limiting a given critical tendency is an important open topic; the answers already available, as we will see, provide good provisional answers to the crucial question, why can't capitalism go on forever?

A given critical tendency may come up against more than one barrier, and, as the plural above implies, there may be more than one critical tendency. The final concept in the sequence is the location, or *site*, of each of the critical processes (consisting of a tendency and the barriers encountered by it). There are, in fact, multiple sites at which these processes may operate; examples are the point of production (the workplace), the sphere of consumption and social legitimation, and the financial markets.

We have, then, multiple sites, at which immanent critical tendencies and their associated barriers are at work. A comprehensive view of the overall critical process, therefore, must develop the interrelations among the several sites and processes. I believe that a comprehensive analysis of this kind can potentially provide solid ground for efforts at periodization. Suggestions of this kind will be offered, although a warning must be stated: this project is open at the back end, and the reader must not expect full closure! (Of course, in the spirit of this sort of inquiry, full closure would not even be desirable.)

While we will eventually arrive at a point where all of the critical processes and sites can be brought together, it will be useful to set the stage by concentrating on one critical tendency, much debated in the literature: the process of technical change, and the trend in the rate of profit. To this end, the next chapter will introduce a simple macromodel of the capitalist economy. We still have a long way to go.

REFERENCES AND READING SUGGESTIONS

A good discussion of the definition and characteristics of capitalism is Heilbroner (1985); better, I think, on the 'nature' than on the 'logic' of capitalism, and also very strong on the problem of periodization. The modern debate on exploitation owes much to Roemer (1982). For a simple and powerful discussion of the relation between value and exploitation, see Sensat (1979). A useful critique of the 'Analytical Marxist' view is Lebowitz (1988). The classical reference on the class

struggle and the value of labor power is Marx (1971). For a strong statement of the need to (re)incorporate the autonomy and agency of the working class into Marxist political economy, Lebowitz (1992).

For a contrary view on capitalism and forms of property, see Bettelheim (1976). The dialectic of the individual capital and capital-in-general is explored in Weeks (1981); this book is also an excellent guide to Marx.

Disproportionality theories are examined in Sweezy (1956); this book is, more than 50 years after its first publication, still the best introductory guide to Marx and the early Marxists. The inherent-but-not-intensifying position is well stated by Clarke (1990–1). The concept of crises or cycles becoming 'nonreproductive' is based in Marx (what isn't?), but is first stated in this form in Gordon *et al.* (1983).

3 A Simple Macro Production Model

Our task now is to define the elements of a model, which can represent production, exchange, distribution and consumption, in their capitalist forms, in the most simple and general way.

To this end, we will adopt the 'macro' view, in which the entire output of the economy is represented by a single good. We will want to keep track of the distinction between the capitalist unit of control – Marx's 'individual capital' – and the aggregate level of all reproduction activity in the economy – 'capital as a whole', or the 'social capital'.

Since we are abstracting from the fact that output takes the form of multiple goods, the intermediate level of sectors or industries is not represented in the basic model with which we begin. We will not want to forget, however, that all output takes the form of commodities, which must be sold – their value realized – in order for systemic reproduction to take place. For some purposes, therefore, we will work later (Chapter 9) with a more disaggregated model, in which price ratios, or exchange values, between two or more commodities can be represented explicitly. At the outset, we have a single, all-purpose commodity, which can be added to capital stocks, or consumed (by workers or capitalists). The concept of labor value, explained below, will enable us to represent value magnitudes as quantities of social labor, which can be compared with the corresponding physical quantities, even in this highly aggregated, austere atmosphere. Moreover, if desired, the value magnitudes may be represented as quantities of money – in effect adding a money commodity to the single all-purpose commodity that is produced, exchanged, distributed and consumed – by means of a coefficient relating the amount of value to be circulated to the quantity of the money unit available. This lends the discussion an aura of realism; it is only an aura, however, and I want to emphasize that the 'pure' macro abstractions, if handled with intelligence and purpose, are

quite acceptable as representations of the core reality of capitalist economic relations.

Our economy may have only one good, but it necessarily has two social classes: capitalists and workers. The heart of the production process, controlled by capitalists, is the performance of labor by workers; we represent the *flow of living or current labor* as L. In this discussion, the heterogeneity of labor – its division into grades of skill, or segregation into segmented markets based on nationality, or race, or gender – will be ignored. Our capitalist economy, in effect, has realized one of its inner tendencies: to reduce all labor to interchangeable parts of a single, homogeneous social labor available for redistribution and exploitation as required by the shifting, and growing, needs of capital.

The flow of living labor, L, is measured in a single period of production: perhaps one week, or one year. The output of the same period, also a flow, is Y. All production is measured by the period chosen; any complications arising from the fact that certain commodities may have production periods with distinctive time characteristics (for example, agriculture) may be ignored, especially in the one-good macro world of our model. The industrial revolution has taken place, however. Production uses both labor and fixed capital goods (machines), and these last longer (usually significantly longer) than the period of production. From the standpoint of that period, therefore, physical capital takes the form of a *stock* of the all-purpose good; this stock is represented by K.

The production process begins with the stock of capital accumulated by the capitalists, which is combined, under the capitalists' control, with the flow of living labor performed by workers. This results in a flow of output. The entire process may be represented as follows:

$$K, L \rightarrow Y \tag{3.1}$$

The reader will notice that all physical inputs in production are included in K. If there are material input *flows* as well as capital *stocks*, and indeed if the depreciation of the capital stocks must be represented as a material flow (unless the fixed

capital goods last forever), we would want to add the material input flow M to the picture:

$$K \parallel M, L \rightarrow X \tag{3.2}$$

where the double vertical bars separate the stock from the flows. Notice that X has now been used for output; X is *gross* output, now distinguished from *net* output, $Y = X - M$. Define the production system's *input–output coefficient*, $a = M/X$. Note that a must be less than 1 for production to be viable. We can then move the representation of the material input flow from the left side of the production arrow to the right side, interpreting K and L as the quantities of capital stock and labor, respectively, used in the production of the *net* product:

$$K \parallel L \rightarrow X - M = Y = X(1 - a) \tag{3.3}$$

Finally, the entire production relation may be divided by $(1 - a)$ (a number less than 1), forming *larger* quantities of capital and labor:

$$\begin{gathered} K\frac{1}{(1-a)} \parallel L\frac{1}{(1-a)} \rightarrow X \\ K' \parallel L' \rightarrow X \end{gathered} \tag{3.4}$$

These larger quantities are the *direct-plus-indirect* capital stock and labor flow, K and L, needed to produce the gross output X, adding to the original quantities K and L the amounts needed also to produce (replace) the material flow M. In this way, the simple relation (1) can be interpreted as indirectly expressing material input flows as well as input (capital) stocks. (Note that L' is Marx's 'direct-plus-indirect labor', and L'/X the unit labor value of output.)

We will want, however, to interpret the output in net terms, so that its distribution as income to the two major classes can be studied. For present purposes, therefore, it may be wise to continue with the simpler conception represented by (K, L, Y), where Y is the net output of the economy, imagining a 'pure fixed capital' case without material input flows or depreciating

capital stocks. To make sense of the complexities of capitalist (or any other) economic reality, we always have to resort to heroic abstractions; the only question is, which ones?

The real output of the economy is divided between the two classes. Workers receive an aggregate real wage, W, and capitalists appropriate real profits, P. These sum to the total output: $W + P = Y$. Here, and in what follows, we will be representing the central relation of exploitation and its outcome – the payment to workers of a sum of value equal to the value of the labor-power purchased, and the forcible appropriation of a surplus value through workplace domination, valorization, and differential ownership of property (see Chapter 2) – in the prosaic terms of 'distribution' of Y into W and P. The simple accounting identity $Y = W + P$ can of course be read in 'vulgar' (everyday) terms, or it can be used in the framework of a deeper analysis of capitalist relations of production. The connection between the value forms and exploitation is a matter of continuing controversy, which is not under study here; a classical Marxist stance is in effect being assumed. My point is only that, against the interpretation held by some writers, there is nothing in the simple macroeconomic income identity $Y = W + P$ that *prevents* its use within a Marxist, as opposed to Ricardian or Keynesian, framework; further, there is no reason for Marxists not to use it, assuming the underlying basis of the outward economic categories in capitalist production relations is kept in mind.

With these preliminaries in hand, we can define the three main ratios, in whose terms the capitalist accumulation process may be described. First, the balance of class forces is expressed in the determination of the value of labor power – that highly unique commodity – and consequently in the proportions in which the net product of the workers' labor is divided into the portion returned to the workers and the portion appropriated by the capitalists. Define the *profit share* of income or product:

$$\pi = \frac{P}{Y} \tag{3.5}$$

This ratio represents the power of capitalists to exploit – to appropriate a portion of the product as property income. It has a logical minimum of 0 and a logical maximum of 1, although in practice it will be confined within much narrower limits.

π can be written as $(P/W)/[(W/W) + (P/W)]$, or $\epsilon/(1 + \epsilon)$, where $\epsilon = P/W$. If the physical quantities P and W are multiplied by the *unit labor value*, λ, they are transformed into quantities of abstract social labor time, the S and V (*s*urplus value; *v*ariable capital) that will be familiar to readers of Marx; ϵ is therefore the *rate of surplus value* or *rate of exploitation*, as defined in *Capital*, Vol. I. It should be noted that π and ϵ vary in the same direction; they are therefore alternate ways of measuring the same underlying social reality.

Production is the interaction of the active principle of labor with its objective external means, embodied in the physical capital goods upon which labor acts. Marx developed several measures of the crucial relation between the non-human means of production and the flow of living labor; we will need to sort these out.

The simplest relation is the ratio between the physical capital stock and the labor flow. Define $k = K/L$ as the *technical composition of capital*. This concept measures the degree of mechanization of production: the extent to which labor has been provided with physical capital goods (machinery). It is one of two macroeconomic measures of the degree of development of the production forces. Of course, K is only a well-defined quantitative magnitude in the simple case we are studying, in which the capital stock K consists entirely of the one all-purpose commodity, and is measured in the natural units of that commodity. In more complex cases, K must be considered an index number, representing a heterogeneous capital stock consisting of diverse goods, and the concept of a ratio of *physical* capital to labor is inherently ambiguous.

The related concept of the capital stock as a quantity of *value* – the labor value embodied in the physical capital goods – can be approached by first defining the second central measure of the development of the productive forces: the *productivity of labor*, $y = Y/L$. The connection between the two

measures, k and y, will be a major concern in the theory of capitalist technical change, to be developed in later chapters. For now, I call attention to the fact that the reciprocal of y, or L/Y, is the labor content of output per unit of output, or the *unit labor value*, l. Remember that either there are, by assumption, no physical input *flows*, or that such flows have been pre-incorporated into the concepts K and L. In the former case, there is no 'indirect labor', and the labor value added, or L, is the entire labor (value) content of Y; in the latter case, L is the direct-plus-indirect labor input into Y, the direct labor (value added) multiplied by $1/(1 - a)$. For either interpretation, therefore, we have $\lambda = L/Y = 1/y$.

The value of the physical capital stock, then, is λK. The ratio of this value to the flow of living labor is the *composition of capital*, $Q = \lambda K/L$. Using the relation between l and y developed above, Q can be further analyzed: $\lambda K/L = (L/Y)\ (K/L) = K/Y = k/y$. The composition of capital, then, is expressed quantitatively by the ratio of physical capital to net output. Clearly, the labor-value counterparts of K and Y, respectively, are the social labor embodied in the physical capital stock, and the flow of living labor embodied in the net product.

It may be useful, for some readers, to relate this definition to one using classical Marxian notation. The value of the physical capital stock is the stock of constant capital, C. The flow of living labor is $v + s$, variable capital plus surplus value. The composition of capital, then, is $C/(v + s)$. I believe this definition is superior to Marx's c/v, for two reasons. First, it incorporates the stock character of capital goods, as opposed to the 'circulating capital' approach, which represents physical capital goods entirely as the lower-case c, implying that all capital goods are used up in each period of production. Defining capital invested as a long-lived stock, C, seems warranted for a model of post-industrial revolution capitalism.

Second, by using the entire flow of current labor, instead of just the part deployed by capitalists as variable capital and paid to workers as the (full) value of their labor power, the

definition of Q is made impervious to changes in the rate of exploitation, $\epsilon = s/v$. The resulting definition is more in the nature of a 'composition of capitalist production' than a 'composition of capital'. The latter, however, would have to be defined consistently in terms of capital stocks, C and V, and the notion of a stock of *variable* capital V is problematic: capitalists, by definition, cannot hold the actual stock of labor power, which must be produced outside of capitalist control and sold independently and piecemeal by workers, if the relation of exploitation is to be properly valorized. Moreover, the alternative sense of V as a wage fund is useless, since such a fund is negligible in magnitude in relation to the value of the non-human capital stocks, C. The measure $C/(v + s)$ therefore seems superior to any of the alternatives: c/v, C/V, and so on.[1]

We come, finally, to the ratio of primary importance to the capitalists themselves: the *rate of profit*, defined as $r = P/K$. The crucial magnitude expressing the power of accumulated capital is the size of the capital stock, K, and profit P represents the potential expansion of this stock, and power. The rate of profit, then, is the central measure of the effectiveness of capitalist production from the point of view of capital: its potential rate of self-expansion. Again, I draw attention to the difference between this definition and some classical formulations. In classical notation, this profit-rate is s/C. Capital, for reasons explained above, must be represented by stocks, not flows; $s/(c + v)$ does not achieve this; $s/(C + V)$ does, but the only useful interpretation of V as a wage fund suggests that its magnitude is irrelevant in any case. We are left with $r = s/C$, or, in physical terms, P/K.

1. It should be noted that this entire discussion benefits from the simplicity of the one-good macro framework. The transformed determination of value by profit-rate equalization across multiple sectors in which the compositions of capital differ does not occur here. I believe that the entire discussion in this essay can be conducted in terms of a multi-sector economy and capitalistically transformed labor values, without essential loss in either the political-economic or quantitative dimensions. See Laibman, 1992, Chapters 1, 2 and 8.

Taking stock, we have the following fundamental ratios:

$$\pi = \frac{P}{Y} \quad \text{profit share}$$

$$Q = \frac{K}{Y} \quad \text{composition of capital}$$

$$r = \frac{P}{K} \quad \text{rate of profit}$$

The *fundamental equation* of capitalist accumulation is a straightforward relation among these three ratios:

$$r = \frac{P}{K} = \frac{P/Y}{K/Y} = \frac{\pi}{Q} \tag{3.6}$$

$$r = \frac{\pi}{Q}$$

This relation among the three ratios is, of course, essentially tautological. It becomes interesting only when behavioral theories are added, depicting dynamic interaction among them. The classical theory, from which we begin, suggests that π and Q move in such a way that r falls, at least as a long-term tendency. We now turn to the statement of the classical view of capitalist accumulation, and its critique.

REFERENCES AND READING SUGGESTIONS

The basic elements of a macroeconomic production model are too widely shared to admit of scholarly attribution. The macro model is a distillation of the linear production model, and I learned much of what I know about these models from Sraffa (1960), and Brody (1970); see also Morishima (1973). My preferred definitions of the composition of capital and the rate of profit owe much to Mage (1963). A 'new orthodoxy' (an oxymoron?) attacks all simultaneous equation models as inherently neoclassical, Walrasian, or neo-Ricardian; see, for example, Freeman and Carchedi (1995).

4 The Classical Theory and Its Critique

There is reasonable doubt about Marx's final intentions concerning the 'general law of capitalist accumulation'. The *Communist Manifesto* and *Value, Price and Profit* make an intriguing pair: they are texts written near the beginning and near the end, respectively, of Marx's productive lifetime, and both suggest that the core of the process lies in the struggle between the two defining classes, capitalists and workers. In the *Manifesto*, the capitalists 'create their own gravediggers': in their frenzied (but absolutely necessary) pursuit of profits and power, they call into existence the class with 'radical chains', the proletariat. This class, through its experience of daily struggle and periodic crisis, both grows and matures – industrially, politically, educationally – gradually acquiring the capacity to take power and reshape society along new lines. The long-term balance of class forces, then, shifts in favor of the workers; this is the basis of structural crisis in capitalism.

In *Value, Price and Profit*, a picture is drawn of incessant class struggle, with an indeterminate outcome. By its resistance against devaluation of labor power, the working class not only defends its own existence, thus safeguarding the productive forces of the future; it also provides the incentive for technical progress, and, in general, for the further advance of civilization (which must take place increasingly in spite of capitalism, rather than because of it).

This placing of class and class conflict at the center appears muted in *Capital*, perhaps partly because of Marx's shifting intentions regarding future volumes of that work. In Volume I, the term 'absolute general law of accumulation' appears, and is applied to the tendency of capitalism to generate a 'reserve army' of unemployed labor, in proportion to the extent of accumulation and concentration of capital. Marx does not tell

a very precise story about this process; in particular, no argument is given to establish an *increase* in the size of the reserve army over time (as opposed to its cyclical rise and fall). The impression is given of a progressively worsening structural crisis, immanently linked to the core process of accumulation; the argument, however, is quite general and relies heavily on literary images and the power of metaphor.

In *Capital*, Volume III, Part III, however, a more definite story emerges. The very process of growth in the scale of production and accumulation of capital must lead to a *falling tendency of the rate of profit*. Since, as we saw in the last chapter, the rate of profit is the single most important indicator of the efficacy of the capitalist process of exploitation and potential accumulation, a falling rate of profit, even as a long-term tendency that can be offset in the short run by counteracting causes, appears as a powerful statement of the critical – 'contradictory' – and therefore transitory nature of capitalism.

Questions must be raised about the logic and coherence of the falling profit rate concept, as we will see presently. Moreover, we may wonder why this central principle in the theory of capitalist accumulation was left out of Volume I of *Capital*, even though the materials for Part III of Volume III were in existence long before the publication of Volume I. Still, and with a view to integrating our results into a wider vision of the evolution of the class relations of capitalism (see Chapter 2), the theory of the tendency of the rate of profit to fall provides the most reasonable starting point for our investigations.

Recall the fundamental equation of accumulation, from the last chapter: $r = \pi/Q$. It is clear that if the composition of capital, Q, rises, and if the profit share, π, does not rise sufficiently to offset the rise in Q, then r will indeed fall. This, in fact, is what Marx expected to be the case. It turns out, however, that demonstration of this result is by no means easy; in fact, numerous Marxist writers, not to speak of legions of opponents of Marxism, have concluded that it is not possible.

We may begin with Q. At first, a casual glance at the history of technology in capitalist societies suggests the plausibility of a rise in the composition of capital – the proportion of dead

(or embodied) labor to living labor. In a time-lapse sequence of pictures running from the eighteenth through the twentieth centuries, for example, we would see a transition from *manu*facturing (making by hand), to *machino*facture (steam-powered machinery), to the electric, fossil fuel and electronic revolutions; from production sheds with a dozen or so workers at the beginning of the period to the mass-production enterprises with detailed division and cooperation of labor at its end. It would seem to be obvious that the weight of the non-human elements – machinery, plant, throughput of raw materials – in comparison to living labor has been steadily rising.

In the austere world of our macro model, this process appears as a long-term tendential rise in the machines-to-workers ratio, or the degree of mechanization. Complementing a sense that this rise is inherent in technical progress as such, Marx emphasized a social-relations view of the process, which will be elaborated in detail in the next chapter. In this view, technical progress is neither an autonomous process of discovery along a predetermined path, nor an embodiment of abstract human rationality. Rather, it takes place – or fails to take place – as a result of, and in a manner determined by, specific social relations; in our case in point, by the production relations of capitalism. In the capitalist environment of hostile, antagonistic class relations, capitalists will introduce machines not in the general interests of production, but with concern for safeguarding and increasing the power of capital to exploit and accumulate. Machines may replace workers as a weapon in the class struggle against them: machines do not offer resistance to the imposed pace of labor, and do not form trade unions, demand higher wages, and so on.[1]

All of these considerations, however, suggest a long-term tendential rise in the *technical composition of capital*, k. A rising k therefore has powerful backing in theory, and indeed

1. A famous, and most likely apocryphal, story has a former leader of the United Automobile Workers in the United States being shown around a plant by executives of the General Motors company. One of the executives reportedly pointed to a set of newly installed, highly automated machines, and said to the labor leader, 'Let's see you organize those.' (For the labor leader's reply, see Chapter 10, fn. 1.)

is upheld by the weight of empirical evidence. The fundamental equation and its dynamics, however, call for a rise in Q, which, it will be recalled, is equal to λk or k/y. In short, we need to show not only that k rises (a fairly easy task); we also need to show that (or determine the conditions in which) it rises *faster than* the productivity of labor, y (not such an easy task).

Marx was aware of the problem; he spoke of the 'cheapening of the elements of constant capital' as a factor that partially offsets the rise in the technical composition. In terms of $Q = \lambda k$, we can see that a rise in k may be offset by a fall in the unit value of constant capital goods (in our one-commodity world, all goods), λ. Marx repeatedly expressed his view that this offset would be *partial*; it is now rather commonly recognized, however, that he did not provide an argument to support this view. The argument must show that the technical composition of capital rises more rapidly than the productivity of labor. We have seen that a rising k is an outcome of capitalist production relations. It is just as clear, however, that valorization and reproduction (and therefore accumulation) take place through capitalist competition, and that rising productivity is a central weapon in that competitive struggle. Capitalists raise k to fight the battle for survival on one front; but they raise y to fight the same battle on another. There seems to be no reason to argue that the former must predominate over the latter, and that therefore Q must rise.

There has been an attempt to argue that historical cost, not replacement cost, is what matters to an individual capitalist. Q is therefore equal to $\lambda' k$, where λ' is the original, historical unit value, which does *not* fall with the increase in productivity. Rising k is therefore sufficient to ensure rising Q. This, however, is a short-sighted argument (it is considered further in Chapter 8). The individual capitalist may not immediately be able to escape from 'moral depreciation' (Marx's term for the obsolescence imposed on capital goods by the emergence of more efficient ones), as new techniques for producing replacements of his capital goods become available. He may even be in trouble with his creditors, if loans of the original sums borrowed to purchase means of production must be

repaid. His creditors are not likely to write down these obligations just because replacement capital goods can be acquired more cheaply. They will worry more, however, if he loses ground to competition, which can acquire means of production more cheaply, at λ instead of at λ'. Technical change ensures that an actual set of capital goods is never 'replaced'. Its productive capacity, however, is, and must be, continually replaced; 'moral depreciation' compounds physical depreciation, and the relevant measure of the capital stock is the replacement cost, which is lowered by rising productivity. The crunch experienced by a firm that faces existing loan obligations while productivity is rising (and product price falling) is in fact the fate of the hapless capitalist who fails to keep up with the pace of technical change in the industry in general; this capitalist will indeed experience a sharp fall in its profit-rate, a harbinger of likely bankruptcy and/or takeover in the near future. This is not, however, the case with the pace-setters in the industry, who by virtue of their dominant position can roll over old debts and anticipate higher profit-rates from now-cheaper capital goods. Thus the problem remains.

For the time being, we may assume that Q rises, and move on to other aspects of the falling-r problem. The story that develops in the following chapters, however, will return to the central problem of the composition of capital. In brief, I argue that the theory of Q is more fundamental than that of the rate of profit, and that its analysis must therefore precede that of the rate of profit – a point many students of this subject have missed. A glance at the fundamental equation will show that a rising Q implies *either* a rising π *or* a falling r, suggesting a two-barreled theory of crisis. I come back to all this in detail later. The point for the present is that we must return with full force to the question of the conditions in which k might rise more rapidly than y, and therefore produce a rise in Q. And so we will, in Chapters 5–7.

Applying the temporary, and so far unsubstantiated, assumption that the composition of capital indeed rises, the next hurdle for the theory of a falling rate of profit concerns the profit share. As argued in Chapter 2, the profit share, as an index of the general balance of class forces and the degree of

exploitative pressure at work in that balance, is complexly determined: it is the distillation of the entire history of struggle in a country; of the way in which accumulated working-class experience is formed into consciousness and organization; of the extent to which the capitalist ruling class has been able to evolve hegemonic structures, in education, culture and the media as well as in the political (representative and coercive) institutions.

All of this implies that π has no *a priori* trend, lending a certain indeterminacy also to the trend of r. The argument referring to the tendential increase in relative strength of the working class suggests downward pressure on π over the long term. Against this, rising productivity makes it possible to produce a given working-class living standard with less current labor, increasing the share of net output going to profits (Marx's 'relative surplus value'). We will return to the subtle balance between structural factors and consciousness in determining the profit share. For present purposes, we may conclude that, even given a rising composition of capital, there is no way to preclude the possibility of a rise in the profit share sufficient to offset the rise in Q and prevent the rate of profit from falling.

Owing to the indeterminacy encountered at these two points – the trend in Q and the possibility of an offsetting movement in π – many observers have concluded that the argument from technical transformation of production to the trend in the profit-rate is inherently inconclusive, and cannot be sustained. One counter-argument, however, can be considered at this stage. Assume for now that the composition of capital rises. The profit share may rise to offset this trend, but it has, as we have seen, a logical maximum of 1. We may then define the *maximum* rate of profit. $r_{max} = 1/Q$, which clearly falls as Q rises. The actual profit rate may rise toward the maximum rate – Marx spoke, as we know, of a *tendency* for the rate of profit to fall, which need not be effective at every moment of time – but it must ultimately be governed by the maximum rate. $r_{\max}$ forms a 'funnel', and r must eventually move within that funnel. The argument is illustrated in Figure 4.1, panel a, in which time is plotted on the horizontal axis. The profit rates

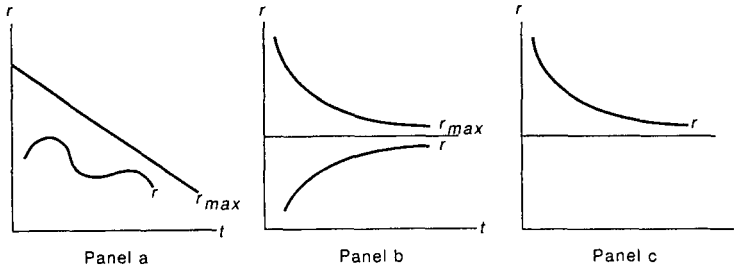

Figure 4.1 Possible time paths for r and r_{max}

are measured vertically; the maximum rate falls over time, as shown, and the actual rate is drawn on a hypothetical path that must ultimately fall.

In response to this, one may wonder how long the process might take. For a tendency of the rate of profit to fall to be meaningful, it must establish that r falls within a reasonable time span. (Rosa Luxemburg, a critic of the falling-r theory, likened it to the burning out of the sun!) Moreover, for the funnel concept to be effective, Q must rise in such a way that r_{max} not only falls, but falls to (or toward) zero. If r_{max} falls toward a positive asymptote (see panel b of Figure 4.1), the actual profit rate may still rise indefinitely. The argument *assumes* a rise in Q; it is certainly in no position to assume in addition that Q rises without limit.

These considerations also prompt a more fundamental question: *why does it matter* if the rate of profit falls? As with r_{max}, r may fall toward a positive horizontal asymptote (Figure 4.1, panel c); if the asymptote represents a level for r that permits the capitalist process to continue, then the actual r, which is higher, should be able to fall without significant effect. Clearly if the rate of profit falls not *toward* but *to* zero, in reasonably finite time, capitalist reproduction has been decisively challenged. But r may fall *toward* zero indefinitely, and (depending on further specification) the actual profit P may rise continually over the same period. This train of thought, then, highlights the general need for a positive theory of crisis emerging from a falling-r trend – that is, for a careful answer to the question posed at the beginning of this paragraph.

The critique of the classical theory, however, goes beyond the problem of indeterminacy in the trends of Q and π. A question lurked beneath the surface of this discussion for a long time, but has emerged in full glory in recent years. It concerns the relation between the consciousness and activity of individual capitalists and the macro or aggregate outcome of that consciousness and activity. We need not resort to a full-fledged philosophical individualism; thus we allow for the possibility that rational individual (capitalist) choice may lead to unintended or undesired outcomes, based on the structural matrix in which those individual decisions are embedded. We further acknowledge that the content of the 'rational' itself may be historically relative and evolving. Nevertheless, a theory of the capitalist economy that does not attribute at least a *historically limited* rationality to individual capitalists is surely on shaky ground. If capitalists control the production process, including decisions regarding technical change, then any changes that affect their closely watched rs must be perceived by them as being in their interest.

Presumably, then, capitalists will *never* introduce a new technique if that technique lowers the rate of profit! Further, having switched from technique A to technique B in anticipation of a higher r, and finding, against that anticipation, that r has fallen, capitalists would immediately switch back from B to A, restoring the original rate of profit. This consideration of capitalist rational choice appears to be a final and decisive answer to any effort to build a solid theory of accumulation based on a falling rate of profit emerging from technical change.

The only apparent remaining possibility would combine false expectations with the disappearance of the earlier technique. Technique B appears, wrongly, to offer a higher profit rate, and so is introduced. Once discarded, technique A (for some reason) is lost to science (as with certain medieval stained-glass technologies?), and cannot be recovered. This replacement-by-error and technical-retrogression process must be thought of as not a one-time occurrence, but a continuing and necessary one! A slender reed, indeed. But without it, the debate concerning technical change and the falling rate of profit would appear to be decisively settled.

In fact, one more stage in the critique must be recounted. Marx distinguished the moment of innovation, when an individual capitalist is in sole possession of a new technique. In 'the sunny time of this, his first love' (this is Marx, quoting Shakespeare), the innovator has a temporary monopoly and earns profits at a rate above average; this is in fact the incentive to innovation. In preference to a variety of terminologies – 'innovator's profit rate', 'monopoly profit rate', 'transitional profit rate' – I have chosen the term *conjunctural profit rate* for the rate received by the innovating capitalist. The term emphasizes the point that all capitalists act in the given situation, or conjuncture, at all times; unlike 'innovator's profit rate', it avoids a sense of a segmentation into innovators and imitators (as in Schumpeter). 'Monopoly' is best reserved for other uses; 'transitional' implies movement from one equilibrium to another, and I am concerned to depict the process as one of continual disruption of equilibrium. Accordingly, I have chosen 'conjunctural' for the situation, and profit rate, of the individual capital, self-conceived as the monopoly possessor of a new technique. All capitals must continually strive to occupy this space, even as they know that their occupancy is fleeting: competitors will rapidly destroy the temporary monopoly position achieved. Failing to achieve it and allowing others to do so instead, however, is tantamount to surrender in the struggle for growth and survival. The temporary extra profits achieved by the innovator are a key to successful accumulation, and their pursuit is an imperative for all capitalists at all times.

This concept of conjunctural competition, then, is a historically specific delineation of competition for capitalist society. It presupposes, and deepens, the sense of capitalist competition as atomistic, spontaneous, elemental, and intense. It strongly works against the presumption that capitalists can anticipate paths of change over a future period, and make an optimal calculation based on that perception. The idea of forward anticipation is at the heart of the notion of the internal rate of return to an investment that yields a known stream of returns over a sequence of future years, presumably a 'sophisticated' calculation by comparison with the one-period P/K. It

is also central to the currently fashionable dynamic optimization models of economic growth, in which agents maximize an entire (possibly infinite) sequence of returns extending forward into the future. Even when there is reasonably reliable information about future values, however, capitalists operating in the conjuncture of the present are not able to use that information. Suppose, for example, that firms anticipating purchase of computers know, with certainty, that the price of these machines will fall over the next ten years, and that they even know the rate of this decline. They will still have no choice but to make purchases today that maximize the conjunctural rate of profit; they cannot afford to leave those profits to their competitors.

Here and in succeeding chapters, I will designate the *conjunctural rate of profit* as ρ.

The question now is: can ρ provide the necessary micro-rational foundation for a theory of falling r? Capitalists will innovate according to ρ. Each capital thinks of itself as sole possessor of a possible new technique, and calculates ρ using existing prices and the existing balance of forces in the labor market, as represented by the real wage rate, w. (In the macro model of this study, there are no relative commodity prices, and w is therefore the only price that can be represented explicitly.) The potential new technique is *viable* if ρ is greater than r, the pre-existing average profit-rate. In this case, the innovating capitalist (potentially all capitalists) will have no choice but to adopt the new technique, regardless of the subsequent adjustment or the capitalists' ability to anticipate that adjustment.

If we revert momentarily to a multi-sector, multi-commodity world, the following story captures the process. Begin at the level of the *economy*; focus down to one *industry* (one of thousands, perhaps); then focus down to one *firm* in the industry (also one of thousands). The economy is competitive, in the sense that there has been full shifting of capital among the industries, so that a price structure among all goods, inputs and outputs, has emerged incorporating a uniform rate of profit across all sectors.

I note in passing, with reference to the discussion in Chapter 2, that in capitalist reality this uniform profit rate is

never achieved; it exists only as a tendency. Also, capitals within an industry are not uniform, but are ranked hierarchically by productivity, scale, and profit rates (these three measures will not, in general, yield the same rankings). The competitive price structure (Marx's 'prices of production') therefore also only exists as a tendency, a benchmark toward which market prices move, only to be thrown off course again as underlying conditions change and new capital movements occur. Innovation decisions are, we may assume, made under such shifting (non-equilibrium) conditions. There is, however, good reason to think that the most central features of those decisions are revealed by examining the 'tranquil' case in which conditions have settled into uniformity within each industry, and profit rates have equalized across all industries. This is the counterfactual case in which underlying technical and social conditions remain constant long enough for the forces inherent in the given situation to work themselves out completely.

Imagine, then, that into this tranquil situation, into the head office of a single firm in a single industry, an engineer runs with blueprints for a new technique: a new k and a new y. The firm 'costs up' the new technique in the existing prices – as innovator the firm can assume its small size will not disturb the existing balance of forces or market situation – and determines whether ρ is greater than r; that is, whether the new technique is viable. If it is, then the firm will both *want* to innovate – replace the old technique with the new one – and *have no choice* but to do so.

In competitive conditions, of course, the remaining firms in the industry (and indeed other firms as well) will rush to acquire the new technique, and this will not take long to happen. When it does, the entire situation in the industry, and therefore the economy, is transformed. The industry is linked with other industries, as a supplier of products that enter into production there or as productive consumer of goods produced there. The entire input–output structure of the economy will require realignment; the structure of prices will adjust, toward a new position at which the profit rate is once again uniform across all industries. We have, then, the old uniform profit

rate, r_0; the conjunctural rate ρ; and the new uniform rate r_1. Choice of technique is microrational: only if the new technique is *viable*, in the sense that $\rho > r_0$, will it have been introduced. The question now is, What is the relation between r_1 and r_0?

One answer is that given by the now-famous Okishio Theorem. If we make the crucial assumption that in this whole series of events the real wage rate, w, has remained constant, then the new uniform ('equilibrium') profit rate cannot be lower than the old one. In symbols: $\rho > r_0$ implies $r_1 > r_0$. The Okishio Theorem therefore implies that rational innovation cannot lead to a falling rate of profit.

The proof of the theorem in its general form requires mathematics, but we can prove it for the somewhat trivial macroeconomic one-good case. From the identity $P + W = Y$, and using the definitions $r = P/K$ and $w = W/L$, we have

$$rk + wL = Y \tag{4.1}$$

and dividing through by L, the same equation in per unit of labor form:

$$rk + w = y \tag{4.2}$$

where, as before, $k = K/L$ and $y = Y/L$. Solving for the profit-rate,

$$r = \frac{y - w}{k} \tag{4.3}$$

Using subscript numerals 0 and 1 to represent the 'old' and 'new' situations, respectively, the three profit rates are as follows:

$$\begin{aligned} r_0 &= \frac{y_0 - w}{k_0} \\ \rho &= \frac{y_1 - w}{k_1} \\ r_1 &= \frac{y_1 - w}{k_1} \end{aligned} \tag{4.4}$$

Notice that ρ and r_1 are identical. This is due to the fact that in the macro case the only relative price that can appear is w. The technical coefficients y and k change, of course, but w is constant in the definition of ρ by the inherent nature of the conjunctural situation (the behavior of a single innovating firm does not affect the overall balance of the labor market), and it is constant in the definition of r_1 by assumption (we will return to this matter in the next chapter).

Now clearly, since $\rho = r_1$, the Okishio result must hold: $\rho > r_0 \Rightarrow r_1 > r_0$. It may still be worthwhile to express this result using a diagram (Figure 4.2), in which the new levels of y and k are drawn on the vertical and horizontal axes. To this end, we write down the two relations, one expressing viability of

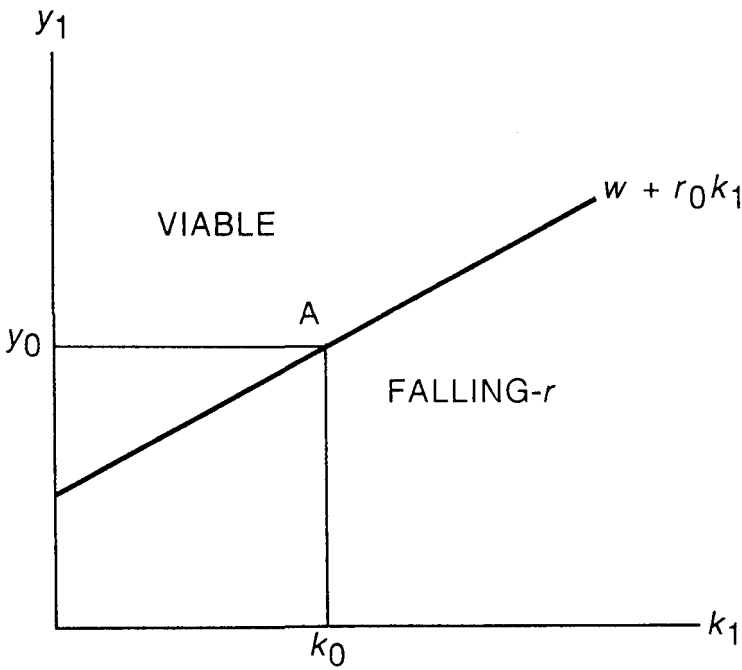

Figure 4.2 The Okishio Theorem: viable technical changes do not overlap with profit-rate-lowering ones

the new technique, and the other the condition for a falling rate of profit:

$$\rho = \frac{y_1 - w}{k_1} > r_0$$

$$\Rightarrow y_1 > w + r_0 k_1 \quad \text{viability condition} \tag{4.5}$$

$$r_1 = \frac{y_1 - w}{k_1} < r_0$$

$$\Rightarrow y_1 < w + r_0 K_1 \quad \text{falling } r \text{ condition} \tag{4.6}$$

The straight line $w + r_0 k_1$ is drawn in Figure 4.2. The two inequalities in (5) and (6) identify the spaces above (northwest) and below (southeast) of the line. The point A represents the original technique. As can be seen, the two sets of possible new techniques (y_1, k_1) – those that produce a conjunctural profit rate higher than the original uniform one, and those that deliver a new uniform rate lower than the original one – are separated by the line $w + r_0 k_1$, and are therefore disjoint. No technique is possible that is both viable and profit-rate lowering.

This simple result – together with the rationality question about reversion to an old technique once the profit rate has fallen, and the original critique of the falling-r approach in terms of the indeterminacy of trends in Q and π – seems to seal the case against the falling rate of profit. The game is far from over, however! We must still inquire further into the crucial Okishio assumption of a constant real wage rate. This is best done in connection with further investigation into the social determination of technical change, as this investigation lays the foundation for a new approach to the entire problem. To this we now turn.

REFERENCES AND READING SUGGESTIONS

The classical texts referred to are Marx and Engels (1971), and Marx (1971). An interesting, if perhaps overstated, argu-

ment for the centrality of class and class conflict in the interpretation of all issues in the political economy of capitalism is Cleaver (1979). See also Lebowitz (1992).

The Marxian falling rate of profit story begins in Marx (1967), Vol. III, Part II; also Marx (1967), Vol. I (esp. ch. 10, 'Machinery and Modern Industry'). Definitions of the value, technical and organic compositions of capital occur in ch. 25. The story continues in an enormous literature ever since. Highlights include Fine and Harris (1979); Mage (1963); Rosdolsky (1977, ch. 26); Shaikh (1978a, 1978b); Weeks (1981); Grossmann (1992); Freeman and Carchedi (1995, chs. 12, 13). (The latter reference contains the 'historical cost' argument.)

Critics of the classical Marxian line of argument include: Sweezy (1956); Robinson (1942); Gottheil (1966, ch. 8); Blaug (1968); Steedman (1977); van Parijs (1980). The Okishio Theorem, as its name implies, is due to Japanese economist Nobuo Okishio (1961; 1963). Elaborations and extensions will be found in Roemer (1978b), and Sensat (1979). The reversibility argument is stated most strongly by Steedman. The one-sector proof of the Okishio Theorem is based on a two-sector version in Laibman (1992, ch. 7).

5 Technical Change and the Profit Rate

The critique appears decisive. The profit rate is $(y - w)/k$. It can fall as a result of a rise in w; this would follow from the maturation of the working class – the expression, perhaps, of the most truly classical contradiction of capitalism. This approach, however, is commonly derided as the 'profit-squeeze' theory of crisis. It reduces the fall in the profit rate to an outcome of the conflict between classes, considered by many to be an ephemeral or superficial phenomenon; the source of declining profitability must, in this view, be found in the presumably more fundamental process of the developing forces of production.

Examining the formula further, we find that the profit rate can also fall as a result of a fall in y and/or rise in k, where these changes are not the result of deliberate intervention by capitalists (mechanization and innovation), but rather stem from processes occurring outside of their control: diminishing returns to natural resources, exhaustion of power supplies, etc. Marx scorned the Ricardian postulate of declining profitability due to diminishing returns in agriculture as a 'retreat from political economy into organic chemistry'. If, however, we take account of the stress the world economy is placing on the planet's ecological balance, and attribute at least part of that to the specific social characteristics of capitalist industrialization and development, the strain arising from this quarter can be seen as a contradiction of capitalism, perhaps an r-lowering one. As in the case of the profit squeeze, what appears to be a process taking place on the surface, rather than within the structure, may in fact reflect contradictory aspects of capitalist production relations. An ecological theory of the falling rate of profit, however, implies a crisis arising from falling general efficiency of production, rather than from rising efficiency. The obstacles to growth in the productive forces are so profound, in this view, that the fettering of the forces results in a

reversal of the general forward movement. The resolution of capitalist crisis, then, would be a socialism of scarcity and not a socialism of abundance. Whatever the likelihood of this scenario, it does not square well with the Marxian vision of social change based on the continuing forward development of human power to transform nature.

A final possibility is one based on the concept of 'unproductive labor', taken over by Marx from the classical tradition, particularly Adam Smith. Generalizing the 'unproductive labor' concept to one of *unproductive expenditures*, u, the profit rate would now be written as $r = (y - w - u)/k$; if there is also unproductive capital investment k_u), the relevant rate of profit becomes $r = (Y - w - u)/(k + k_u)$. Unproductive expenditures (flows and/or stocks) reflect capitalism-specific costs of supervision and control; expenses of circulation (marketing, advertising); and general social waste (legal and financial services). If these expenditures rise over time, the profit rate may fall, independently of other factors.

The u factors are like any other from the standpoint of the capitalists, however. The incentive is to search for ways to minimize them. Exponents of this approach to capitalist crisis will have to explain why capitalists do not solve, for example, problems of supervision and control by increasing the productivity of efforts devoted to these activities; and why success in that endeavor does not lead to survival of the successful capitals at the expense of others. Put the other way around, how is the assumed introduction of new techniques and forms of organization that increase costs of control, circulation and legal/financial management consistent with microrational behavior? The unproductive expenditures approach to falling profit rates must face the same questions that are asked of the general theory of capitalist innovation.

We seem to have come full circle. The ecological and unproductive dimensions may play a role, but the problems must still be resolved fundamentally on the plane of the general theory of capitalist innovation and technical change. In this chapter, I will present an alternative (a 'dual') to the Okishio Theorem, as a way of setting the stage for what I take to be the central issue: the theory of the long-term trend of the

composition of capital, Q. For this purpose, we will need to develop a sufficiently broad social theory of technical change, in which its specific qualities, structures and effects are significantly determined by production relations – in the present case, by capitalist production relations. Placing the quality of technical change and its macro-structural properties at the center will reinforce the conclusion, alluded to in the last chapter, that the primary focus should be placed on the dynamics of the composition of capital, rather than directly on the rate of profit, as is so often done in the Marxist literature on long-term trends in the capitalist economy. The theory of the social determination of technical change and the dynamics of Q is the subject of the next chapter.

The Okishio Theorem is undoubtedly correct, on its own assumptions. The question now is: can we come up with an alternative vision that captures the necessary microrationality of individual capitalist behavior; addresses the question of reversibility (the possibility of returning to a replaced technique after a fall in the rate of profit); and poses the problem of the social determination of technical change as a basis for a theory of the dynamics of the composition of capital? We begin with a simple numerical example (Table 5.1, p. 45), in the time-honored tradition of Marxist discussion.[1]

Before beginning to unravel the table, a notation convention must be introduced. I will designate the *growth rate* of any item by placing a star (*) after the item. Thus, K^* is the growth rate of K; Q^* is the growth rate of Q^* and so on. A growth rate is the proportion between the change per unit of time and the level of the variable: $K^* = (\Delta K/\Delta t)/K$, for example. The dimensions of growth rates are familiar from everyday discourse: typically, per cent per year. Calculation of growth rates involves certain ambiguities and irritants,

1. The use of numerical tables in economic argument, taken over from Marx's use of them in Volume III of *Capital*, can be misleading. The numbers in such tables may reflect different factors determining their magnitudes – price vs. physical quantities, for example. Tables of this kind should be used to simplify the presentation of results achieved by more rigorous methods. When you see enormous tables with little or no explanation of the source of the numbers in them, don't be impressed; be suspicious!

which I will deftly cover up in this essay (for detailed discussion see Laibman, 1992, Chapter 7). We will need to use one property of growth-rate arithmetic: for small changes in the variables, the growth rate of a ratio is approximately equal to the growth rate of the numerator *minus* the growth rate of the denominator: thus if $a = b/c$, then $a^* = b^* - c^*$.

The economy being described in Table 5.1 is a one-good macroeconomy. The rows – labelled 1, A, B, C, D – are the original position (1), in which all individual capitals share the same technique and balance of class forces (that is, face the same real wage rate); and four hypothetical new techniques, each of which is possible and could be installed (A–D). The column headings, in (by now) familiar notation, are: the physical capital stock; the flows of wages, profits and output; the rate of profit; the growth rates of the capital stock, output and the composition of capital; and the conjunctural rate of profit.

Consider the first row (1), which is our starting point. The original composition of capital is set at 2: $Q = K/Y = 800/400 = 2$. The output of 400 is divided between wages and profits in such a way that the profit share, π, is 100/400, or 25%. The profit rate, $r = P/K = 100/800 = 12.5\%$. (All of the numbers to the right of the vertical divider in the table are in 'per cent' units; numbers to the left of the divider should be thought of as real quantities of the all-purpose macro good.) The real wage of 300, corresponding to a given and constant flow of labor, represents a given real wage rate; it will therefore remain constant in this Table, which presents only alternatives that appear to the innovating capitalist in the conjunctural 'moment', at which the real wage rate is given (regardless of whatever we assume may happen to it later).

The four innovation possibilities should be examined first in terms of the growth rates of capital, output and composition that have been assumed. For example, possibility A involves a 5 per cent growth in the capital stock, which enables a 6 per cent growth in output to take place. If these percentages are applied to the original K of 800 and the original Y of 400, respectively, we get 840 and 424, as seen in row A to the left of the divider. With a given real wage of 300, a profit of 124 is found as the residual. Using the growth rate numbers assumed

Table 5.1 Baseline position and four hypothetical new techniques in a one-good economy

		K	W +	P =	Y	r	K^*	Y^*	Q^*	ρ
	1	800	300 +	100 =	400	12.5	–	–	–	–
	A	840	300 +	124 =	424	–	5	6	–1	14.76
	B	880	300 +	140 =	440	–	10	10	0	15.91
*	C	920	300 +	148 =	448	–	15	12	3	16.09
	D	960	300 +	152 =	452	–	20	13	7	15.83

on the right side, all of the numbers on the left have been generated. (Note that the growth rates of the composition of capital have been found from the simple relation $Q^* = K^* - Y^*$; this is inaccurate for changes of a large magnitude, but adequate for present purposes.)

In possibility A, the fact that Y^* is greater than K^* means that the composition of capital is falling. This reflects an assumption: there is a certain amount of *autonomous* technical progress – growth in productivity due to improved organization of production and more efficient use of existing equipment. Thus, even without any increase in the degree of mechanization – $K^* = 0$, a possibility not shown in the Table – some improvement in productivity will take place.

The rest of the growth-rate numbers in the Table reflect another crucial assumption, to be discussed in detail later. Notice that the alternative possible percentage increases in the capital stock occur in equal increments: each succeeding technical proposal involves an additional five percentage points of increase in the capital stock. But the productivity gains associated with those increases in K do not rise in proportion. The first five percentage points of growth in K yield a 6 per cent growth in productivity. The *next* five percentage points of growth in K only produce *four* additional percentage points of productivity growth, from 6 per cent to 10 per cent. The five percentage points of K^* after that generate *two* more percentage points of Y^*. Finally, the last five-point increment in K^* yields only *one* additional point of Y^*. This dropoff is based

on an assumption of *diminishing returns to mechanization*, in the strategic short run within which the choice of a technical change path occurs.

The ρ percentages in the last column are simply the achieved profit rates, given (for the innovating capitalist) a constant real wage of 300. Thus, for possibility A, 124/840 = 14.76%. The rational choice for the innovating capitalist is now clear: the goal must be to *maximize the conjunctural rate of profit*, and this is achieved by choosing technical change possibility C, for which ρ = 16.09%, the highest possible among all the alternatives. Notice that possibility C involves an increase in the composition of capital of (approximately) 3 per cent. Given the combination of assumptions about autonomous technical progress and diminishing returns to mechanization used in this example, it is clearly rational for capitalists to choose a technique that increases Q, regardless of any assumptions we may make later concerning how the resulting technical change will affect the profit share and the level of wages, once it escapes the control of the single innovating capitalist and becomes general.

To examine those issues, we may now assume that possibility C is chosen, and see what results from different assumptions concerning the behavior of the class-balance variables upon generalization of this technique. This part of the story is told in Table 5.2.

Row 1 of the Table repeats the original position of the economy from Table 1. Row 2a reflects the Okishio Theorem assumption: throughout the process of introducing and gener-

Table 5.2 Two benchmark outcomes of the optimal technical change, and the impossibility of going back

	K	W +	P =	Y	r
1	800	300 +	100 =	400	12.5%
2a	920	300 +	148 =	448	16.09%
2b	920	336 +	112 =	448	12.17%
1b	800	336 +	64 =	400	8.0%

alizing the new technique, the real wage has remained constant at 300. The new uniform ('equilibrium') rate of profit is therefore 16.09 per cent, equal to the conjunctural rate (as we have already seen). This new rate is, of course, higher than the original rate of 12.5 per cent, in confirmation of the Okishio result. In the circumstances, no question of reversion to technique 1 would ever arise.

Row 2b of the Table, however, reflects a different benchmark assumption concerning the way the economy behaves when the new technique is generalized. Recall that the original profit share is 0.25, and that that *share* reflects the pre-existing balance of class forces. While the deepest perspective on this problem will suggest that *neither* measure, w or π, ought to have priority in setting a baseline for the analysis of technical change and its impact on the profit rate, there are some reasons why we might prefer π to w. Assuming that the change to the new technique does not alter the balance of forces – an assumption that can be called *class struggle neutrality* – then it is π that should remain constant; if it does not, then the change in π should be explained. If our goal is to isolate the effects of microrational technical change on the profit rate, without any interference from the side of the relation between the classes, or 'distribution', then constant π seems at least as sensible as constant w. Holding the profit share constant in the face of productivity increases, of course, means that real wages rise exactly in proportion to the increase in productivity. But holding w constant implies a rise in the rate of exploitation: in fact, in row 2a of Table 5.2, the profit share rises to 148/448, or to about 0.33. The rate of exploitation is just as *real* as the real wage rate! Either assumption involves a change in something that we might want to hold constant in order to 'isolate' the effect of the technical change.

In row 2b, the real wage rises to 336, corresponding to Y^* of 12 per cent, to keep the wage and profit shares of the larger output constant. π thus remains at 0.25, but, as can be seen, the rate of profit *falls*, to 12.17 per cent. (This follows clearly, with π constant, from the 3 per cent increase in Q.) Under the assumption of constant π, the microrational innovation in

pursuit of a conjunctural profit rate of 16.09 per cent results in a fall in the finally achieved profit rate. This scenario, therefore, confirms the possibility – we have yet to inquire about the likelihood – of microrational technical change choice leading to a falling rate of profit. The central point, for the present, is that, while the assumption of a constant π is artificial, it is no more so than the Okishio assumption of a constant w.

Since the resulting profit rate of 12.17 per cent is lower than the previous level of 12.5 per cent, the question now becomes relevant: will capitalists be at all tempted to switch back to the superseded technique of the first row? The answer again involves the conjuncture principle. Individual capitalists must always consider their own actions in isolation from others'. They will therefore examine the old technique of row 1 of the Table in the new conditions, in which the real wage (for the standard flow of living labor) is 336. The result is in row 1b of Table 5.2, from which it can be seen that the old technique, yielding a conjunctural profit rate of 8 per cent, is clearly inferior to the existing rate of 12.17 per cent. There is therefore no reversion to the old technique, and the story of r-maximizing technical change leading to a fall in r is vindicated, in the sense that it is shown to be consistent with ongoing rational choice on the part of capitalist innovators. The situation described by row 1b is, in fact, the position that would result for any individual capitalist who failed to make the change in technique when all of the others did so.

If the capitalists could collude, and *simultaneously* reintroduce technique 1, then it is *possible* that with a lower level of productivity the real wage could be rolled back to 300, and the profit rate of 12.5 per cent restored. It is a central part of the assumption of spontaneous, unregulated competitive behavior that this sort of collusion is not possible, and I believe that to be true even in the environment of advanced capitalism in which there are partial possibilities of oligopolistic collaboration and institutionalization of price and technology policy that go beyond what was available in earlier periods. However, even with collusion, it is by no means assured that reversion to a lower productivity technique would

enable capitalists to reverse the rise in wages. The working class will always have something to say about that. One of the goals of our emerging theory of accumulation and technical change is to keep the autonomous element in the class struggle – the 'complexly determined' nature of π – always in mind.

In comparing the two assumptions – constant w, constant π – it may be useful to ask, what variables are workers interested in? (We may assume that capitalists are interested in ρ and r.) The usual, somewhat physicalist, answer is that workers are concerned exclusively with the *real wage rate*, w. Two considerations, however, bring π into the picture as well. First, the actual utility or 'psychic income' resulting from a given physical wage basket may depend, at least partly, on its *relative* size. To the extent that a larger profit share, for example, is manifested in an observable increase in capitalist consumption and power, relative to a given real wage, the change in the profit share will be tangible to workers – a fact about the way in which they experience their own standard of living.

Second, in a competitive regime (perhaps characteristic of the European and North American capitalisms of the nineteenth century) the role of money is passive, and rises in productivity are reflected in falling prices of goods, including wage goods. Given money wages, then, will result in rising real wages; to hold the real wage constant, the capitalists will have to change the terms of the ostensible wage bargain, which is made in money terms. The autonomous effect of rising productivity, then, will be to bring about a corresponding increase in the real wage rate.

The beginning of true wisdom about technical change, however, is that ultimately, all benchmarks notwithstanding, there is no reason to believe that *any* parameter – π, w, or any other – will remain constant. A change in technique alters all of the relationships in the workplace, both explicit and implicit. Productivity norms for each operation must be redrawn, and will be the object of struggle. Lines of authority must be redirected; some centers of power within the workplace may be eroded by the introduction of a new technique, and others strengthened. The change gives capitalists the

opportunity to try to remove, or at least undermine, all manner of formal and informal agreements concerning the pace of work, the degree and methods of supervision and accounting of results, and so on. The numbers for K^* and Y^* in the examples above are, in fact, the capitalists' *estimates* of what they can achieve, given the optimal exercise of their power in the reshuffling of the workplace relations deck. Neither the real wage nor the profit share is at all likely to remain constant in this tempestuous process. Once we have developed the theory of Q^* (hinted at in this chapter; presented more thoroughly in the next), the problem of tracing the long-term dynamics of π, without denying its complexly determined character, will re-emerge.

REFERENCES AND READING SUGGESTIONS

'Profit squeeze' approaches to falling profits are developed in Glyn and Sutcliffe (1972), and Itoh (1978). An ecological take on the theory is explored in Perelman (1987). The unproductive expenditure possibility is the basis of Gillman (1957), and Moseley (1991).

The 'dual benchmarks' analysis is my own thinking; see Laibman (1982; 1992, ch. 7). Parallel analyses of the constant profit share case, without all of the interpretation, will be found in Roemer (1978a), and Foley (1986).

6 The Capitalist Determination of Technical Change

One of the most pervasive illusions of our time is technological determinism. Our culture promotes a firm belief in the 'march of technical progress', seen as an inevitable and external motor driving the shape of our social and economic life. This belief actually encompasses and contains its apparent opposite: the ritual rebellion against technology, science, and progress. The rejection of technology in its entirety appears as a futile gesture, which in fact confirms what we really thought all along: technology follows a preordained curve, and will ultimately prevail. This plays a direct ideological role, as when 'technical change' is blamed for a variety of ills, from the fragmentation of personality and loss of community to unemployment, regional decline, and many other symptoms and components of capitalist crisis.

The view of technology that motivates the theory of accumulation developed in this essay rests on the opposite conception. The shaping of technology – its degree of dynamism, qualitative characteristics, structural features and paths of development – by social relations in general, and capitalist social relations in particular, is pervasive, and operates on many levels. The point may be illustrated by several examples, before we rejoin the formal argument.

It is commonly thought that a necessary feature of industrial technology is the fixed nature of input–output relations, rates of output, and the speed and intensity of machine production. Equipment is designed so that its speed of operation cannot be adjusted by its operator, and this design becomes embedded in the accumulated experience of industrial design in a given society – its *engineering culture* or *technological culture*. The outcome is a *fixed coefficient* technology, one in which the relation between a unit of labor (for example) and a unit of

output is a constant and known fact, apparently determined by the brute facts of 'modern' technology. In fact, the fixity of that relation is a direct result of social relations involving alienated labor, and antagonistic and hierarchical control over production. The last thing bosses want is for workers to understand their machines, and have control over the pace and rhythm of their operation.

The alienation of labor from control in the workplace, and the sense that workers have of being dominated and controlled by their own tools and products (so well described by Marx), are not inevitable byproducts of technological modernity; they are the direct result of the antagonistic structure that arises when the labor of one class is a means to the accumulation of power and wealth in the hands of another. A society that is further evolved, with production democracy and self-determination in the workplace, would generate technologies that place control increasingly in the hands of operators; with that more advanced engineering culture in place, it would be hard for workers to understand the sense of disempowerment, the alienation, and the Luddite tendencies of earlier times.

Computer-guided production brings forth a wide range of possibilities. With programming available to coordinate rapidly changing interconnected elements – parts manufacture, assembly, finishing – it is increasingly possible to combine flexible scheduling for each operator and process with overall coordination. This autonomy, however, runs up against the requirements of capitalist control, depending on other aspects of reproduction. There may, for example, be an inverse relation between the possibility of flexibility and devolution in the workplace, on the one hand, and the magnitude of the 'social wage', on the other. High levels of unemployment and insecurity, accepted as normal in the society at large, may be the price that must be paid for modern team systems of production, job enrichment and rotation, and so on., consistent with overall capitalist class control. (This aspect of the capitalist workplace is further developed in Chapter 11.)

Computers also make possible increasing centralization of control over production, and central monitoring of the pace of

production at individual work stations, as data can be transmitted from work stations and aggregated rapidly. Many workers experience the computer environment as one of 'Big Brother' despotism. While the technological determinist thrust of the popular culture leads them to blame the computer itself, a deeper view grasps the evolution of computer technology in a functional relationship with the existing class structure and its reproduction requirements. The engineering culture works to make this relationship invisible. Designers of hardware and software do not consciously think through the connection between their designs and systems of social control; it is 'just how things are done'.

The work environment, whether in the classic 'Fordist' assembly line form or some modern type of batch production, is thought to reflect the needs of production efficiency and productivity. In fact, many aspects of the work environment are determined by the requirements of antagonistic control. The very physical layout of production may be involved here. Work stations are separated in space, so that workers cannot talk to each other while on the job; to what extent is this an inevitable accompaniment of the progress of technology; to what extent is its introduction due to the fact that it is functional for the securing of capitalist control in the workplace?

Heroic measures have been taken to ensure that modern software design is compatible with existing property relations. The technology preventing costless copying of software, and the counter-technology to break the lockouts, have driven many aspects of the software itself. The fragmented, competitive environment has limited the compatibility of different systems, thereby hindering full realization of the technology's potential. Technical designs are developed for the purpose of promoting temporary monopoly. In general, the requirements of antagonistic control, both in relation to workers and in relation to competitors, confer an advantage upon techniques that are excessively obscure. An element of mystification, in which rational understanding of the components of a technological process is prevented except for a secure elite of technicians, is advantageous for the reproduction of capitalist control of technical change, and therefore becomes an important component

of the engineering culture. The enormous, and apparently widening, gulf in understanding between the numerous users of computer technology, on the one hand, and programmers, on the other, is the obvious example.

The advantage conferred on an individual capital by temporary monopolization of a new technique – the conjunctural profit rate – is a major disincentive to dissemination of technical knowledge. Secrecy and duplication in research are obstacles to rapid introduction of innovations, an important 'external diseconomy' of the capitalist environment. (No individual capitalist wishes to confer benefits on its competitors.)

Perhaps the major impediment to rapid dissemination, and to adequate promotion of basic research, is the notoriously short time horizon imposed by conjunctural competition. Capitalist firms are under pressure to achieve short-term results that can be used in the ever-present struggle for survival. They are necessarily impatient concerning basic research, which yields uncertain results over a much longer span of time. If a productivity increase can be achieved in the near term by means of mechanization, within existing technical horizons, that course will be favored over one that revolutionizes the production process itself, but promises usable outcomes only after the competitive dust has settled.[1] The short time horizon, again, becomes embedded in the engineering culture of the society; it operates and shapes the path of technical change without, in general, entering into the consciousness of the individuals carrying out the technical change.

The engineering culture has features that are specific to a given social formation. The construction technology of the Roman Empire in the early centuries of the present era showed a bias in favor of 'giganticism' – emphasis on sheer dimensions, of buildings, roads, aqueducts – which may have played an ideological role in conveying to the surrounding populations a sense of the strength and invincibility of the empire. (A similar giganticism is hypothesized for the techno-

1. A *Wall Street Journal* cartoon of a few years ago captured this aspect of the business culture. A businessman has read a newspaper headline, had a shock, and is now relieved. The headline reads: 'World Will Come to an End in 35 Years.' The businessman's reaction: 'Whew! For a minute I thought it said, '3 to 5 years!'

logical culture of the Soviet Union, particularly in the early years of its industrialization; in the Soviet case, the ideological impact was directed toward the Soviet population itself, among whom there were profound social and cultural obstacles to industrialization needing to be overcome.)

Capitalist development in the United States, in the nineteenth century, was heavily influenced by a specific circumstance: a huge continental territory, with small indigenous population and insufficient immigration, created an ever-present labor shortage. This is turn promoted a massive development of diversified machine tools, a culture of micro-mechanization expressed by the colloquial term 'gizmos' – highly, perhaps overly, specialized mechanical devices. The humorous drawings of Rube Goldberg, in which a simple task such as cracking a soft-boiled egg is performed by an enormous system of levers, springs, mechanical arms, gravity devices, and so on, are an expression of this aspect of the engineering culture specific to the capitalist social formation of the United States.

The approach to technical change developed in this study posits the existence of an identifiable engineering culture for capitalism in general. The key ingredients are the short time horizon, and the competitive monopolization of technical information. Starting from the existing standard-practice or best-practice technique, an individual capitalist faces a major strategic decision: the choice of a path of technical change for the near future. At the given level of mechanization, a small improvement in productivity is possible, coming from improved organization, application of existing knowledge – the autonomous elements determining 'disembodied' technical change. This possibility is limited by the failure of individual capitals, and therefore of capital in general, to promote and disseminate basic research.[2] Driven, however, to much

2. An indirect source of evidence for this claim is the fact that, historically in most capitalist countries, basic research has been supported at the level of government, or in the quasi-autonomous university sector. The institutional distance between the locus of basic research and the sites of application of research – the productive enterprises – is a further factor restricting the scope of non-embodied productivity increases.

greater short-term increases in productivity in pursuit of maximum conjunctural profit rates, capitalists promote mechanization and embodied technical change. The short time horizon within which this can take place imposes severe diminishing returns to mechanization: equal increments in the degree of mechanization, represented by k, result in progressively smaller increases in productivity, y. This relationship between growth in k and growth in y is presumably subject to slow drift over time. At any given moment, however, it confronts the individual capital as an unavoidable tradeoff, and in fact serves as the constraint along which the strategic choice of a path of technical change must occur. The relation $y^* = f(k^*)$ is called the *mechanization function*, or (more generally) the *productivity growth function*. (I will use the former term in what follows.)

Before examining the mechanization function in detail, it is worth noting one significant aspect of this approach. In standard treatments of technical change and choice of technique, the two topics tend to be separated. In one story, the firm is confronted with a set of pre-existing techniques, and its problem is to choose from among them the one that meets some optimization criterion. In another story, technical change simply *happens* – it occurs outside the firm, which then incorporates the changes into its activity. In the concept developed here, however, technical change is *endogenous*, chosen strategically by the firm. Capitalists, in effect, *choose a change*, rather than either choosing from among existing techniques or reacting to a change that is given from the outside. The capitalist choice of a technical-change path is, of course, the clearest embodiment of the point of view with which this chapter began: the nature and dynamics of technology are decisively shaped by specific social relations.

The situation confronting the capitalist firm as it seeks to choose a path of technical change is illustrated in Table 6.1. The first three columns of the table illustrate the mechanization function. (Ignore the fourth column for the moment.) Unlike the numbers used in the last chapter, these are generated by an underlying equation with parameters chosen to be

Table 6.1 The mechanization function: the possible changes of technique, with associated conjunctural profit rates

K^*	Y^*	Q^*	ρ
–0.100000	–0.041830	–0.060710	0.232317
–0.080000	–0.031242	–0.050330	0.233021
–0.060000	–0.020769	–0.040063	0.233634
–0.040000	–0.010406	–0.029905	0.234163
–0.020000	–0.000151	–0.19852	0.234617
0.000000	0.010000	–0.009901	0.235000
0.020000	0.020050	–0.000049	0.235319
0.040000	0.030002	0.009707	0.235578
0.060000	0.039859	0.019369	0.235782
0.080000	0.049623	0.028941	0.235936
0.100000	0.059297	0.038425	0.236044
0.120000	0.068884	0.047822	0.236109
0.140000	**0.078385**	**0.057136**	**0.236134**
0.160000	0.087803	0.066369	0.236122
0.180000	0.097141	0.075523	0.236077
0.200000	0.106400	0.084599	0.236000

closer to realistic magnitudes than numbers used for expository convenience only.[3]

The first column shows possible growth rates of K, rising in equal increments of 0.02. In the first rows of the table, the possibility of falling K, or *de*mechanization, is presented, in the form of negative values for K^*. The second column shows the corresponding growth rates of Y; the third column shows the growth rates of the composition of capital.[4]

3. The numbers in Table 1 come from the mechanization function $G_Y = 1.01G_k^{0.5}$, where G_Y is the growth *factor* of Y (1 + its growth rate), and similarly for G_k. The coefficient, 1.01, is 1 plus the percentage rate of disembodied productivity growth; the exponent, which is a positive fraction, governs the rate of diminishing returns. The function is in classical Cobb-Douglass form. For detailed discussion, see Laibman, 1992, ch. 7.
4. The values for Q^* were not calculated directly from K^* and Y^*, using $Q^* = K^* - Y^*$; this calculation gives accurate results only for very small ('infinitesimal') changes. Instead, the growth factors, mentioned in footnote 3, were used: $G_Q = G_K/G_Y$, and $Q^* = G_Q - 1$. See Laibman, 1992, Chapter 7.

The amount of autonomous productivity growth can be read from the sixth *row* of the table, at which the capital stock does not grow at all, and productivity nevertheless increases by 1 per cent. By the eighth row, the diminishing returns effect begins to outweigh the effect of autonomous productivity growth, and the composition of capital begins to rise.

The question can now be posed rigorously: on what basis will capitalists make a choice of one of the technical change options shown in the rows of Table 6.1? As in the simpler example of the last chapter, the target for maximization must be the conjunctural rate of profit, ρ. The fourth column of Table 6.1 gives the values of ρ for each technical change possibility, calculated for a profit share of 0.46 and an original Q of 2. (The original rate of profit r is, of course, 0.46/2, or 23 per cent.) Running down the column, we find the row set in bold type, at which ρ stops rising and starts falling; the maximum conjunctural profit-rate, ρ_{max}, is therefore identified as 0.236134. This row, then, will be the technical change path toward which rational, competitive capitalist firms strive; as can be seen, it involves a rising composition of capital – Q increases by about 5.7 per cent.

The range of variation of the conjunctural profit rates appears to be quite small, beginning in the third decimal place; one might imagine that these variations are too fine to be perceived. Alternatively, to get significant variation in ρ, the growth rates of K and Y would have to be outside of any reasonable range of variation. This is due to the fact that our model ignores a feature of capitalist production mentioned in Chapter 2, but left out of account in the examples we have been considering: to maintain or improve their competitive position, individual capitals need *both* productivity *and* scale. The newer technologies are embodied in the latest vintages of capital goods, but it is not possible to get the highest overall productivity by prematurely scrapping the earlier vintages, as this would leave the scale of production too small; a small firm, no matter how productive, is vulnerable to takeover by larger capitals. When technical change choice decisions are applied in determining the characteristics of the latest vintage techniques only – a reasonable assumption – the growth rates

of the *total* capital stock and output are much less sensitive to the parameters, and reasonable rates of change of mechanization and productivity produce significant variations in ρ (for further details, see Laibman, 1992, Chapter 8).

The model thus far provides an answer to the challenge from critics who insist on an explicit statement about the rational behavior of the individual capitalist firm. Microrational behavior is seen, in the example provided, to lead to a rise in the composition of capital, thereby eliminating the indeterminacy that seemed to plague Marx's statement of the problem. The fact that ρ_{max} lies in the Q-increasing range rather than in the Q-decreasing one depends on the choice of assumptions used in generating the possibilities shown in the table, and the likelihood of this outcome must therefore still be further explored.

This will be done in the context of a full model of capitalist growth, to be developed in subsequent chapters. Given the parameters of the mechanization function, however, the crucial determinant of the trend in Q is the profit share. In Table 6.2, the maximized conjunctural profit rate and its

Table 6.2 Various profit shares, with associated optimal growth rates of Q and maximal ρ

π	Q^*_{opt}	ρ_{max}
0.450	0.089082	0.229551
0.455	0.079181	0.231657
0.460	0.069280	0.233802
0.465	0.059380	0.235987
0.470	0.040479	0.238213
0.475	0.039578	0.240482
0.480	0.029677	0.242794
0.485	0.019777	0.245152
0.490	0.009876	0.247555
0.495	–0.000025	0.250006
0.500	–0.019704	0.255025
0.505	–0.029507	0.257601
0.510	–0.039310	0.260230

associated *optimal* Q^*, Q^*_{opt}, are presented for a series of values of π.[5]

The maximum conjunctural profit-rate, in column three, rises as the profit share rises, as would be expected. The interesting feature, however, is found in comparing columns one and two: as the profit share rises, the growth rate of the composition of capital associated with ρ_{max} *falls*, eventually becoming zero and then negative as the profit share crosses from 0.490 to 0.495. Provisionally identifying a rising composition of capital as an *immanent critical tendency* of capitalist accumulation (this concept is developed fully in Chapter 10), we can see that this tendency is operating as long as the profit share is above approximately 0.49, given the choice of the other parameters in this example. We return to the problem of numerical estimates in the next chapter. For now, we note the inverse relation between π and Q^*_{opt}, based on ρ-maximization. This relation is drawn in Figure 6.1; the curvature is confirmed both by simulations and by the full algebraic analysis of the model (for which the reader is referred – hopefully for the last time! – to Laibman, 1992, Chapters 7 and 8). The significance of the profit share π_s, at which growth in the composition of capital comes to a halt, will become clear as we proceed.

The π-Q^*_{opt} relation will play a central role in the model of the path of capitalist accumulation – our next focus of attention.

REFERENCES AND READING SUGGESTIONS

The critique of technological determinism occupies a vast literature; no attempt will be made to summarize even a portion of this work here. My own thinking was greatly influenced by

5. The reader will wonder why the numbers in the 3rd row, for $\pi = 0.46$, do not correspond exactly to the numbers in Table 6.1. For example, ρ_{max} from that table is 0.236134, as against 0.233802 in Table 6.2. This is because the numbers in Table 6.1 are based on arbitrary increments of 0.02 in K^*, and the row in bold type in that table is not the exact ρ-maximizing position. The 'true' Y^*_{opt}, for example, is 0.08, not 0.078385, and the 'true' K^*_{opt} is 0.143417, not 0.14.

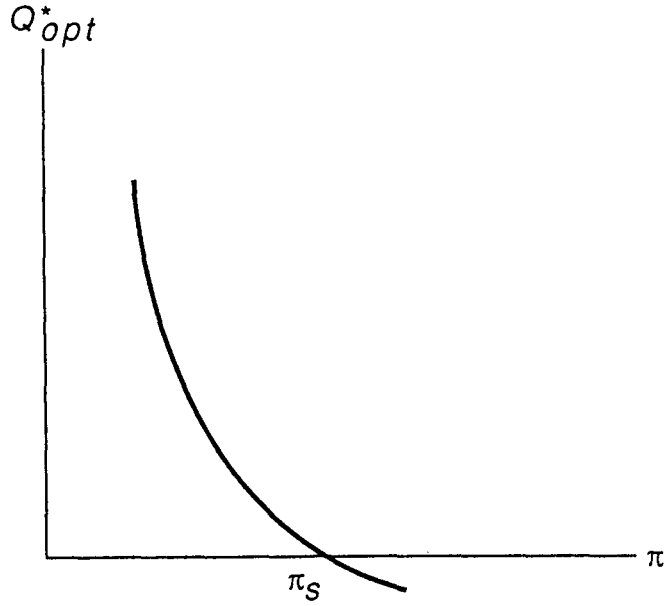

Figure 6.1 Inverse relation between the profit share and the optimal Q*

Rosenberg (1981); Cleaver (1979) also emphasizes the social-relations source of apparently external and 'hard' technological facts. See also Lilley (1966) and Childe (1969) for a broader historical materialist view of social relations and technical change over the long historical record. Two contemporary studies of social and political determination of the nature and impacts of technology are Sclove (1995); and Mackenzie and Wajcman (1985).

The concept of the mechanization function has developed over a period of time. My own earliest attempt to grapple with endogenous diminishing returns to innovation is Laibman (1976); subsequent studies eventuated in part II of Laibman (1992).

7 The Consistent Path

The relationship between π and Q^*, developed in the last chapter, is a crucial – and hitherto missing – ingredient in the full model of accumulation. We are now ready to sketch in the general shape of the accumulation path, laying the foundation for exploration of both cyclical and long-term crisis. To this end, we must now discuss four additional relationships, all of which have appeared in some form in the literature on economic growth.

1. First, we take note of the fact that the source of new capital, and therefore of reproduction on an enlarged scale – what Marx called 'expanded reproduction' – is profits. A proportion of profits, denoted by the *accumulation ratio*, α, is devoted to saving, or investment, or accumulation (the three terms being, for present purposes, synonymous). We assume $0 < \alpha < 1$; in words, some profits, but not all profits, are accumulated. Notice that no savings come from wages; this is the 'classical savings' assumption, and for an appropriate definition of wages it is supported by data on saving in most capitalist economies. Remembering the discussion of Chapter 2, capitalists' consumption plays a functional role in accumulation, as the basis of the upper-class lifestyle through which new members from the 'lower orders' are recruited and class reproduction assured. The intense intercapitalist struggle for survival, however, imposes a strong drive to accumulate as an objective necessity for individual capitals; on this basis, I assume that α evolves toward a fairly high level, closer to 1 than to 0. Like π, α is complexly determined, and subject to catastrophic variation, a matter that we will explore in a later chapter. For the present, we take α to be given and constant.

α and r together determine K^*, the growth rate of the capital stock. (For reasons explained in Chapter 3, there is no need to pre-accumulate Marx's 'variable capital'; the wages for new workers can be paid out of current revenue, perhaps buttressed by some short-term borrowing that does not enter

significantly into our accumulation arithmetic.) The relationship is straightforward:

$$K^* = \frac{\Delta K}{K} = \frac{\Delta K}{P}\frac{P}{K} = \alpha r \tag{7.1}$$

The growth rate of the capital stock, then, given α, is a linear proportional function of the profit rate. For this and all of the relationships in the model, we will use only the general direction of variation: (7.1), then, can be expressed by saying that K^* varies directly with r.

2. Next, we need to know how the growth rate of the demand for labor is determined. The demand for labor will be represented by our symbol for the quantity of current labor, L; its growth rate is therefore L^*. The first factor determining L^* is clearly K^*, the growth rate of the capital stock; in fact, without any change in the composition of capital, we would have $L^* = K^*$ (a 10 per cent increase in the capital stock, for example, would require exactly 10 per cent more workers to operate it). However, we must take into account the possibility that production overall is becoming more (or indeed less) capital-intensive, and this also plays a role in determining the growth rate of the demand for labor. If both K and Q are rising, to continue with the example above, a 10 per cent increase in the capital stock would occasion a rise in the demand for labor of *less than* 10 per cent. Abandoning precision in favor of ease of exposition, I will state the approximate truth: the demand for labor will vary inversely with the growth rate of the composition of capital, Q^*. (As always, for a precise algebraic treatment the reader is referred to Laibman, 1992.) We therefore arrive at this general proposition: The growth rate of the demand for labor varies *directly* with the growth rate of the capital stock, and *inversely* with the growth rate of the composition of capital.

3. The fact, and problem, of unemployment now enters the picture. The dynamics of unemployment, Marx's 'industrial reserve army', plays a major role in the accumulation process. The third relationship simply defines unemployment, U, as determined by the relation between the growth rates of labor

demand, L, and labor supply, N. The growth rate of the demand for labor was discussed above. The growth rate of labor supply, N^*, will be treated for the present as an exogenous constant – in this case, *not* complexly determined. It is, of course, like practically everything else, inherently variable. Determinants of N^* include the growth rate of population, the changing age structure of the workforce, changing participation rates of different categories of the population (women; teenagers; seniors), and the process of immigration and emigration. All of these, of course, are proper objects of political-economic analysis. A Malthusian approach – following T. R. Malthus' dictum that a wage rate above a given subsistence level causes population growth to increase – might link N^* positively to the level of wages. An alternative suggestion is that the relationship of N^* to w is negative: lower wage rates force workers to work longer hours, that is, supply more labor. Neither of these suggestions (especially the former) seems particularly useful for the baseline model that we are developing; in any case, complicating assumptions can easily be added at a later stage. For this reason, we take N^* to be given and constant.

The level of unemployment, then, will vary directly with the growth rate of the labor supply and inversely with the growth rate of labor demand. (Again, we forego algebraic precision in favor of an approximately correct general statement.)

4. Finally, we come to the problem of the relation between unemployment and the profit share. Here we encounter Marx's fundamental insight into the functional role of unemployment in capitalist accumulation: the industrial reserve army prevents the competitive fever of accumulation from tilting the balance of class forces too far in favor of the working class and pushing π and r in a downward direction. Unemployment, particularly if it enters into the consciousness of workers in general in a pervasive way and constitutes a threat to those workers who remain employed, alters the bargaining situation in favor of capital; this should result in a rise in the profit share. We therefore posit a direct relation between U and π.

The problem, discussed previously, is that we will want to retain a role for the historical, organizational and ideological

elements entering into the balance of class forces. The profit share, as I have repeatedly emphasized, is complexly determined: there is an autonomous element that cannot be reduced to a simple function of other variables. A 'sea change' in class consciousness may alter the balance in a sudden and unpredictable way, for example. We will want to account for the autonomous role of class struggle, and the political process in general.

To do this, we may write $\pi = f(A, U)$, where A represents the autonomous factors. The direct relation between U and π still holds, but we reserve the right, so to speak, to extend the analysis to include variations in A as well. It will not be necessary to spell out, *a priori*, any direction of variation; A is not in fact a well-defined variable. It merely serves to remind us of the need to retain the autonomous and contingent dimension in our thinking as we proceed.

We can now summarize the five relationships, in equations (1) through (5) below, using the following conventions: the arrow $\Rightarrow$ signifies determination; $a \Rightarrow b$ says 'determination (*possibly*, causation) runs from a to b'. The ratio form distinguishes between direct and inverse determination: $a/b \Rightarrow c$ is read 'a affects c positively and b affects c negatively'; or, 'c varies directly with a and inversely with b'. Using these conventions, we summarize our findings:

$$\frac{1}{\mathrm{p}} \Rightarrow Q^* \tag{1}$$

$$r \Rightarrow K^* \tag{2}$$

$$\frac{K^*}{Q^*} \Rightarrow L^* \tag{3}$$

$$\frac{N^*}{L^*} \Rightarrow U \tag{4}$$

We are now in a position to develop the concepts *consistent point* and *consistent path*. The accumulation process will be described in a space defined by the rate of profit, measured

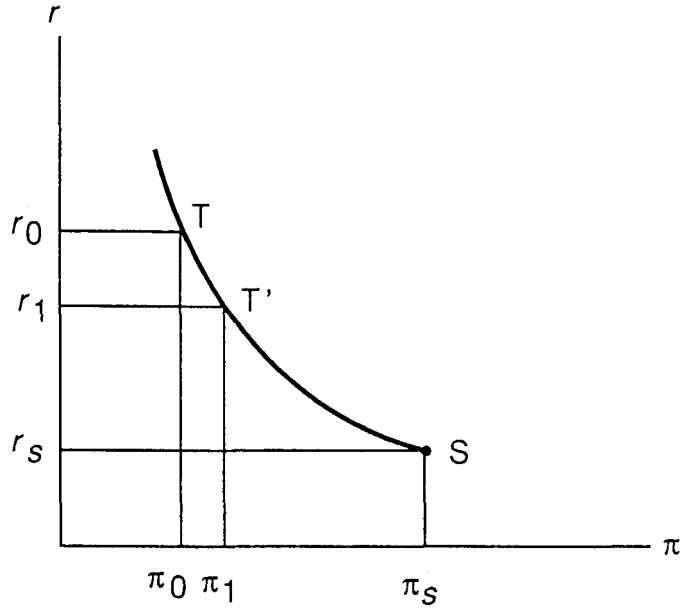

Figure 7.1 The consistent path

vertically, and the profit share, measured horizontally; refer to Figure 7.1.

A *consistent point* is a pairing of a particular r with a particular π – (r_0, π_0) – that obeys relationships (1)–(4), and in particular keeps the rate of unemployment constant. Begin with r_0. This particular level of the profit rate, together with the accumulation ratio, fixes a growth rate of the capital stock, K_0^*, (2). If the unemployment rate, the reserve army, is not to change, we will have $L_0^* = N^*$ (4). This L_0^*, together with K_0^*, fixes the level of Q_0^* (3). (We are concerned here with consistency, not with the most appropriate statement of the order of determination.) Finally, the consistent value Q_0^* requires, under the assumption of ρ-maximization, a certain level of the profit share, π_0. This profit share is linked to the original profit-rate, r_0, from which we began, at point T in Figure 7.1. The point T is therefore confirmed as a consistent point. It

represents a combination of r and π such that, at the given r the growth rate of the capital stock is such that, given the growth rate of the labor supply and the requirement of a constant rate of unemployment, the growth rate of the composition of capital is the one that results from ρ-maximizing technical change, given the stated level of π.

To find a second consistent point, consider the effect of a fall in r, starting from the confirmed consistent point T. The chain of events is as follows. The fall in r decreases the growth rate of the capital stock (2). Given the growth rate of the labor supply, and holding the growth rate of demand for labor to that level to keep the unemployment rate constant (4), the lower K^* will require a lower Q^* (3). This, in turn, can only result, given the ρ-maximizing process, at a *higher* profit share (1). The chain can be represented symbolically:

$$r \downarrow \rightarrow K^* \downarrow \rightarrow Q^* \downarrow \rightarrow \pi \uparrow$$

The fall in the profit-rate, hypothetically from r_0 to r_1, must thus be associated with a *rise* in the profit share, from π_0 to π_1, defining T′ as a second consistent point. The locus of all of the consistent points is the *consistent path* of the economy. Comparing points T and T′, we have established that the consistent path is downward sloping, from northwest to southeast. The curvature (convex to the origin) can be established using Figure 6.1 of the last chapter, or by analyzing the algebraic version of the model. Nothing of significance depends on this particular shape.

Note that the profit share π_s, from Figure 6.1, is identified as one coordinate of the right-side endpoint of the consistent path. It will be remembered that π_s is the (relatively high) level of the profit share at which the growth rate of the composition of capital falls to zero. At all points on the consistent path northwest of S, therefore, the composition of capital is growing.

This fact gives us the needed clue to the accumulation dynamics. To the relations (1)–(5) – the all-important (5) has not been used yet – we add the fundamental equation of accumulation, from Chapter 3: $r = \pi/Q$. Refer to Figure 7.2. The

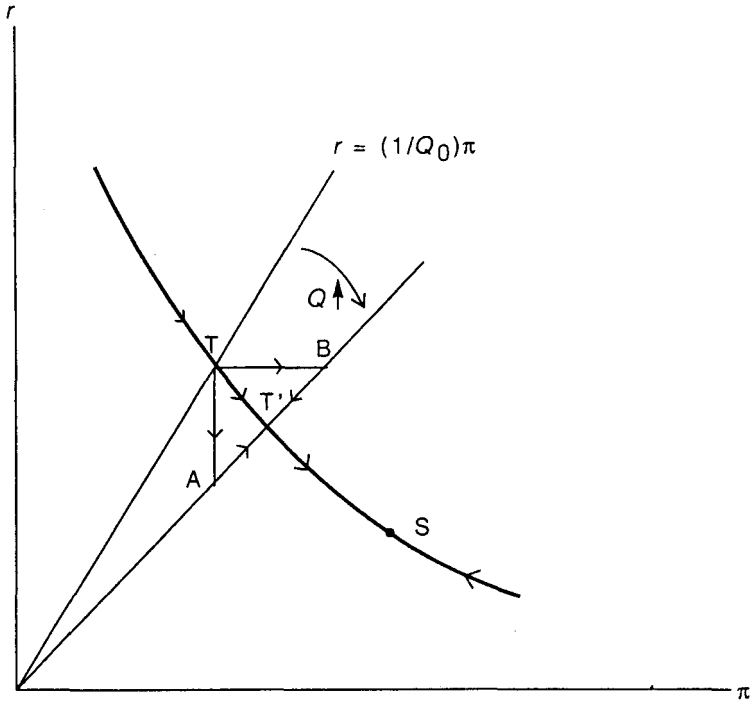

Figure 7.2 Dynamic adjustment along the consistent path

fundamental equation is drawn as a ray through the origin, whose slope is $1/Q$ (call it the 'Q-ray'). For the given initial level of the composition of capital, Q_0, the economy must be on the ray drawn through T. This is, as we know, a consistent point, and therefore for the moment – given optimal technical change choice, the accumulation ratio, and the growth rate of the labor supply – the unemployment rate is constant. At T, however, the composition of capital is rising, and that will cause the Q-ray to rotate downward, as shown by the arrow in the Figure.

At this point there are two stories, and two phases. The phases are artificially separated for purposes of analysis; they can be recombined later. We begin with story 1. In the first phase, the downward swing of the Q-ray causes the profit rate

to fall; in the Figure the movement is from T to A. This implies that workers are strong enough – since nothing has changed to alter the class balance of forces – to win a real wage increase equal to the increase in productivity associated with the technical change that is occurring. The profit share is therefore constant, as seen in the downward movement from T to A, and the rate of profit bears the entire brunt of the rise in Q, falling as shown.

The fall in r away from the consistent path, however, has now altered the balance of the labor market. With a lower K^* and therefore lower growth rate of the demand for labor, *unemployment begins to rise*. The rise in unemployment, according to relation (5), weakens the bargaining position of the workers, and π begins to rise. We are in the second phase of story 1, moving from A toward T′ in the Figure. This movement must continue as long as the economy is below (southwest of) the consistent path, since in that region unemployment is rising, the profit share is therefore rising, and movement will be occurring along the new Q-ray toward the consistent path. The movement stops at T′, since at that point unemployment stabilizes. An important point to notice is that movement stops – the new consistent point is reached – at a lower rate of profit than before: one effect of the rise in π is to reduce Q^*, and that takes some of the burden off of the profit rate in restoring K^* to its previous level.

In story 2, the rise in Q rotates the ray as before, but this time the capitalists are able to take steps to raise the profit share – by speedup, aggressive anti-union campaigns, legal measures, and so on – so that the profit rate is unchanged; the economy moves from T to B, the first phase of story 2. Maintenance of r at its previous level means that there is no change in K^*. The rise in π, however, means that the ρ-maximizing Q^* is lower, and this *raises* the demand for labor. Unemployment begins to fall – the reserve army dries up – and the workers are in a progressively stronger position; they are therefore able to demand wage increases in excess of the productivity increase associated with the technical change, and the profit share starts to fall. This is the second phase of story 2, the movement away from B toward T′. As before, the

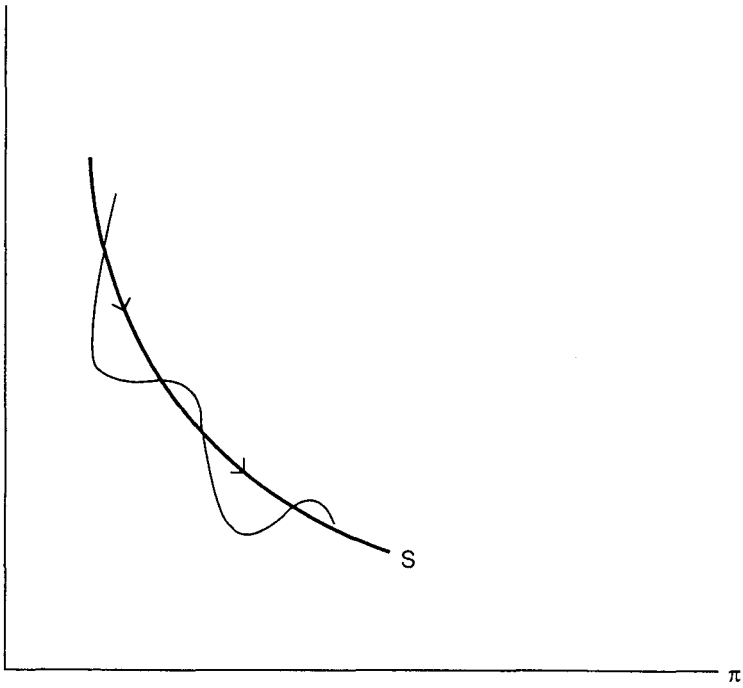

Figure 7.3 Long-term rise in the average unemployment rate

movement must continue until the consistent path is reached at T′, since whenever the economy is northeast of the consistent path, demand for labor exceeds the supply and π will be falling.

As noted, there is no reason to assume that the Q-ray shifts a finite distance before the adjustment depicted in either story 1 or story 2 begins; nor is there any reason to suppose that the two phases are artificially separated as in our initial description of the process. We can imagine a cyclical movement around the consistent path, as sketched in Figure 7.3, in which the phases and the stories are blended together. What necessarily emerges, however, is an immanent process of downward movement, along the consistent path, from northwest to southeast, as shown by the arrows along the path. This

movement continues *until point S is reached*; there, as we know, the rise in Q, which sets the entire process in motion, comes to an end. In fact, as suggested by the segment of the consistent path southeast of S and the arrow on that segment (see Figure 7.2), if the economy were on the path southeast of S, Q would fall, and the resulting movement would be toward S from below.

Along the significant segment of the consistent path to the northwest of S, however, the trends in Q, π and r confirm the most essential components of Marx's vision of capitalist accumulation. We have derived a rising Q from a rigorous analysis of microrational (ρ-maximizing) technical change choice. We have incorporated this trend into an equally rigorous model of the entire macroeconomic structure of accumulation, and derived immanent pressures leading to a falling rate of profit and a rising rate of exploitation (profit share). This confirmation is all the more striking, as it is based on a model of great simplicity and generality. While it will be of interest to extend the model to include additional institutional features of capitalist economies, the presumption is that the main conclusions will continue to hold.

One additional insight can be teased out of the model in its present form. We have the two stories. Both are completely logical, but is there any presumption that one or the other might be more likely? In story 1, it will be remembered, the workers are able to resist attempts to raise the profit share, *until* they are weakened by rising unemployment. This story, therefore, is somewhat akin to the constant π case – the 'dual' to the Okishio assumption (see Chapter 5). In story 2, the capitalists are able to raise the rate of exploitation; if real wages are in fact held constant, we have the analog of the Okishio assumption. The source of the power to do this, however, is not clear. As Marx pointed out in *Value, Price and Profit*, the desire to extend profit margins is not at issue; what matters is the *power* to do so, the limits to that power, and the nature of those limits. If there is nothing in the nature of the technical change itself that gives the capitalists the power to hold real wages down as productivity rises, then story 2 appears less likely than story 1. Of course, as indicated in Chapter 6, the capitalist determination of technical change may include

power-enhancing aspects not captured in the macroeconomic model; in this case, story 2 comes back into its own. The point is not to rule one story out completely, but to establish a basis for a presumption that the movement below the consistent path may prevail in the long run over the opposite movement. The cyclical movement of Figure 7.3 is in fact drawn using that presumption.

If that is the case, then there is an important implication. Since the unemployment rate rises (falls) when the economy is below (above) the consistent path, and stabilizes upon return to the consistent path, the absolute *level* of unemployment will rise with movements like T–A–T′ and fall with movements like T–B–T′ (see Figure 7.2). If story 1 predominates, then, on average, the level of unemployment will rise over time. The presumption in favor of story 1 therefore, establishes a basis for expecting long-term aggravation of the problem (from the workers' standpoint) of unemployment, and its many associated ills.

The question remains, however, concerning the relative likelihood of points like T and S. Is the consistent path a significant construction for mature capitalist economies? Is it possible that the entire analysis, including the confirmation of Marx's main macroeconomic predictions, pertains to an early phase of industrialization, and that the 'steady state' of point S has long been reached? Can anything further be said about the empirical likelihood of either outcome?

The answer to the last question is both yes and no. It is possible to derive estimates, and I will present my own preliminary ones. The problem is that assumptions are required concerning parameters that are inherently difficult to estimate. I assume, for the results reported below, autonomous productivity growth of 1 per cent per period; a coefficient of diminishing returns of 0.5 (refer to footnote 3); and a growth rate of the labor supply of 1 per cent per period. Then, allowing the accumulation ratio to vary from 0.5 to 0.75,[1] I find values for

1. It should be remembered that the accumulation ratio is the share of investment in profits, including undistributed corporate profits (retentions), all of which are presumably invested. The assumption of α between 0.5 and 0.75 is entirely consistent with the much lower observed share of saving in personal income.

r_s varying from 0.04 to 0.10, and values for π_s varying from 0.49 to 0.74. These are the coordinates of the point S.

These estimates are of course subject to varying interpretation. If they are anywhere near the mark, however, they suggest that S is well beyond the reach of most capitalist economies, in which profit shares are far below 50 per cent of net output and profit rates are considerably above 10 per cent per annum. While these results are preliminary and only intended to point the way toward further analysis, they do not support any presumption that the consistent path can be relegated to the early nineteenth century. The immanent critical tendencies of rising Q, falling r and rising π (perhaps the best analog for Marx's proposition concerning 'relative immiseration') are very likely at work, in most capitalist economies today.

REFERENCES AND SUGGESTED READING

The elements of the growth model (with the exception of ρ-maximizing technical change, which is my own theoretical innovation), have a common basis in the literature of growth economics; precise attributions are impossible. An excellent introduction to modern growth models is still Hahn and Matthews (1967). The positive relation between N^* and unemployment, which I do not pursue, is explored in Eagly (1972). An excellent presentation of the dynamics of Marx's 'industrial reserve army' of unemployed is Boddy and Crotty (1975).

The relation between the profit share and the unemployment rate used here is my own choice. Related conceptions will be found in Harris (1983), and Thompson (1995), which provide useful discussions of the impact of technical change on the labor market in general. For a more compact statement of the consistent-path conception, see Laibman (1996).

8 A Thumbnail Survey of Marxist Crisis Theories

Most defenses of Marx's vision of capitalist crisis have focused on the theory of the falling rate of profit, attempting to defend that theory against the critical assault described in Chapter 4. Before resuming the main line of development of this book – the positive theory of accumulation, technical change, structural trends, cyclical and secular crisis – it may be useful to address briefly some of the strategies that have been adopted by the defense.

I will examine three main categories of argument, without any pretense at detailed presentation of particular authors' positions or complete coverage of what is by now an enormous literature (as always, references are provided at the end of the chapter). I will call these categories of argument (a) non-equilibrium; (b) hyper-competitive; and (c) unproductive labor.

My purpose is not to engage in polemical demolition, but rather to situate the approach developed in this book in relation to other approaches. Following the synthesizing philosophy set forth in Chapter 1, it may be assumed that alternative theories grasp different aspects of a complex and multifaceted process. We may therefore look to different theories of crisis to contribute elements to a progressing larger vision. It would, however, be less than candid on my part not to admit that I find the approaches under discussion to be essentially flawed and inadequate as vehicles for serious thinking about capitalist dynamics, whatever their role may be in drawing attention to important aspects of the overall process.

1. *Non-equilibrium.* Aspects of this argument are found in several early twentieth century writers (for example Grossmann; Rosdolsky). It has been taken up recently by, among others, Weeks, Kliman, and Freeman.

Marx had pointed, as we saw in Chapter 4, to the 'cheapening of constant capital' by rising productivity in the

production of capital goods as a *partial* offset to the rising tendency of the composition of capital. In what Marx referred to as 'the law as such', the rising technical composition, k, produces a fall in the rate of profit at constant unit values; that is, without taking into account the rise in productivity in the capital goods industries. Capitalists, in this view, act on the basis of a historically given situation, in which a circuit of capital began *via* purchases at market prices different from any central-tendency or 'equilibrium' prices (whether based on values or on prices of production). The important measure of the value of the capital stock is its money value at time of purchase; this has nothing to do with its valuation or revaluation at prices of production, and certainly nothing to do with any subsequent technical changes. If a set of capital goods was purchased for a given sum of money, then that sum is the appropriate denominator for the rate of profit: profit accrued relative to that sum is the appropriate measure of the expansion of capital. If the sum was borrowed, the outstanding debt will not be reduced because the capital goods can now be purchased more cheaply. The rising technical composition, then, is a sufficient basis for the rising *value* composition and for the tendential fall in the rate of profit.

The argument, as stated, has three elements: the historical, constant-value measure of the capital stock; the unmediated role assigned to mechanization, or the rising technical composition of capital; and the attack against equilibrium, or measurement of capital stocks at current prices of production.

The first element indeed points to an interesting possibility: a contradiction between the industrial and financial aspects of investment and accumulation. Competitive devaluation is of no interest to creditors, or to outside controllers in general. (The distinction between outside and inside capital plays a role in Chapters 9 and 10.) There is good reason, however, to believe that over time the industrial view, according to which reproduction of the capital stock under current conditions is the central strategic task, predominates over the financial view. Outside capitals do not merely want 'their money back'; they want a piece of the action of a successful ongoing concern. Capital stocks depreciate, both physically and

'morally' (that is, as a result of technical change). The true potential rate of expansion of the capital stock is based on its replacement cost, and the value changes resulting from rising productivity are relevant to this measure of the composition of capital and the profit rate. While individual capitals must pay off old loans made under obsolete circumstances, successful innovation of new techniques establishes the real measure of their ability to negotiate the financial seas and escape from old obligations; the new techniques therefore determine their true strategic possibilities and shape the profit rate that is relevant for their decision-making and behavior.

Concerning the reassertion of the link between mechanization and the falling rate of profit, we may grant the first argument and assume that the relevant profit rate is one based on historical money cost of the capital stock. Then, however, it must be explained how mechanization in general – the rising technical composition of capital – is consistent with rational decision-making by individual capitals. Despite certain efforts in this direction, the non-nequilibrium approach fails to address the question raised by the Okishio Theorem concerning the viability of technical change. The link between the micro level of the individual capital and macro trends must be stated explicitly. Capitalists must be theorized to act in their perceived interests; if those interests are thwarted by unanticipated outcomes, then their rational response to that thwarting must again be traced, as always given whatever limitations of vision may result from their partial and conjunctural field of vision.

The nonequilibrium theorists, as shown by the name I have given them, reserve their most vocal objections for the use made by Okishio and his followers of equilibrium: the static solution of a set of simultaneous equations determining a general and equal profit rate across all industries and an associated set of prices (Marx's prices of production). The Okishio argument, as we have seen, runs from an initial equilibrium of this sort, to a conjunctural situation in which a new technique is introduced by a single firm, with no effect on prices or the profit rate in its own and other sectors. This in turn leads to a new equilibrium in which a new uniform profit rate (with

associated prices) emerges. This argument from one static situation to another is worrisome to the non-equilibrium theorists, who are at pains to emphasize that capitalism works through constant transformation and interruption of whatever temporary equilibria might exist. Nothing ever takes place at equilibrium, prices are never 'stationary', profit rates are never equal, and so on. Marx is presented as a theorist of a continually dynamic situation, in contrast to all manner of Okishians, Walrasians, neo-Ricardians and neoclassicals.

This non-equilibrium argument, I believe, confuses *ontological equilibrium* with *methodological equilibrium*. It also confuses the *reproduction* equilibrium of the classical economists (Marx contributed the inter-sectoral structural aspect) with the *allocation* equilibrium of neoclassical theory (whether in Marshallian or Walrasian form). 'Ontology' is the theory of being, or existence; an ontological equilibrium is therefore one that actually comes to pass, whereas a methodological equilibrium is a hypothetical position of rest that need never actually appear, but merely serves as a tool for the analysis of the actual, or ontological, disequilibrium movements of an economy.

Ontological equilibrium thus projects the existence of equilibrating tendencies – for example, the search by individual capitalists for the highest available profit rate, and the consequent tendency of the profit rate to equialize – onto reality itself, and develops a picture of a tranquil economy in which the equilibrium actually prevails and change (at least change in proportions) is absent. Methodological equilibrium, by contrast, identifies a central tendency, which itself is continually shifting, and around which fluctuations constantly occur.

The reason for studying the properties of the position of central tendency, as Marx did in his theory of prices of production and in his models of simple and expanded reproduction, is to grasp certain properties of capitalism that cannot be perceived in the stormy seas of outer reality with its incessant fluctuations. The central tendencies make it possible to get a hold on *general* aspects of capitalist structure and dynamics, which then take on more complex forms at more concrete levels. The canonical form of this methodology may be found,

in fact, in Marx's theory of value, which is defined as a substance underlying the perceived surface reality of contingency and fluctuation. Value – and dynamic equilibrium – are also *real abstractions*, processes made abstract by actual historical development, especially in its capitalist form. Expanded reproduction equilibrium, for example, may be seen as not only a methodological springboard from which to examine transformational growth and crisis (the perspective adopted in this book), but also a real abstraction expressing an inherent tendency in real life. This amounts to a claim that capitalism has homeostatic, structure-preserving qualities, as well as disequilibrating, structure-disrupting ones. The balance of the centripetal and centrifugal forces must be grasped in a good general theory of capitalist accumulation. Constant repetition of the mantra of non-equilibrium will not achieve this task.

2. *Hyper-competition*. Another angle of attack against the Okishio Theorem, developed mainly by Shaikh and Nakatani, is based on what it sees as that theorem's failure to grasp the true nature of capitalist competition. In contrast to neoclassical 'perfect competition', which, in this view, has undue influence over the critics of Marx's falling = profit-rate theory, capitalist competition is a brutal struggle for conquest and survival, a no-holds-barred war among individual capitals. Readers will sense a broad agreement with this perception in the conceptual grounding of the theory of conjunctural profit-rate maximization presented in this book.

In one version of the hyper-competitive argument, however, capitalism enforces an entirely different set of behaviors: in the intense short run imposed upon them, capitalists maximize the profit margin, or *amount* of profit, not the profit *rate* (whether realized *or* conjunctural). The object is to achieve the highest margin, regardless of the size of the capital investment required to achieve this. A temporary monopoly of high profits is then used as a weapon: the capitalist drives out competitors, perhaps by price cutting. When the dust settles, the rate of profit has fallen. A fall in the rate of profit must lead, eventually, to a fall in the *amount* of profit, and this fall results in bankruptcy for marginal capitals. An ensuing domino effect leads to crisis.

While this chain of reasoning is suggestive, and its qualitative aspects may well be incorporated into the theory of accumulation and crisis, the specific links are all questionable. First, it is never explained why techniques that produce high profit *margins* are associated with lower *rates* of profit. This could perhaps be based, implicitly, on a mechanization function of the sort proposed in this study, but this is never made clear. Second – and perhaps most importantly – I must question the assumption that an individual capital with a higher P but lower r than its rivals is in a stronger competitive position. Capitalist competition is dynamic: the ability to grow is of central importance. In the hyper-competitive story, the capital with a profit margin high enough to survive a price war then grows rapidly and takes over markets from its competitors. With a lower r, however, its rate of growth will be lower, its borrowing capacity less, and its vulnerability to takeover greater!

If capitalists believed that the world were coming to an end tomorrow (not in 3-to-5 years; see footnote 1 in Chapter 6), they would maximize profits instead of the profit rate. In fact, we may hypothesize that P-maximization might take over from r-maximization at the peak of the critical cycle, that is, at the moment of a crisis of overproduction (see the next chapter). At such a moment, however, no sustained impact on the path of technical change can be expected. The bulk of technical change decisions occur along the growth phase of the cycle, and the profit *rate* will have strategic importance as the source of growth in that phase.

The later links in the hyper-competitive chain of argument are also suspect. It is not clear that a falling r must eventually lead to a fall in P; this result requires the stronger assumption that r fall asymptotically toward zero (on this, see Chapter 4). But even if P does fall eventually, we once more come up against the requirement of microrationality: how can we explain a fall in P resulting from a fall in r, which in turn came about *via* deliberate capitalist action to *raise* P? If capitalists are in control of the process of technical change throughout this story, there is no way we can reconcile a rising P at one end with a falling one at the other.

The theory of crisis emerging from a falling *P*, in turn, is insufficiently developed. The postulated chain reaction following upon bankruptcies of marginal capitals is never theorized; it is not explained why the fall in the amount of profit is not spread imperceptibly over all capitals, instead of being concentrated in one or several; and so on.

Perhaps most significantly, the central competitive story, in which a capitalist who has been able to innovate and achieve a high profit margin starts a price war and drives out competitors, does not explain why this process will not drive capitals out of the sector where this is occurring and into other sectors, in which either the rate or amount of profit presumably remains higher. The argument loses sight of both the profit-rate dynamic and the sectoral structuring of capitalism.

3. *Unproductive labor.* The final approach to defense to be considered in this chapter is that based on Marx's distinction between productive and unproductive labor. The argument, developed in the 1950s by Gillman, and more recently by Moseley, among numerous others, sees the share of unproductive labor (or expenditure) in total labor (or expenditure) rising as capitalism matures. This is what drags down the rate of profit.

The distinction between productive and unproductive labor was originally drawn by Marx in the context of value theory: unproductive workers did not create *value*, and their incomes were therefore derived from value created by productive workers. There has been a long, and inconclusive, controversy surrounding this conception (see Laibman, 1992, Chapter 4). For present purposes, I will skip over this level of the discussion to address the more prosaic issues. Defining unproductive activity in terms of socially specific *waste* – expenses of circulation, financial activities, advertising, and costs of supervision are usually included in the definition – the argument focuses on the effect of growth in these activities on the rates of profit and growth, regardless of value accounting problems.

The first response to this argument points to a subtle reimportation of the value-accounting aspect. In some sense, whatever is considered to be unproductive is not counted in either profit or growth. The argument is then circular: If

unproductive activities or sectors are growing more rapidly than average, it is a mathematical truism that the productive activities or sectors are growing more slowly. Unproductive labor drags down the 'real' rates of profit and growth – but not, of course, if you *like* advertising, insurance salesmen, factory overseers, etc. If, on the other hand, its proponents frankly admit that what they are doing is stating a preference for those activities they define as productive over those they define as unproductive, then the argument boils down to one concerning social evaluation. Using the implicit standard of a superior order of society, waste is measured in the present one. It is, of course, not at all clear that this implies falling rates of profit or growth achieved in the production of this waste.

In some versions, capitalists indeed 'perceive', and presumably act upon, an illusory and rising rate of profit that includes profits realized on unproductive activities. The true, or 'Marxian' rate of profit, however, is falling. The question must then be asked, why does the Marxian one matter at all? As with the other defenses of falling r, this one runs up against the shoals of microrationality. This problem appears again when we ask *why* capitalists would introduce new techniques that increase waste, if those new techniques are profit rate–lowering. For example, a new and highly integrated assembly line is projected, but the problem of sabotage by workers is anticipated, and there are increased costs associated with security guards, who must be stationed along the entire length of the line. If the savings from the productivity of the line do not more than compensate for the increased costs of supervision and control, capitalists will not introduce the new technique. The increased unproductive expenditures will only appear in conjunction with a higher profit rate, not a lower one. Alternatively, engineers may be instructed to develop a line based on a parallel principle, rather than a series one, in which sabotage at one point does not disrupt the entire sequence of stages of production. In this case, costs of supervision do not rise. Either the rise in costs of supervision must be explained, or it must be explained why those costs are not more than offset by higher productivity in general, if a

theory leading from rising unproductive expenditures to a falling rate of profit is to be sustained.

Each of the lines of argument considered in this chapter contributes an important dimension to the general argument. While the distinction between ontological and methodological equilibrium must be maintained in defense of the analysis of central or gravitational tendencies in capitalism, it also warns against confounding the two. The positions of rest – values, prices of production, expanded reproduction equilibrium, and, for that matter, the consistent path – are never actually achieved; there is a constant dialectic between approach toward them and critical shifts away from them, mediated by steady qualitative and quantitative transformation in the underlying conditions themselves. Also, at moments of particularly rapid technical change, contradictions may arise between the active-capital calculation of the profit rate, based on real possibilities of expanded reproduction at new levels of productivity, on the one hand; and the passive-capital calculation, based on historical cost, on the other. This requires further exploration.

The hyper-competitive story also helps in the development of the theory of capitalist competition, which distinguishes that form of struggle and accumulation decisively from the textbook idealization of 'perfect competition', and indeed also from a tranquil ontological view of classical competitive equilibrium with equal profit rates actually accruing across the entire economy. The shift from r-maximization to P-maximization at a moment of crisis is also worthy of further development and analysis.

Finally, the study of socially unnecessary costs of circulation, finance and supervision is an important part of the political-economic critique of capitalist society, and may be shown to play a role also in the theory of accumulation and crisis.

For the reasons adduced in this chapter, however, I have chosen not to place any of these approaches at the center of the analysis. The microrational foundations must be protected, and the analysis of capitalist behavior, and of crisis resulting from that behavior, must be specified rigorously, if foundations

are to be laid upon which detailed studies of capitalist competition and development can proceed. I have tried to show how this can be done with respect to the long-term trends in the profit rate and share, and the long-term effects of technical change, in the preceding chapters. We now turn to the topic of cyclical movements and crises, as the basis for approaches to long-term, or secular, crisis.

REFERENCES AND SUGGESTED READING

The 'disequilibrium' defense of the orthodox argument has roots going back to Rosdolsky (1977), Grossmann (1992) and Rubin (1973), but it has seen a recent flurry of activity: Freeman and Carchedi (1995) provide a useful compendium; see especially Chapters 12 (by Andrew Kliman, on the Okishio Theorem) and 13 (by Alan Freeman). See also Weeks (1981).

The 'hyper-competition' authors (the term is mine) are: Shaikh (1978a, 1978b); Nakatani (1979).

The best representatives of the unproductive labor approach are Gillman (1957) and Moseley (1991).

9 Cyclical Crisis

The consistent path provides a framework for study of capitalism's long-term dynamics. However, just as there is no rigid wall separating micro and macro analysis in the Marxian tradition, there cannot be a strict separation between short-term, or cyclical, behavior and long-term structural change. The theory of cyclical crises along the accumulation path provides essential material for the longer view of crisis, which seeks to identify ultimate immanent limits to capitalist reproduction.

The starting point is capitalism's fundamental equation, $r = \pi/Q$. We have explored the technical and microrational foundations for a rising trend of the composition of capital, and I will work here with the presumption that that tendency is operative. I can now reiterate the premise underlying my approach to both cyclical and secular crisis. Much of the Marxist literature has concentrated on the rate of profit, assuming that (a) the dynamic of r is the only critical (crisis-generating) trend; and (b) the trend of r can be tracked without paying much attention to Q. Proponents of the Okishio Theorem, for example, focus on their result that viable (microrational) technical change must raise the profit rate, whatever happens to the composition of capital. If Q rises, then the increase in the profit rate implies an even greater proportional increase in the rate of exploitation; this, however, does not appear to be of any interest, since, as stated above, the profit rate alone matters.

I argue, however, that the composition of capital has more basic significance, and that its dynamics must be determined before turning to an analysis of either the profit rate or the profit share. The fundamental equation, in fact, yields the following deductions:

$$Q\uparrow \Rightarrow \begin{cases} r\downarrow \Rightarrow \text{crisis} \\ \pi\uparrow \Rightarrow \text{crisis} \end{cases}$$

In words: a rising composition of capital must eventuate in either a fall in the rate of profit, or a rise in the profit share, or both. Given rising Q – the first *immanent critical tendency* we have examined – the economy is on the horns of a dilemma: it must encounter at least one of the two critical movements: fall in r, rise in π. Either of these, in turn, can be seen as the trigger leading to periodic cyclical crisis.

This approach, then, does not attempt to derive an actual path for the economy; that would be determined partially by contingent historical factors, reflecting the relative autonomy of the class struggle. It does suggest that there is an inherent tendency to encounter periodic crises, which originate in two different ways. The situation is represented in Figure 9.1, showing alternative paths in r-π space determined by rising Q and the consequent downward shift of the Q-ray. The paths A–B and A–C are drawn as wavy lines to emphasize their contingent nature.

Our first task in this chapter is to outline the two critical processes, based on falling r and rising π. We then bring these processes back into the framework of the consistent path, by uniting them into a self-generating cycle.

1. *Liquidation crisis.* We are now ready to take our first crack at the question, why does a falling profit rate matter?

In a world of perfect competition and perfect information, it most likely would not matter. As we saw in Chapter 4, as long as the profit rate is greater than 0, it is not clear that capitalists cannot become accustomed to low rates of return; absolute profits may be adequate, even growing, while the rate of profit declines. If a falling r does in fact provoke periodic cyclical crises, this undoubtedly results from the fact that capitalist accumulation is not a world of perfect competition and perfect information.

Capitalists have difficulty perceiving rates of return. An individual capital knows its own profit rate only after the fact, and in a manner subject to all of the uncertainty due to poor information, arbitrary accounting procedures, and so on. Profit rates of competitors, in other sectors, and in the economy as a whole are, in general, a matter for guesswork and speculation. The random noise thrown up by the market, together with the

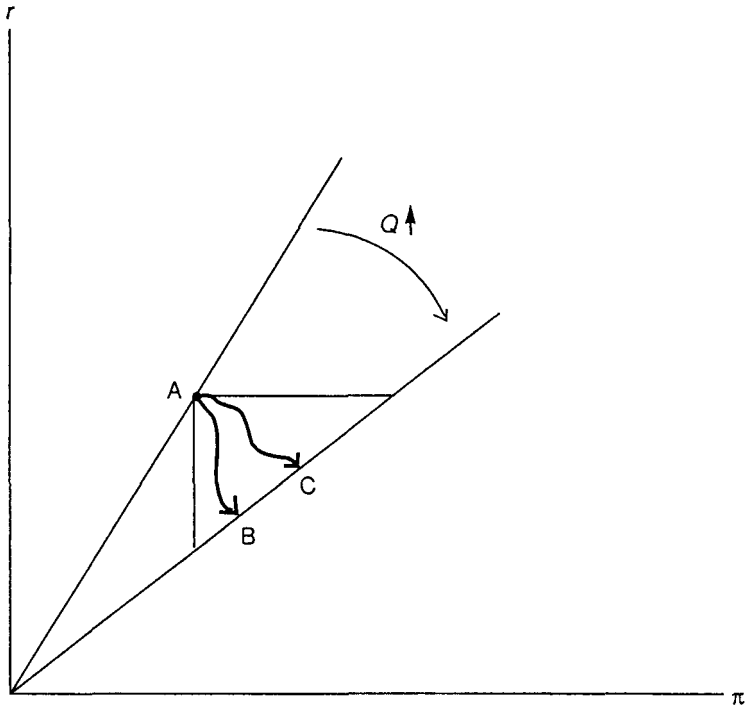

Figure 9.1 The immanent critical tendency for Q to rise

secrecy and disinformation attendant on competition in its capitalist form, create a band of uncertainty around realized rates of profit. All of this suggests that a change in r must first pass beyond a *threshold of perception* before it enters into consciousness. Small changes, if correctly perceived in the first place, may be random. A fall in the profit rate, therefore, must be sustained and must achieve a certain magnitude in order to cross the threshold of perception.

Once it does, the individual capitalist does not know whether the fall is a general one for the economy as a whole; confined to one sector; or confined to the single capital, or firm. The only safe assumption is that the fall is local, not global, and the response – an almost knee-jerk mechanism of

survival in the accumulation wars – is to withdraw capital, shift, *liquidate*.

If all capitals do this simultaneously, in response to a threshold-crossing general fall in the profit rate, there is a sudden rush into liquidity and consequent collapse of demand. The familiar choreography of the classical crisis of overproduction ensues: a sharp fall in production, rise in unemployment, and spread, or 'multiplier', effects. The triggering liquidation need not be general throughout the economy; it can occur in one or more decisive sectors only.

An additional dimension of liquidation crisis may be mentioned briefly, if only as a spur to further investigation. Accumulation in mature capitalist economies takes a financial form, in which active, or entrepreneurial, capitals draw upon passive sources of funds in order to enlarge the scale and growth rate of production. The inside rate of profit is the general rate, plus the outside/inside ratio times the difference between the general rate and the outside rate (the rate of interest paid to passive investors). A higher ratio of outside to inside capital thus increases the inside rate of profit, and active capitals are tempted to take on an ever-increasing proportion of outside capital. The down side to this, of course, is ever-greater risk of bankruptcy and takeover, in the event of unforeseen disruptions in production and sales – or unanticipated falls in the underlying rate of profit. The inside capital operates on a knife-edge: borrowing (or selling shares) to the limit. A small fall in r may have a qualitative effect, and shift the balance of power, placing highly leveraged capitals 'in play'. In this situation, the flash point is reached, and one or more capitals pull out, interrupting the circuit of reproduction. When one does this, others in the same industry are under intense pressure to follow. An old banking adage applies generally to financial accumulation: 'Don't panic, but if you do, be the first.'

A fall in the rate of profit, then, from a previously known level, will very likely provoke periodic shifts into liquidity, which then cause demand-side problems and a general decline in production and employment. This is the *liquidation crisis*. It will occur, even though there are no fundamental structural

obstacles to accumulation at the new, lower, profit rate; indeed, once the crisis has worked itself out, accumulation will resume at that lower rate.

2. *Realization crisis*. Falling r, and periodic liquidation crisis, may be avoided, but only at a cost of rising π. The problems associated with this tendency must now be addressed, in the cyclical context. For this purpose, it will be useful to step down from the one-good macro environment a bit, to a *two-sector* model, of a kind that will be familiar to students of Marxist theory.

The economy is now divided into two 'departments', or sectors: I, producing capital goods (means of production); II, producing consumer goods (means of consumption). As in the examples of Chapter 5, we choose $Q = 2$, assumed to be the same in both sectors. The other parameters of the baseline case from which we begin are: profit share $\pi = 0.4$, and accumulation ratio $\alpha = 0.5$. The argument will proceed in terms of Table 9.1, whose column headings are: capital stock; wages; the share of profits consumed; the share of profits accumulated; and total output. Output is of course the sum of wages and the two components of profits. Material input flows are not represented, as before. The rows I and II refer respectively to the capital goods sector and the consumer goods sector. The

Table 9.1 Structural change and intersectoral disequilibruim

		K	W	$(1-a)P$	aP	Y
A	I	200	60 +	20 +	20	= 100
	II	800	240 +	80 +	80	= 400
B	I	220	66 +	22 +	22	= 110
	II	880	264 +	88 +	88	= 440
C	I	220	55 +	27.5 +	27.5	= 110
	II	880	220 +	110 +	110	= 440

most important difference between this table and the one-good cases of Chapter 5 is this: the numbers here represent not physical quantities, but *values*: quantities of labor time (or money, if one prefers).

Part A of the table is the starting point: a simple check will reveal that in both sectors profits are 40 per cent of output, as required by π; that the composition of capital is indeed the same in the two sectors: 200/100 = 800/400 = 2 (these numbers, in labor time, are the value of the capital stock divided by the flow of current labor); and that profit is divided equally between capitalists' consumption and accumulation, as required by $\alpha = 0.5$. As a final preliminary, we must check to see if the sectors are in the proportions required for reproduction and accumulation.

This is a distinguishing requirement of the two-sector model: sector I needs consumer goods produced in II, sector II needs capital goods produced in I, and the reciprocal demands, in value terms, must be equal. The value generated in I as wages plus the consumed portion of profits constitutes I's demand for consumer goods (these quantities of value are boxed in the I row of part A); the accumulated portion of profits in sector II constitute that sector's demand for capital goods (also boxed). It will be apparent that these two value magnitudes do indeed match up, and that exchange and accumulation can proceed.

In part B, the accumulated capital good values are added to the preexisting capital stocks. We have a profit rate of π/Q = 20 per cent, and a growth rate of αr = 10 per cent. All of the numbers in part B are 10 per cent greater than the corresponding numbers in part A – a representation of simple proportional growth. Clearly, in this situation, the condition for reproduction/accumulation equilibrium – that wages and consumed profits in I equal accumulated profits in II (see the boxed figures) – has not been disturbed.

In part C, however, we consider the situation that would result if the profit share were to *increase*: in the case assumed, from 0.4 to 0.5. The capital stocks, formed on the basis of accumulated profits in part A, are the same; the distribution of output is now different, however. As can be seen, the sum

of wages and consumed profits in I is now 55 + 27.5 = 82.5; this demand for consumer goods confronts a supply of consumer goods (demand for capital goods) coming from II, of 110. The rise in π has brought about an overextension of sector II, and an excess supply of consumer goods, in the amount of 27.5.

Before we jump to claim that this excess supply of consumer goods is the trigger of a *realization crisis* – a crisis due to failure to sell, or realize, goods – several questions must be answered. First, the drift from A to C, along with the rise in the profit share, occurred gradually; why does the situation have to reach the extreme represented by C before some sort of adjustment takes place? Second, with a surplus of consumer goods and a shortage of capital goods, the market price ratio will adjust: the relative price of consumer goods will fall, and that of capital goods will rise. This will bring about a divergence of profit rates between the sectors, with $r_1 > r_2$; won't this divergence prompt the necessary shift of capital from II to I? Finally, even without a movement of capital and production from II to I, the higher profit rate in I will lead to more rapid accumulation there, and conversely in II; over time, therefore, the relative size of the two sectors will adjust toward the new proportions required for reproduction/accumulation equilibrium. Is a realization crisis necessary?

The divergence between the sectors will indeed proceed until it has reached a certain finite size, represented by part C of the table, if, as in the case of liquidation crisis, a threshold of perception must be crossed before the divergence becomes tangible, owing to random noise and imperfection of information. At bottom, then, critical phenomena arise in spontaneous market economies, especially capitalist ones harnessed to private accumulation, because of the inherent nature of spontaneous markets, atomistic behavior, and the distortion and imperfection of information that follows from these factors.

Once the threshold is crossed, and the surplus of consumer goods becomes evident, will profit incentives enable capitalists to migrate from II to I, restoring reproduction equilibrium? The simple answer is no, as can be seen by a careful delineation of perceptions and motivations. Capitalists in sector II know of the glut in their own sector; they therefore

know that their demand for capital goods has collapsed. Regardless of price shifts and momentary profit rates, capitalists in II cannot shift into I while being unable to anticipate adequate demand for capital goods. Blocked realization in II is compounded by realization *fear* concerning shift into I. If a *coordinated* shift of capital from II to I could occur, the surplus of consumer goods would quickly be eliminated. The *individual capital* in II, however, cannot make that move independently; consequently, the move cannot be made, without an intervening crisis. Again, the source of the crisis is located in an aspect of spontaneous competition: the conjuncture principle, which plays a central role in the dynamics of technical change (as we have seen), appears again in the theory of realization crisis.

It should be noted that the reverse situation, in which the profit share falls, would not have the same crisis potential. In that case, sector I would be overextended, and the divergence of market profit rates would spur a shift from I to II. But no problem of anticipated realization difficulty arises in this case: demand for consumer goods would be expected, especially with rising wages, and individual capitalists in I would be able to move to II without difficulty. We may conclude that capitalism is able to manage falls in the profit share much more easily than rises. The same, in fact, turns out to be true regarding the composition of capital and the accumulation ratio. Rises in all three ratios prompt realization difficulties and crises associated with blocked sectoral readjustment, while falls can be accommodated spontaneously to a much greater degree.

We have, as a provisional result, that rising profit shares are likely to provoke periodic crises triggered as realization crises, based on relative overextension of sector II. The theory has some weak spots. The level of the threshold of perception is simply assumed. If there were different levels in different subsectors of the two main sectors, or if capitalists in a given subset of II assume that the glut is occurring in that subset only, shift into I may occur. It must be shown that the autonomous change in the growth rates of the sectors is not sufficient to prevent adjustment from taking the form of a

crisis, as noted above. Finally, both realization and liquidation crises should be linked to the endogenous cyclical movement around the consistent path.

Before linking the two crisis mechanisms described above into a single model of cyclical crisis, a warning may be useful. It is tempting to speak of 'liquidation crisis' and 'realization crisis', as though these were two distinct types of crisis, occurring in isolation from each other. As we have seen, however, once a crisis is under way, the two mechanisms overlap. A rush into liquidity in one sector causes a collapse of demand in another. Experienced demand crunches trigger fear of low profit rates – capitalists neither know nor care whether those low rates stem from structural changes in production with sale at full value, or from realization difficulties – and this leads to secondary liquidation effects. Liquidation and realization should be thought of as triggering mechanisms, rather than distinct 'types' of crisis. As we will see, the crucial downturn in the comprehensive cycle we are about to develop relies on aspects of both realization and liquidation problems.

3. *The comprehensive growth cycle.* I will now describe a growth cycle model that brings the dynamics of unemployment into the picture, and that addresses the complexly determined character of the accumulation ratio.

Until now, we have taken the accumulation ratio, α, to be given and constant. The decision to accumulate, or invest, is one of the three central strategic decisions in the capitalist environment (the other two are the technical change choice and the financial choice determining the outside ratio). Can anything more be said about the accumulation decision?

I will begin by proposing that the extreme positions in the economic theory of investment be avoided. On one side, the orthodox neoclassical view reduces the investment problem to one of optimal choice. The investor in this perspective is a passive maximizer of some objective function (ultimately a utility function). On the other side, the Keynesian view places investment outside of all economic determination. The investor is governed by unanalyzable 'animal spirits', and investment is *ex machina*; it is simply what the investors want

it to be. By contrast, I would like to portray the capitalist as something in-between: neither a passive maximizer, nor an all-powerful God.

With this goal in mind, we may consider the problem of determination of α. Ingredients in this story will include the historically based (and functionally required) level of consumption out of profits; the periodic reality of panics, stampedes into liquidity (treated not as a psychological process but as a response to structural situations); and the ever-present aspect of realization, and consciousness of realization (capitalists must always be concerned with markets).

In this framework, I postulate a complexly determined, high, baseline level of α, less than 1 but on the high end owing to the ever-present, powerful imperative to accumulate. Call this level α_A. At the same time, when realization dangers appear critical, the accumulation ratio reverts to a temporary low level, α_B, which may be zero.

It is difficult for capitalists to 'see' profit rates, surpluses and shortages in other sectors, and many other potential indicators that might warn of realization problems ahead. One indicator is massively present and central to the consciousness of both major classes of capitalist society: the level and rate of unemployment. We may therefore postulate a link between perceived unemployment and capitalist expectations concerning markets. When the unemployment rate, U, is falling – or, indeed, when it *stops rising* – capitalists expect markets to be expanding, or at least stable. Given this expectation, the survival imperative requires rapid accumulation and capacity expansion to maintain and extend market share; any other course would be suicidal. Accumulation then proceeds at the high rate, α_A. When, in contrast, U is rising – and when it *stops falling* – danger lurks. If anything will provoke that panic in which, according to the banking adage mentioned earlier, each capitalist seeks to be the first, it is an end to the fall in the rate of unemployment: stabilization of the consumer goods market will create a fall in demand for investment goods (the classical 'accelerator' principle), anticipation of a turn in the cycle, etc. In these conditions, the survival imperative requires liquidation: reversion to α_B. Again, failure to do

this would leave an individual capital exposed, when others have shifted, and liable to takeover.

This sketch of a theory of α can be represented schematically as follows:

$$\alpha = \begin{cases} \alpha_A \text{ if} \begin{cases} \text{U}\downarrow \\ U \text{ stable after } \uparrow \end{cases} \\ \alpha_B \text{ if} \begin{cases} \text{U}\uparrow \\ U \text{ stable after } \downarrow \end{cases} \end{cases}$$

The cycle rests on the relation between the growth rate of the demand for labor and the level of the unemployment rate. This relation is governed by the effects of unemployment on the profit share, and consequently on r and Q^*. The causal chains are:

$$U\downarrow \Rightarrow \begin{Bmatrix} r\downarrow \\ Q^*\uparrow \end{Bmatrix} \Rightarrow L^*\downarrow$$

$$U\uparrow \Rightarrow \begin{Bmatrix} r\uparrow \\ Q^*\downarrow \end{Bmatrix} \Rightarrow L^*\uparrow$$

A fall in unemployment, and consequently in the profit share, leads to a fall in the profit rate and a rise in the growth rate of the composition of capital. Both of these, in turn, lower the growth rate of labor demand. The reverse chains hold for a rise in unemployment. This clearly establishes a positive relation between U and L^*.

This positive relation is drawn in Figure 9.2, in simplified linear form, for two cases: one in which α_A obtains, and the other for α_B. The growth rate of labor supply, N^*, is also drawn, as a horizontal line; we continue, as in Chapter 7, to regard N^* as given and constant, and, in particular, unrelated to U. The story of the cycle can now be told.

Begin at point A in the Figure. Accumulation is proceeding at the high rate α_A, and L^* is therefore high, despite the high level of unemployment. At A, $L^* > N^*$, and therefore U is

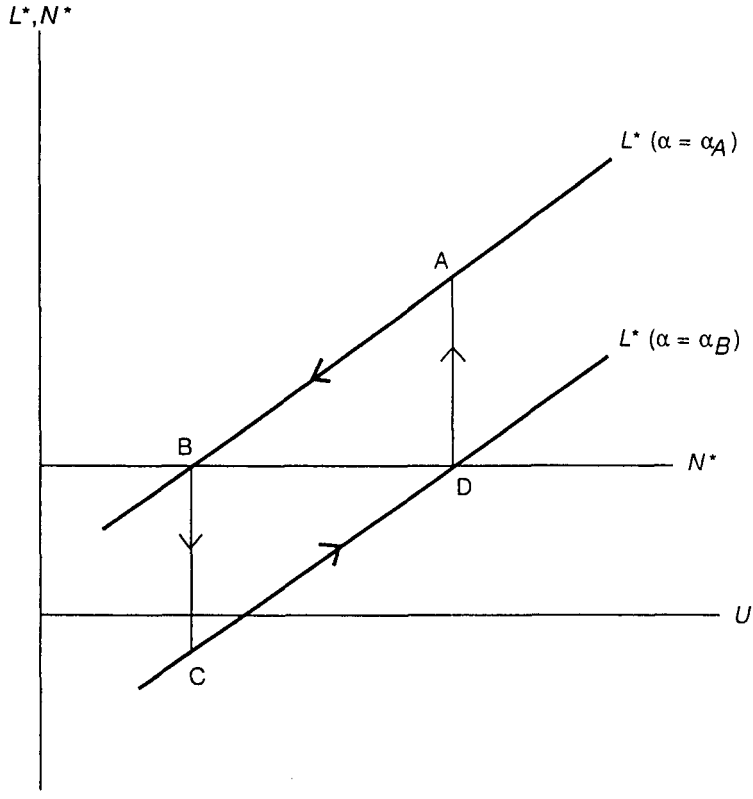

Figure 9.2 A comprehensive employment–profit–growth cycle

falling. Those who think in terms of static underconsumptionism might wonder how accumulation can be rapid in a depressed economy; the answer is that the *dynamics*, as measured by a falling *rate* of unemployment, point to wider markets in the future, and capitalists are scrambling for their pieces of those markets. With the reserve army shrinking, we are in the boom phase of the cycle, as the economy moves from A toward B. While the fall in U is putting downward pressure on r, and upward pressure on Q^*, and therefore reducing the growth rate of labor demand, that demand is still greater than N^*, and movement continues toward B.

At B, there is a crucial transition. Unemployment stops falling, and *anticipated markets therefore stop rising* at a rate greater than population growth. This is the realization crisis trigger: fear of overexpansion and death-by-underutilization takes over, panic sets in, and capitalists revert to α_B. The L^* curve shifts rapidly down to the lower level, and the growth rate of labor demand plummets, from B to C. (As drawn, it becomes negative, although this is not necessary.)

It should be noted that the point B provides a provisional answer to the difficult questions posed earlier: why does a falling rate of profit matter, and at what point does it trigger a crisis? Marx wrote vaguely about this in *Capital*, Volume I: when pressure on the profit rate becomes too great, 'accumulation receives a check'. The turning point B points toward a full excavation of the logic of that check, and the level of r at which it occurs. Note also that B has aspects of both liquidation and realization triggering: fear of overextension is an expression of the ever-present problem of demand limitation, but the actual crisis mechanism is not due to an actual glut of goods, sectoral or overall, but rather involves the 'stampede into liquidity' that is characteristic of liquidation crisis.

At C, L^* is now less than N^*, and U begins to rise. The economy is once again in motion, in the trough of the cycle, from C toward D. The rise in U plays its classical role of disciplining the working class and restoring profitability. The high potential profits go unrealized, however: as long as U is rising, capitalists do not anticipate adequate markets, and therefore do not return to a high rate of accumulation. This can only happen when the economy reaches D, and unemployment stops rising. This brings the capitalists to their senses, and at some hard-to-specify point the individual capital becomes conscious of the high potential profits, and the fact that if it doesn't take advantage of them its competitors will. There is then a rush back to α_A, a sudden reversion to point A, and the cycle begins again.

In the trough of the cycle, along the range C–D, the profit share is rising. There may therefore be some secondary realization crises of the sectoral variety. This factor helps explain

why recovery is delayed, even though the working class is being weakened and profitability restored.

The theory of cyclical crisis has much room for development, but even as summarized in this chapter it reveals the richness of the accumulation process, when that process is conceived in its historically specific capitalist market form. It provides a presumption that capitalist growth will not, except perhaps in highly unusual circumstances, be crisis- and cycle-free. The forms of cyclical crisis, moreover, provide us with clues to the long-run behavior of the economy, once they are reinserted into the framework of the consistent path. We turn now to the question of long-term, or secular, crisis: structural barriers to continued capitalist accumulation, at least in any given institutional form.

REFERENCES AND SUGGESTED READING

Bronfenbrenner (1965) is the earliest statement of the falling-r/rising-π dilemma approach to crisis of which I am aware; this essay, by a non-Marxist who managed to 'resist conversion', played a large role in shaping my thinking. The two crisis triggers – liquidation, realization – are presented as two distinct 'types' of crisis in Sweezy (1942), with numerous references showing the source of this distinction in Marx. The *locus classicus* of two-sector crisis models, of course, is Marx (1967, Volume II); a presentation of the capital goods/consumer goods dynamics will be found in Dobb (1955).

The full growth cycle model presented in this chapter owes much to Eagly (1972) for its initial formulation, and to Goodwin (1967, 1991) for the mechanisms of endogenous growth dynamics (see the fuller development in Laibman, 1992, part III). The discontinuous accumulation function, only postulated here rather than being derived, reflects an ongoing effort to use catastrophe theory in the formulation of models of cyclical crisis. A good introduction to the subject (catastrophe theory; *not* cyclical crisis) is Zeeman (1976).

10 Immanent Critical Tendencies and Secular Crisis

The cyclical processes studied in the last chapter emerge from inherent and necessary characteristics of capitalism as a social system of reproduction and accumulation. It is possible to imagine the use of public policy to control and mitigate the effects of cyclical crisis; it is hardly possible, however, to imagine capitalism without cyclical crisis as an immanent reality and potential. Marx's central insight in this regard is that what economists call 'the crisis' is in fact the cure. The actual crisis is the contradictory tension that has built itself up in the boom phase of rapid accumulation; the subsequent downturn, with its bankruptcies, recession, unemployment, destitution and chaos, is the system's means of restoring conditions for a new round of growth. The crisis removes obstacles to accumulation by, first, imposing a new discipline on the working class – creating conditions in which workers have no choice but to accept higher rates of exploitation and insecurity – and, second, shaking out the weakest capitalist units of control, *via* a new round of concentration and centralization of capital. In a bear market, so the Wall Street saying goes, the money returns to its rightful owners.

The question posed in this chapter is: Notwithstanding the cyclical instability that must accompany capitalist accumulation, are there definable *outer limits* to the process? In other words, can this system go on forever? Will it eventually encounter structural constraints that, if they do not literally cause a 'breakdown' of the system, nevertheless pose the urgent need for institutional transformation? Can this question even be meaningfully posed at the level of the abstract capitalist economy that is the subject of this essay? And finally: Can sensible, if perhaps never fully complete, answers to the foregoing questions be developed that do not violate our sense

that all capitalist relationships – even those that seem the most objective and impersonal, deeply imbricated in markets and technology – are ultimately grounded in human experience and consciousness, and therefore involve political and moral factors?

The task is to hold on to the structural requirements of capitalist accumulation, the objective side, without losing sight of the contingent role of human action. As we will see, the effectivity of barriers to accumulation, and consequent crisis, ultimately depends on the amount of suffering that people will tolerate. We emerge from this inquiry, however, with more than a return to an open-ended voluntarism in which consciousness reigns, and all things are possible. Capitalism, it turns out, must require working people to tolerate *more and more*, despite – indeed, because of – their increasing productivity. The test of the synthesis we are seeking, as always, is dialectics: consciousness and agency grounded in historically concrete material and structural constraints.

In pursuit of this tall order, we may now move on to the concept of *barriers*, introduced briefly in Chapter 2. Immanent critical tendencies encounter barriers at different sites. The concept of *sites* will be the focus of the next chapter.

We continue here with the immanent critical tendency that has been the focus of our attention thus far: the rising composition of capital, Q, a peculiar structural property of capitalist technical change determined by r-maximization. This tendency, as we know, implies the necessity of either a falling rate of profit, or a rising profit share, or both. We must now ask, *how far* can r fall?; and, *how far* can π rise?

Barriers, at the site of this immanent critical tendency operating in (r, π) space, are ranges for r and π at which the cyclical crises triggered by those variables become *nonreproductive*. A nonreproductive crisis fails to perform the cleansing functions referred to above, and therefore fails to remove, partially or completely, the conditions that generated the crisis. The critical phenomena therefore become chronic and structural; they engender a qualitatively new level of instability, suffering, and restriction of technical and social progress.

We begin by examining the rate of profit, and posing once again, this time in the secular context, the question: What does it matter if the profit rate falls? Is there a floor, or absolute lower limit, to the rate of profit, that is significantly greater than 0? If such a limit can be found, it would constitute the *financial barrier*. Anticipating determination of this barrier's location, it is drawn in Figure 10.1 as a thick horizontal band. The thickness is designed to emphasize that the barrier need not be determined with precision. We may not be able, or even want, to say that r can fall to, say, 6 per cent per year, but no lower. (Why not 6.5 per cent or 6.001 per cent?) The point is to identify a range with fuzzy borders, and to examine the principles underlying that identification.

First, remember the fundamental relation between the rates of growth and profit, and the accumulation ratio: $g = \alpha r$. If there is a minimum rate of profit, r_{min}, then we can write $g_{min} = \alpha r_{min}$, or $r_{\min} = g_{\min}/\alpha$. The accumulation ratio, for this purpose, is α_A, from the last chapter. Identification of the minimum profit rate, therefore, resolves itself into identification of a minimum rate of growth.

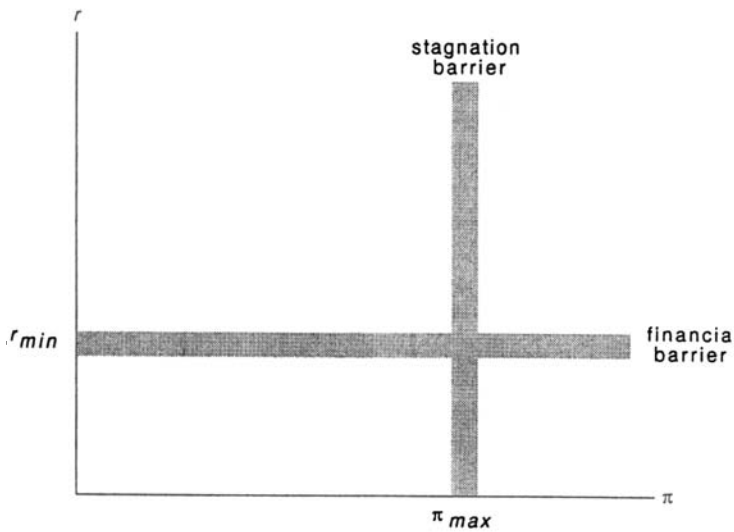

Figure 10.1 The financial and stagnation barriers

There are three reasons to believe that capitalist accumulation runs into structural difficulties if the growth rate falls to, or below, some minimum level. First, remember the tension facing each capitalist between productivity and scale. Both are necessary for success in the battle to accumulate. There is, however, a tradeoff between them, given the range of vintages of capital goods composing the capital stock under a single unit of control. A firm can decide either to be small and superproductive, or large and displaying average productivity. The tradeoff is not severe when the growth rate is high; in that case, the firm can depreciate and retire the earliest vintage capital goods fairly rapidly. It becomes more severe as the growth rate falls, and latest vintage equipment comes to have a smaller weight in the total. If g falls to a critical low level, an individual capital faces a Hobson's choice: either it lets productivity sink below the threshold necessary to maintain its position *vis-à-vis* creditors, or it lets its scale fall below a secure range *vis-à-vis* its competitors. The resulting financial uncertainty renders significant new rounds of accumulation problematic; hence the cyclical-crisis phenomena associated with liquidation crisis become nonreproductive. When the economy hits the financial barrier, the pressure building up to liquidation crisis becomes chronic.

The second factor in determining g_{min}, and therefore r_{min}, is related to the first: individual capitals with high growth rates find it easier to secure loans, or to prevent stockholder rebellions. Collateralization is difficult to achieve with an aging capital stock, and technological obsolescence goes hand in hand with low growth rates. The degree of security required by outside capital (whether as debt or equity) is related to a host of specific institutional factors, and most likely cannot be established without detailed examination of specific historical cases. At or near the financial barrier, however, low growth threatens to render entire capital stocks essentially worthless, just as the risk and instability associated with liquidation behavior are increasing.

The final factor is related to the reproductive role of cycles. The point is mathematical, but can be developed intuitively. There are two measures of a cycle's intensity: its amplitude,

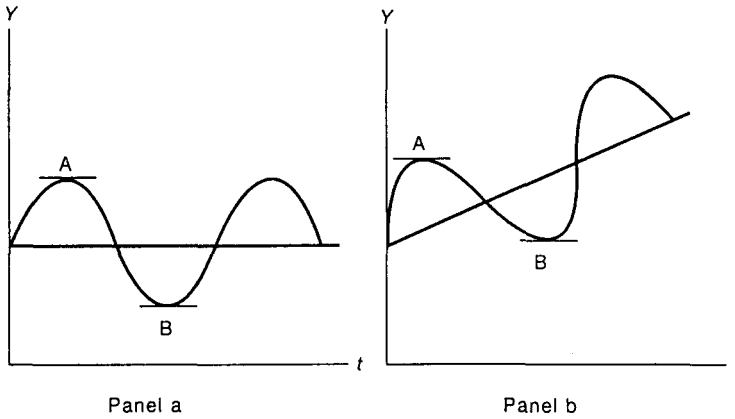

Figure 10.2 The impact of growth on peak-to-trough ratio

the degree of divergence above and below its center; and the peak-to-trough ratio. When the cycle operates around a trendless center, the two measures are the same, as shown in panel a of Figure 10.2. In that figure, the variable of interest is net output, *Y*, but the same analysis could also be applied to a variety of measures of economic performance. In panel b, the *same* cycle is imposed on a rising trend. The deviation parallel to the trend line is the same as in the first case, but the peak-to-trough ratio, as can be seen, is smaller.

When the growth rate is high, therefore, a given cyclical *swing* can be accommodated with a smaller peak-to-trough *ratio*. The swing is the reproductive feature; it is the experienced movement that redisciplines both capital and labor. The ratio expresses the public aspect – the severity of the recession. The point should now be clear. When the growth rate is high, a cycle can accomplish its reproductive tasks within politically acceptable boundaries. As the growth rate falls, the same *swing* requires a greater *fall*. A minimum growth rate, in this interpretation, is one at which the reproductively necessary swing results in a politically unacceptable fall.

The concept of political acceptability reminds us, and not for the last time, that the barriers are ultimately determined by

social perceptions of need, justice, and alternatives. Perhaps the last word in this introduction to the financial barrier should be this general proposition: high growth reconciles conflicting expectations and financial claims; low growth exacerbates conflicts among them. This general notion is sufficient, for present purposes, to establish the existence – if not the precise numerical location – of a range of profit rates, for a given capitalist economy, at which liquidation crises become nonreproductive, and financial difficulties therefore become chronic. The barrier does not constitute a wall, beyond which the associated variable cannot move; it only suggests a range for the variable at which pressure for institutional transformation becomes constant and increasing.

Having located r_{min} in theory, we now turn our attention to the profit share. π, of course, has a logical maximum of 1. Establishing a position for $\pi_{max} < 1$ is more difficult, especially since, with productivity unbounded, an arbitrarily high profit share is consistent with any given level of real wages.

The problem with a high profit share, of course, is the classical concern of underconsumption theory. In its simplest form, this doctrine observes that workers cannot buy the entire product – π is greater than 0 – and therefore some of the product must go unsold. This, of course, is a *non-sequitur* as it stands: capitalists are perfectly happy to buy whatever is left over. They cannot, however, buy it all for purposes of consumption, in an expanding economy. The key question is the role of investment demand; that is, the accumulation ratio. The Keynesian answer (perhaps *not* the answer of J. M. Keynes!) is to view the level of investment as a function of the rate of interest, and to use monetary policy to stimulate the desired level of investment through the interest rate. This conception is static, and insufficient. In Keynes' own terms, in a dynamic conjuncture the 'marginal efficiency of capital' – perhaps, in our language, the 'expected conjunctural rate of profit' – may fall to zero, and the interest rate will be completely ineffective.

The central issue in producing adequate rates of accumulation and growth, given a high profit share, is the extent to which investment can run ahead of current realization possibilities. Here we come up against the short time horizon

imposed by capitalism-specific forms of ownership, coordination and competition. Capitalists simply balk at the notion of investing for a faraway future, any distance ahead of estimable demand. Desired capacity is limited by perceived growth in demand, and the accumulation ratio may not be able to rise above that perception. At the range of profit shares denoted π_{max}, therefore, realization difficulties become chronic and frustrate the reproductive role of realization crises.[1]

In terms of the simple numerical examples of the last chapter, it can be shown that structural (sectoral) realization difficulties develop more rapidly with a rise in π, when the baseline level of π is higher. With demand limitation an ever-present factor, the economy has encountered the *stagnation barrier*, shown as the vertical wide band in Figure 10.1.

As with the financial barrier, it must be stressed that the ultimate force of the stagnation barrier is political: the repercussions fall on the population at large, in the form of persistent unemployment, drying up of job opportunities, stagnating and declining standards of living. The ultimate force of the barrier again rests with the answer to the question, how much will the working class tolerate?

With the financial and stagnation barriers provisionally in place, a simple story may be told. It is illustrated in Figure 10.3, which combines the Q-ray with the barriers. The barriers are now drawn as thin lines, for simplicity, but their thick character may be kept in mind. With Q increasing, the ray is shifting downward and the economy is moving along a consistent path on the ray. On this path, cyclical crises with one or another triggering will be occurring. Now as the heavy regions of the several rays suggest, the economy's range of operation between the barriers becomes narrower as accumulation proceeds. The twin dangers of nonreproductive stagnation ('demand-side') and financial ('supply side') crisis loom ever larger. Schematically, there is a maximum level of Q at which the ray encounters the intersection of the two barriers (point

1. In Chapter 4, the story was related of the automobile union leader asked by company executives whether he could organize their new machines. His reply: 'Let's see you sell them cars.'

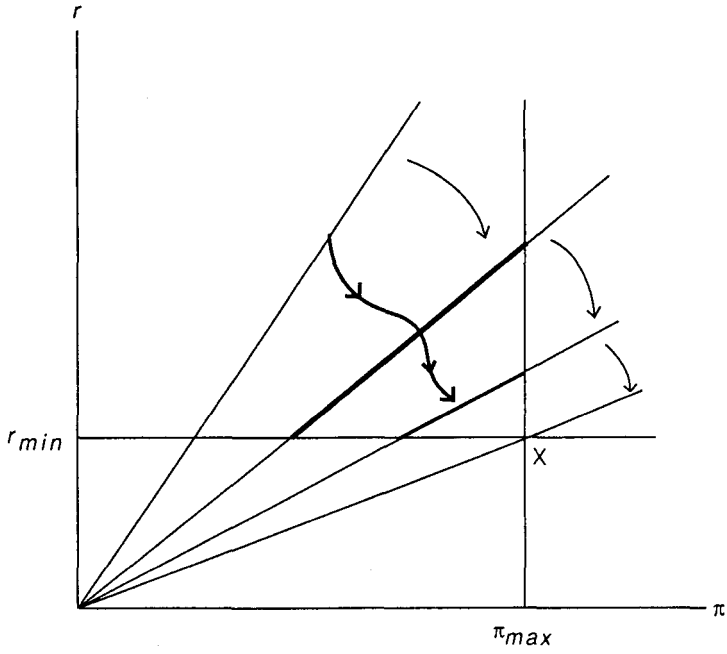

Figure 10.3 Scylla and Charybdis: progressive confrontation between rising Q and structural barriers

X), forcing the economy into a position of simultaneous structural financial and stagnation crisis.

It is important *not* to think of X as a point of *absolute* crisis, or 'breakdown', after the fashion of some early twentieth-century Marxist thinkers. There is no such thing as an absolute crisis of capitalism. The chronicity of crisis symptoms, however, and their increasing severity, suggest that the structural evolution toward X poses, with new political realism and urgency, the need for institutional transformation. Whether that transformation is revolutionary, or merely leads to a necessary evolution in the environment for accumulation within capitalism, is a question we will examine shortly, in connection with the possibility of additional immanent critical tendencies.

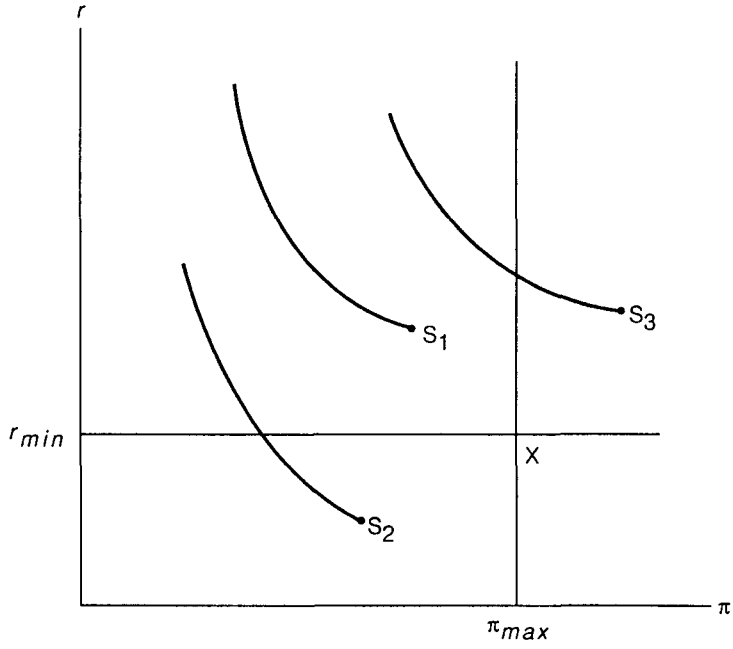

Figure 10.4 Hypothetical alternative consistent paths and crisis profiles

We may now combine the barriers with the consistent path of Chapter 7. In Figure 10.4, three paths are shown, for three different hypothetical economies. Assuming that the actual cyclical growth of each economy follows its consistent path reasonably closely, the three cases can be distinguished. The economy represented by S_1 evolves toward a steady-state position without encountering either barrier. This possibility suggests a capitalism in which accumulation may continue indefinitely, unless international events intervene, or political forces within the country emerge, on the basis of the cyclical process, to challenge its hegemony. There are, of course, historical situations that permit relatively crisis-free development for extended periods; the Scandinavian countries following the Second World War may serve as an example. This case offers a reminder that the theory of secular crisis does not

require an affirmation that every capitalist country in every set of circumstances must move inexorably toward its barriers.

Cases two and three represent economies that are prone to one or the other type of cyclical crisis triggering, and therefore to confrontation with one or the other type of barrier. Economy 2 is especially prone to chronic financial crisis, and its subsequent institutional transformation may reflect that fact. Economy 3, by contrast, faces particularly severe stagnation difficulties. While historical examples may be more epigrammatic than profound, it is tempting to suggest that Germany in the period of the Weimar Republic looks somewhat like a type 2 economy, while Great Britain in the 1960s and 1970s seems to fit the type 3 mold.

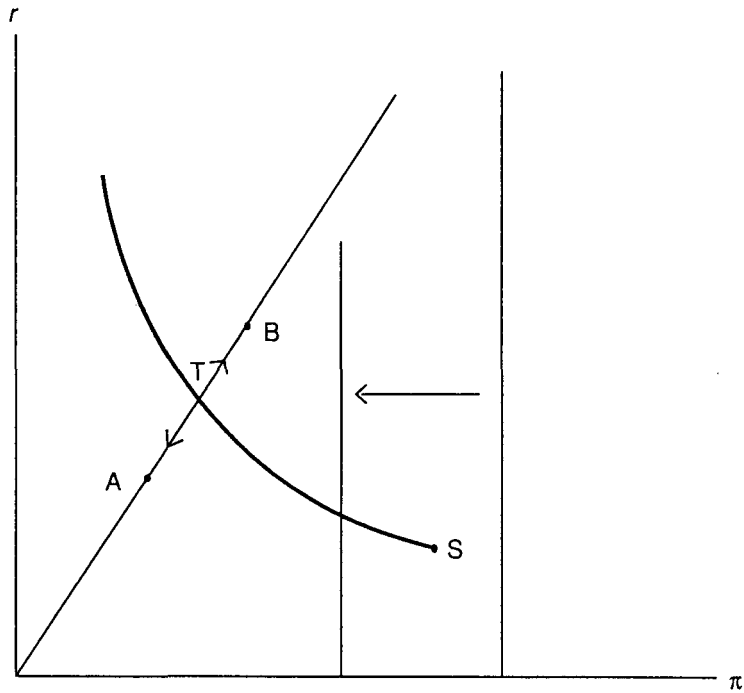

Figure 10.5 Relative autonomy: the actual accumulation path and the consistent path

It should be re-emphasized that an economy may not slavishly adhere to its consistent path. Remembering the autonomous component in π, a change in the balance of class forces may force a movement along the Q-ray in one direction or another, away from the consistent path. Refer to Figure 10.5. Beginning at T, a surge of working-class organisation and power may push the economy toward A; this is a genuine profit-squeeze. From the theory of the consistent path we know, however, that this will be accompanied by a steady rise in unemployment. Under capitalism, victories almost always have secondary consequences. If the rise in U does not force a rise in π and a return to the consistent path, this may be due to political transformation: the working-class movement may be strong enough to win government employment to replace the lost private-sector jobs. Or the pressure may not be contained in this way, and the stagnation barrier may move in (to the left). Alternatively, the rising power of capital may force a movement away from the path toward B. Capitalist victories also have consequences, and the tight labor market will intensify pressure on them to maintain profit rates. A possible solution in this instance may be immigration, or importation of 'guest workers'. Alternatively, an artificial cap may be placed on wages *via* an increasingly authoritarian 'incomes policy'. In any case, the autonomous component in the determination of π must be given full scope. We return to the question of interaction between the ray and the barriers below.

The question concerning the location of point S in relation to the barriers and point X draws our attention to the single critical tendency, rising Q, which we have been exploring up to this point. Is it the only one? If there are others, how are they related?

Here I will introduce one additional possibility: the role of the state, or government, sector, when that role becomes significant. I hope to indicate how government purchases and production can be integrated into the theory of accumulation.

Write Y for privately appropriated and marketed goods; G for public goods, either produced through government employment or purchased by government through taxation and distributed to the public; and X for total output: $X = Y + G$.

We will assume that G is exactly covered by taxation; theorization of deficit financing must wait until a general analytical approach to credit relations in the capitalist macroeconomy is available. W and P are now interpreted as *after-tax* wages and profits, respectively. No attempt will be made to address the old problem of tax incidence: who 'really' pays the taxes. In the present context, at least, that question does not seem meaningful.

The fundamental equation of accumulation must now be reworked. The after-tax profit rate is

$$r = \frac{Y}{K}\pi = \frac{X-G}{K}\pi \tag{10.1}$$

Let $\Psi = G/X$, the share of government expenditures or production in total output. Defining Q as the relation of the capital stock to *total* output X, we process the term

$$\frac{X-G}{K} = \frac{X}{K} - \frac{G}{X}\frac{X}{K} = \frac{X}{K}(1-\Psi) = \frac{1}{Q}(1-\Psi) \tag{10.2}$$

Finally, reinserting this term into the fundamental equation, we obtain:

$$r = \frac{1}{Q}(1-\Psi)\pi \tag{10.3}$$

This new form of the fundamental equation reveals *two* immanent critical tendencies: rising Q, long familiar; *and* rising Ψ. The latter trend emerges with late capitalism, and may come to replace the former as the dominant critical tendency.

To see how this may work, refer to Figure 10.6. The ray (I will now drop the 'Q') labelled A has drifted dangerously close to general crisis point X_1. The institutional transformation impelled by this is the rise in the active role of the government sector. This has impacts on both the ray and the barriers. The ray now continues to shift, past the point X_1 to position B. The rise in Ψ, however, has additional effects. The government spending consists in welfare and other support for the indigent, including (perhaps) unemployment compensa-

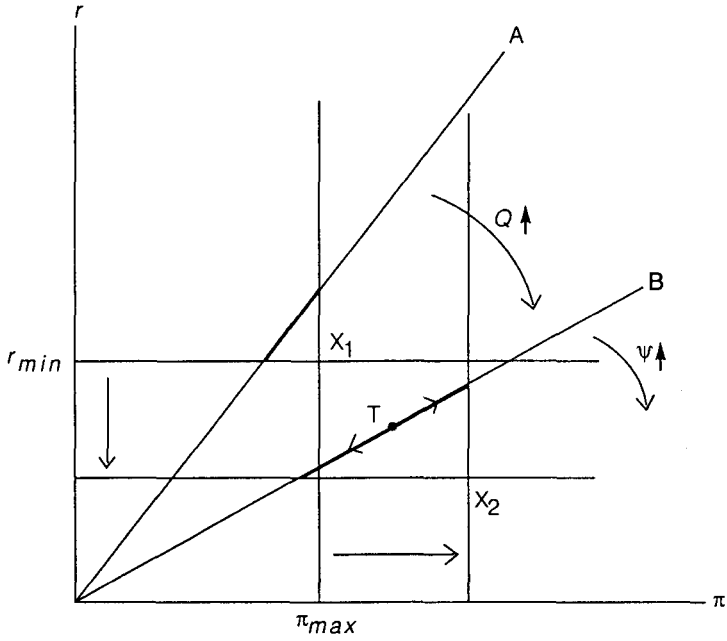

Figure 10.6 The state sector and multiple critical tendencies

tion; this is the 'social wage', and it mitigates the distress associated with the barriers. Government spending also encompasses financial bailouts, underwriting of banks, and so on – what might be called 'social profits'. This acts mainly on the financial barrier (although both forms of G may act on both barriers). The general effect of this new level of government activity is to shift the barriers out: down in the case of r_{min}, to the right in the case of π_{max}. The new general crisis point is X_2, and the ray approaches that point, under the impact of two critical tendencies, of which the second, rising Ψ, may now be dominant. The story is one of a race between the ray and the barriers.

The two phases – A–X_1 and B–X_2 – are separated by a fairly rapid change in the institutional environment, occasioned by the general crisis in the neighborhood of X_1. This approach to the interaction between the critical tendency ray

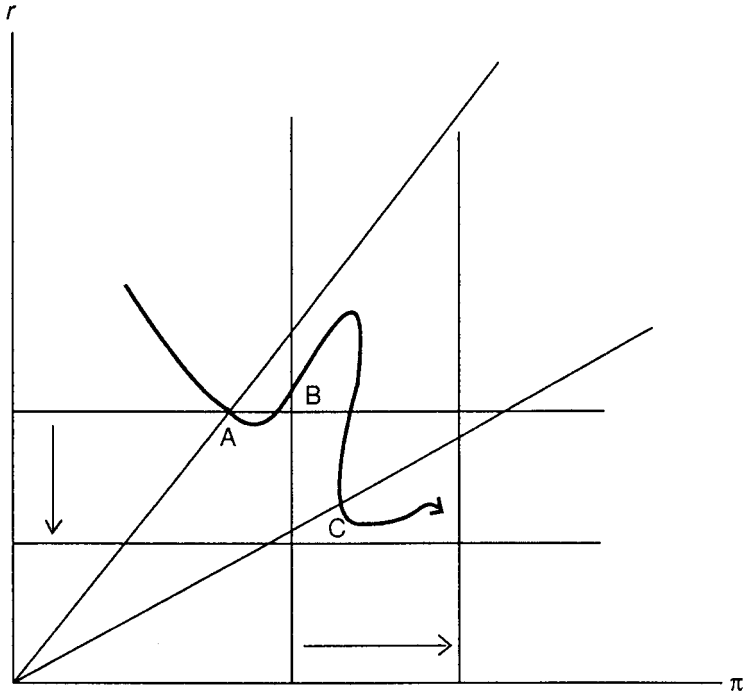

Figure 10.7 The USA: a stylized economic history

and the barriers clearly holds promise of grounding the periodization of capitalist history, or histories, in the theory of accumulation. We can begin to theorize stages, instead of simply postulating them in an *ad hoc* and arbitrary manner. As an example of how this might be done, I offer the following tentative and hypothetical approach to the history of US capitalism, using the tools developed in this chapter.

In Figure 10.7, a path is sketched with critical points A, B and C. In the phase prior to A, the dominant critical tendency is rising Q. The first financial barrier, in this interpretation, was encountered in the Great Depression of 1873–90. This major crisis promoted monopolization and growth of financial power, restoring the profit rate but leading up to the onset of the second Great Depression in 1929, at point B. The massive

social disorganization of the 1930s, coupled with the Second World War, initiated the new (state-monopoly) phase, with its quantitatively increased and active role of government. The balance of class forces in this period reflected the widespread mobilization of workers and popular struggle, and the profit rate was driven downward. Point C represents the postwar recovery – 'recovery' in the special sense of the return of capitalist hegemony – as reflected in the long postwar rise in the profit rate and share (see the discussion in Chapter 1). The barriers, of course, have receded, and the story continues.

This preliminary sketch of secular crisis theory may be concluded with two general points.

First, the model contradicts the usual sense of the political spectrum, according to which Marxism is at the left end, free market conservatism is at the right, and the liberal-Keynesian position occupies the center. Consider point T in Figure 10.6. The free-market conservatives are preoccupied with avoiding 'supply-side' crisis, represented by the financial barrier. In the language of 'restoring incentives', they urge policies to move the economy to the northeast away from that barrier, oblivious to the dangers of the stagnation barrier encountered in that direction. The Keynesians, in contrast, are obsessed with the stagnation barrier, and urge policies to move the economy down along the ray to the southwest. They cannot see the financial barrier, and the dangers it represents. Neither side of the orthodox political debate is able to see the contradictory process in its entirety, since neither side is able to embrace the idea that the problem of crisis is immanent, and has no lasting solution within capitalism. Marxism, by contrast, is able to see the process as a whole; its multi-dimensional view therefore occupies the *center*, so to speak, against the two one-sided positions within conventional macroeconomics.

Second, the model enables us to define two new varieties of crisis, and using those definitions to distinguish between the liberal–conservative polarity just described and an entirely new dimension of political conflict. Apart from the possible encounter with the barriers at X_2 (referring again to Figure 6), the rise in Ψ has a further critical impact: whatever its role in containing social tensions, the rise in the relative weight of

government is itself immanently contradictory. It represents a public principle in the organization of economic life, and this is dangerous to capitalist institutions, rooted in private property and the spontaneous valorization of social relations. The threat of devalorization is always present when a political principle enters into economic activity, regardless of the nature of current policy and the allegiances of the policy-makers. This threat may be termed *politicization crisis*; it is the great worry of the neoliberals, who wish to roll back the government sector.

The neoliberal imagination, however, is rooted in a free-market mythology, and it cannot imagine the potential effects of lowering Ψ. Remembering that the rise in Ψ – social wage, social profits – was the basis for the receding of the barriers, we may consider it likely that lowering the government share by abolishing those supports would bring the barriers up and in, from B to A in Figure 10.6, most likely with greater speed and in greater measure than their original downward and outward shifts. This may be called a *retrenchment crisis*; it constitutes a serious threat in many countries, where the neoliberal agenda is currently on the ascendant.

The general point is that the new left–right polarity within the mainstream centers on the southeast–northwest direction in the r-π plane, in contrast to the old one, ranging from southwest to northeast. And once again, Marxism is able to see the crisis potentials in both directions, since it can address the fact of secular crisis as an indicator of the irreconcilability of capitalist contradictions within capitalism.

REFERENCES AND SUGGESTED READING

The tendency/barrier confrontation, as noted above, owes much to Bronfenbrenner (1965), although the representation in (r, π) space is my own. The X point of general or absolute crisis is in Bronfenbrenner; I have changed the notation from Z to X for didactic reasons. ('Z' stood for *zussamenbruch*, or 'breakdown', a term with implications I would prefer to avoid.) The attempt to theorize the barriers draws on many

sources that I cannot pin down. The concept of a cycle becoming nonreproductive is due to Gordon *et al.* (1983). Some of the reasoning concerning financial crisis has roots in Eichner (1976), and Minsky (1982). I know of no prior attempts to bring the government (state) sector into the theory of accumulation; seminal references on the problem of the state in capitalist society in general are Miliband (1969), and O'Connor (1973); for a useful survey, see Das (1996). The schematic historical sketch of US capitalism was suggested to me by the discussion in Heilbroner (1985), who should however not be blamed for its specifics.

11 Multiple Sites and Comprehensive Crisis

Capitalist secular crisis can, as we have seen, be viewed as a confrontation between an immanent critical tendency and a set of barriers. In the last chapter, this conception was extended to include the possibility of more than one critical tendency. We examined two: the rising composition of capital, and the rising share of government production in total production. (An additional critical tendency arising from the evolving financial relation between inside and outside capitals may be posited for future investigation.) The identification of multiple critical tendencies enriches the theory of secular crisis; in particular, it provides a possible theoretical foundation for stages theory.

The multiple tendencies, however, were examined at only one *site*: that of the twin crisis potentials of falling r and rising π. Our final question in this essay concerns the possibility that critical tendencies may operate at *multiple sites*. What, then, would these various sites be? What critical tendencies are at work at each of them? And, how are the sites/tendencies interrelated? We have been concerned with substantiating the barriers at the r-π site – determining their positions, at least in principle. The multiplicity of sites offers the possibility that barriers at one site are governed by crisis points X_i at another.

This is the most complex level of crisis theorizing, and it should be unnecessary to remark that the explorations in this chapter are highly tentative beginnings only.

I will identify three sites that may be called *substantive* (there may, of course, be others). The r-π site will retain the r_{min} barrier as internal to that site; it therefore comes to represent the *financial site*, the locus of contradictions involving intercapitalist relations and control. The stagnation barrier will be removed to a *consumption site*, at which problems of effective demand will confront a different set of problems: those involving the role of consumption, especially the relative size and quality of capitalist consumption, in social legitimation.

The third substantive site will be the *workplace site*. Here the complex structures of discipline, control and incentive at the point of production will come under scrutiny.

A fourth site, which I place in a non-substantive category because its barriers are entirely derived from other sites, may contain the most fundamental critical tendency of all: rising productivity, y. Call this the *central site*. We may then identify the sites by the variable that serves as the critical tendency at that site. (Full explanation of each site follows below.)

Site	*Critical variable (s)*
Central	y
Financial	Q, Ψ
Consumption	π
Workplace	w (the real wage rate)

The central site relies on a simple identity:

$$\pi = \frac{P}{Y} = \frac{Y-W}{Y} = 1 - \frac{L}{Y}\frac{W}{L}$$
$$\pi = 1 - \frac{1}{y}w \tag{11.1}$$

This is drawn as Figure 11.1, with π on the vertical and w on the horizontal axis. (11.1) has a vertical intercept at 1, and slope of $-1/y$. The critical tendency, of course, is rising productivity; as y rises, the absolute value of the slope falls and the line pencils upward, as shown. This critical tendency, it should be noted, always unfolds with full force. It is confirmed empirically in a massive way, and – apart from specters of deep ecology positing absolute limits to human productivity growth – is non-controversial. Unlike rising Q, there is no question concerning the proximity of a point like S at which the tendency ceases to operate.

I posit barriers w_{max} and π_{max} in Figure 11.1, as shown. The tendency–barriers dynamic is then evident. The π_{max} barrier is, of course, the stagnation barrier from the last chapter; that barrier will soon be redefined, and π will re-emerge as the carrier of the critical tendency at the consumption site. The

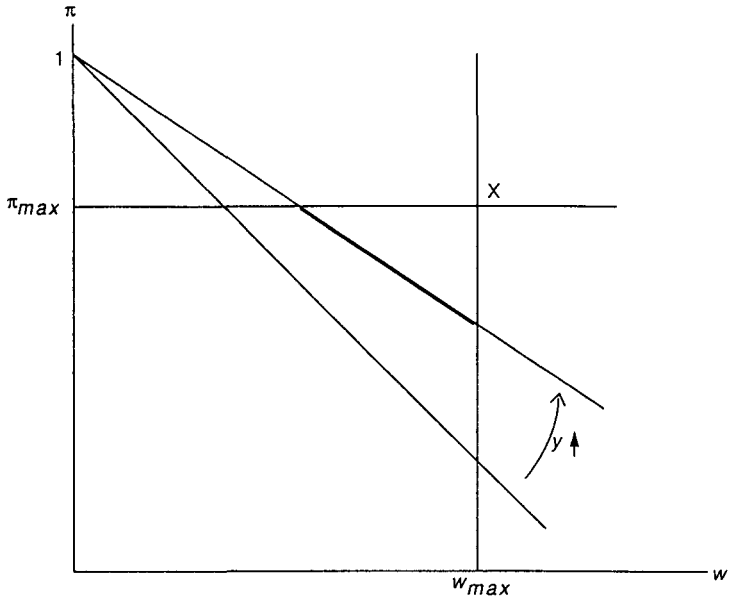

Figure 11.1 The central site: rising productivity

w_{max} barrier suggests that a rising real wage rate is an immanent critical tendency. This may seem strange, since falling real wages constitute the most obvious source of tension and crisis, especially to those receiving them! I will argue, however, that *rising* productivity and real wages may be the true Achilles Heel of capitalism. One virtue of the tendencies/barriers/sites analysis is that it forces us to focus on aspects of capitalist production relations that might not have been apparent previously.

The role of real wages is most evident at the workplace site, and we now turn our attention there. Of the many and varied aspects of the evolving social relations in the workplace, I will single out the twin problems of incentive and control as central. In addition to the real wage rate w, a concept will be needed to capture the quality of autonomy and creativity, or lack thereof, characterizing a given work process. The aspects of the labor process with which we are concerned are the

managerial and the *creative*; for present purposes, these will not be separated. We will want to know, however, to what extent the managerial and creative aspects of the labor process are monopolized by a managerial–technical elite, under the direct control of the capitalist ownership; or, conversely, to what extent they are *devolved*: diffused widely among the workforce. The degree of devolution of managerial and creative qualities of labor is closely related to the technical change choice. In our first attempt at formalizing this feature of the labor process (see Chapters 3–7), it was assumed that the Q^* decision does not limit or constrain the devolution decision, so that the latter may be examined independently of other strategic accumulation decisions.

Without entering into the difficult area of measurement, I define the *devolution ratio*, D, as the proportion or share of labor of the general workforce that has creative and/or managerial qualities. It is intended to be a useful measure, ultimately, of the extent of democratization of the labor process.

It may seem surprising to posit any degree of democratization of the labor process under capitalism; refer to Marx's portrait of the almost military discipline of the factory system of industrial-revolution England. The fact that this reference is to the nineteenth century, however, prompts us to inquire into this more fully. A defining feature of capitalist social relations, as noted previously, is the valorization of the worker–capitalist relation. At capitalist levels of the productive forces, the reproduction of class exploitation would not be possible without this valorization (see the discussion in Chapter 2). Workers must not only appear as autonomous sellers of labor power; they must actually *be* autonomous and independent. Capital moves into any sphere of production that it can, spreading and conquering. It cannot, however, appropriate the industry that produces labor-power itself, which must continue to reside in an independent working-class household sector. (This is the foundation for the specific quality of the household, and of gender relations, in capitalist society.)

The juridical independence – the citizenship – of the exploited class in capitalist society also affects the workplace environment. Unlike victims of precapitalist exploitation,

workers require incentives as well as responding to coercion and control; incentives in turn require a certain democratization of production, involvement in planning and organization. The level of D, then, reflects qualitative requirements of capitalist production, as well as the history of workplace struggle and demands made by workers concerning their work environment and roles.

The central concept underlying the workplace site is the insight that *incentive* (motivation) and *control* (discipline) respond in different ways to D. As D rises, for example, at a given level of the real wage rate and in given conditions of consciousness and working-class power a barrier will be encountered; the result is a significant and sudden loss of control on the part of the capitalist over the pace and conditions of work. The need of the capitalist or its surrogates to remain dominant within the production relations places an upper limit on D. The stronger the workers are, the sooner this limit will be encountered. The single most important variable governing (and reflecting) the strength of the working class within the capitalist production relation is the real wage rate. I assume, therefore, that the *control ceiling* (CC) falls as the real wage rate rises. With D plotted against the real wage rate w (see Figure 11.2), the control ceiling slopes downward as shown.

Lowering D, however, leads in the direction of another limit, given the character of the workplace as 'contested terrain'. The autonomy of labor-power, described above, carries over into the workplace. Incentive is needed if workers are to be induced to maintain standard levels of productivity, unless there is to be a degree of regimentation inconsistent with capitalist technological and social development. As D falls, it encounters a range at which incentive is significantly undermined; this is the *incentive floor* (IF). The IF also depends, positively this time, on the real wage rate: the stronger the workers the greater the incentive required, and the higher therefore must be the critical devolution ratio at or below which incentive falls off significantly.

The intersection of CC and IF in Figure 11.2 determines a maximum real wage rate, w_{max} – a w at which chronic control

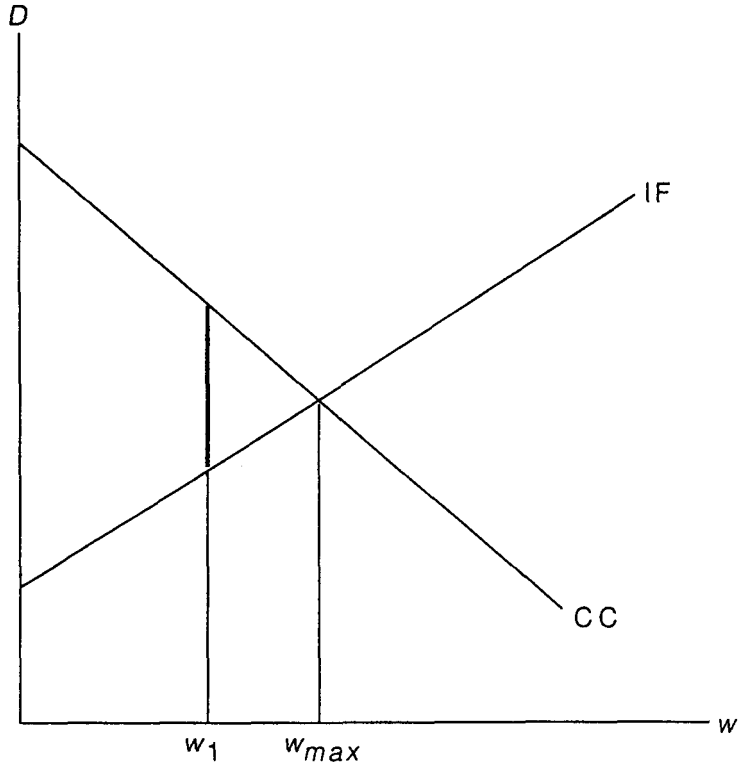

Figure 11.2 The workplace site: antagonistic discipline and rising real wages

and incentive problems in the workplace must be encountered simultaneously. This level of w becomes the w barrier at the central site.

As noted, from the standpoint of working-class *consumption*, it is difficult to imagine a high wage rate being a source of crisis. It is, however, important to look at the effect of a given variable on a specific site, and in the context of the workplace the rising real wage is an immanent critical tendency of a high order. As long as $w < w_{max}$, there exists a feasible range of D strategies, represented in Figure 11.2 by

the heavy part of the vertical extending from w_1. That range vanishes as the real wage approaches w_{max}.

The positions and possible shifts of CC and IF require further analysis. In particular, the position, and even the existence, of w_{max} depend significantly on ideological factors – especially on the conditions for existence of consciousness of alternatives to capitalist organization in the workplace and in society at large. The CC/IF framework, however, provides initial substantiation of the w_{max} barrier in π-w space (Figure 11.1), and establishes a framework for thinking about the ultimate determinants of that barrier.

We now turn to the substantiation of π_{max}. We may begin with the simple identity:

$$\begin{aligned} \frac{P}{Y} &= \frac{C}{Y} + \frac{I}{Y} \\ \pi &= L + J \end{aligned} \tag{11.2}$$

Here, C is *capitalists'* consumption, consumption out of profits; I, of course, is investment. (As before, we make the classical savings assumption: there are no workers' savings to help finance investment.)

The ratio of capitalists' consumption to total income, $L = C/Y$, is a more-or-less visible indicator of class. The lifestyle of the industrial capitalist class of the robber-baron era in the United States was imprinted on popular consciousness, and undoubtedly played a role in the growth of socialism in the decades surrounding the turn of the twentieth century. A given level of L may result in different degrees of visible conspicuous consumption. As the twentieth century progressed, visibility was decreased, for either conscious or unconscious reasons – at least until the (re)emergence of stretch limos and 'lifestyles of the rich and famous' in the Reagan–Bush period. With the general style of ruling-class consumption and the degree of visibility more or less fixed in a given period, rising levels of L arguably generate crisis in the legitimacy of the social order. L therefore rises toward a barrier, L_{max}, at which there occurs a *legitimation crisis*. This might take the form of a surge in working-class rejection of capitalist hegemony – in

simplest terms, a wave of outrage at the inequity of the distribution of income. (I have borrowed Jurgen Habermas' term for the critical process at the L_{max} barrier; his use of it is more in keeping with the 'politicization crisis' of Chapter 10.)

Lowering L, on the other hand, inhibits the use of *power consumption* (a generalization of the yuppie term 'power dressing') to regulate relations within the social upper-class. Its main impact, however, as implied by Equation 11.2, is the release of surplus for purposes of investment. We therefore posit a barrier at J_{max} which becomes the 'stagnation barrier' earlier associated with π_{max}. This barrier, of course, needs further substantiation (see Chapter 10). The legitimation barrier, L_{max}, on the other hand, is what may be called a *fundamental barrier*: while it is not precisely determinable,

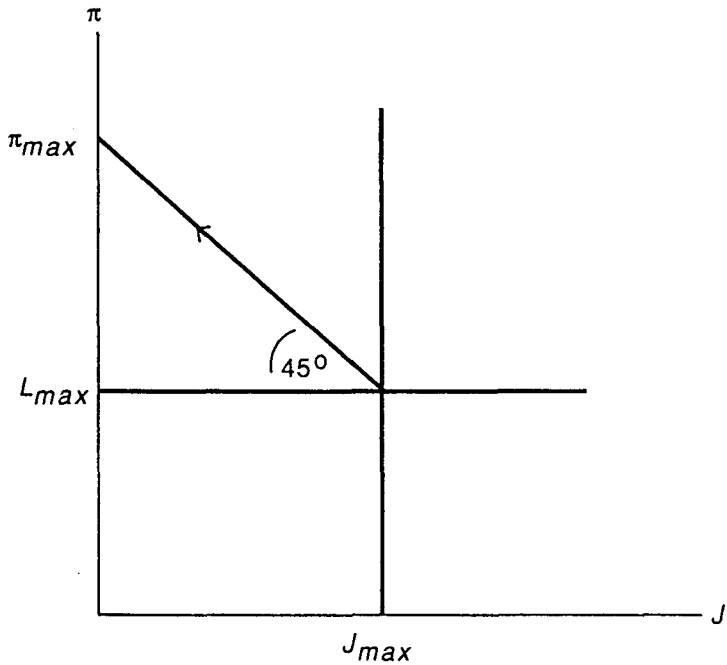

Figure 11.3 The consumption site: legitimation crisis and liquidation crisis

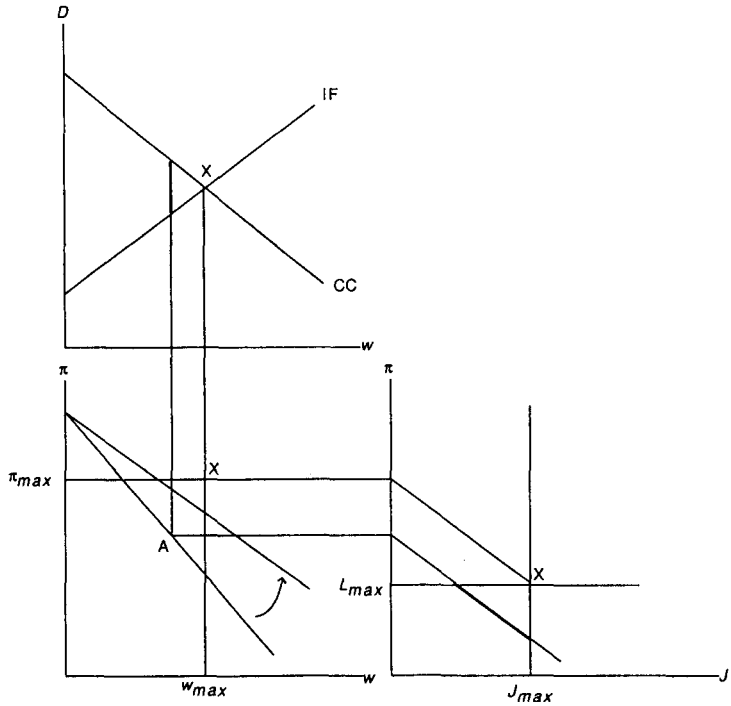

Figure 11.4 Combining the central, workplace and consumption sites

and its effectuation will always be in some doubt, it is not susceptible to further analytical decomposition.

The stagnation and legitimation barriers jointly determine π_{max}, as shown in Figure 11.3, which is a direct representation of Equation 11.2.

The workplace and consumption sites can be brought together with the central site; this is shown in Figure 11.4, which combines Figures 11.1–11.3 into a single interactive framework. The point A in π-w space may be taken to represent the position of a capitalist economy at a given moment in its evolution. This position determines a feasible range for D, shown as the heavy line segment in the top panel; and, simultaneously, a feasible region for L and J between the

legitimation and stagnation barriers, shown as the heavy segment in the right-hand panel.

Now the operation of the critical tendency can be clearly seen. Rising productivity forces the tradeoff between π and w – Equation 11.1 – to rotate upwards, as shown by the arrow in the bottom left panel. As the ray approaches the contact point X, the feasible regions for D and between L_{max} and J_{max} progressively shrink toward their respective contact points. The system experiences a progressively worsening tradeoff between control–incentive balance in the workplace, on the one hand; and maintenance of effective demand simultaneously with preservation of the income distribution consensus, on the other.

The story thus far can be summarized using a causal-chain representation similar to those introduced in Chapter 9:

$$y \uparrow \Rightarrow \begin{cases} w \uparrow \Rightarrow \text{workplace control crisis} \\ \pi \uparrow \Rightarrow \begin{cases} L \uparrow \Rightarrow \text{legitimation crisis} \\ J \uparrow \Rightarrow \text{demand crisis} \end{cases} \end{cases}$$

The notation and argument here should be self-explanatory. Assuming the several barriers are well substantiated, and that there are diminishing returns involved in any mechanism enabling them to be shifted outward (that is, in a crisis-offsetting direction), they constitute a powerful argument linking an inexorable developmental process – rising productivity – to comprehensive crisis.

Finally, we may bring the original financial site back into the picture. This is done in Figure 11.5, which joins the financial site (left panel) to the central site (right panel). (The other sites could easily be added, but nothing new is gained, once we know their role in determining w_{max} and π_{max}.) Unfortunately, the axes must now be reversed for the financial site, with r on the horizontal axis and π on the vertical. The fundamental equation then takes the inverse form $\pi = Qr$. A consistent path is drawn in the left panel, with direction of movement shown by the arrow.

The two immanent critical tendencies (rise in Q, rise in Y) operate from point A. Assuming the economy stays on or

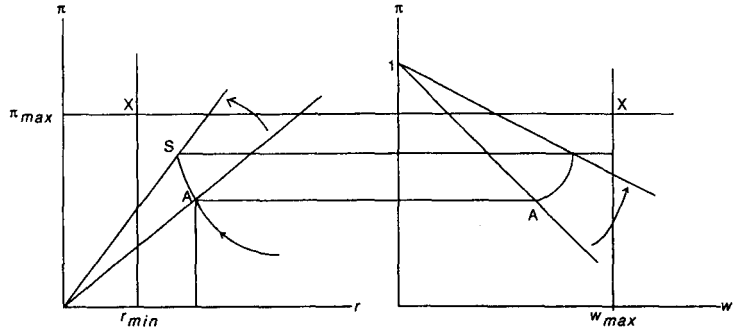

Figure 11.5 The financial and central sites

close to the consistent path, the dynamics of π are given, and the path of w is therefore determined by the growth in y – an ironic parallel to the orthodox neoclassical view of wages as governed by marginal productivity! If the consistent path crossed the π_{max} barrier – the type 3 economy of the last chapter – the ultimate barriers at the consumption site would be triggered: the economy would face chronic realization or legitimation crisis. As drawn, the consistent path is a type 1 path, which stops short of X at the financial site. After π has risen to π_s, the level associated with the steady-state point S, it will rise no further. The entire burden of the continuing rise in Y, then, will be borne by real wages, which rise until contact with w_{max} A type 1 economy, therefore, will experience structural crisis at the workplace site.

The linkages between the fundamental critical tendencies, especially rising y, and the barriers require further investigation. Some obvious hypotheses suggest that the tendencies may operate to shift the barriers adversely. Thus, rising y must eventuate in either rising w or rising π (Equation 11.1). Take these in turn. First, rising real wages suggest that the legitimation barrier, L_{max}, may fall (high-wage workers will be more aware of, and sensitive to, the power consumption of the social elite); this in turn implies a fall in π_{max}. Second, a rising profit share requires a rise in either the capitalist consumption ratio or the investment ratio (Equation 11.2). The former may

bring about a fall in w_{max}, as the increasing legitimation tension in society at large undermines workplace authority, shifting CC down and/or IF up; the latter provokes realization jitters, and this may lead to an increase in r_{min}.

This four-site story is not intended to 'close' the theory of capitalist accumulation, nor to provide a precise path toward some inexorable global secular crisis. First, this sort of item-by-item causal structuring shares many of the difficulties of another model that is similar in structure, although not in content: the static macromodel of Keynesian theory. The model is not robust with respect to dynamics: as soon as the critical tendencies operate, the various panels may interact in ways that preclude any simple prediction of the outcome. Moreover, all sorts of links may be postulated among the sites; for example, a shifting rate of growth and r_{min} is bound to have some effect on the class struggle at the workplace site, and the latter will be connected to the social legitimation barriers. If the ray at the financial site reflects the economic role of the state (the second critical tendency developed in Chapter 10), this will surely affect the balance of class forces in the workplace, social environment, and investing climate. It is, I think, both a strength and a weakness of the model that it brings out all of these possible interconnections, and more.

A further aspect of the model's role in highlighting interconnections is its potential for interfacing several different areas of investigation, which until now have largely gone their separate ways. The canonical tendencies/barriers model shows that the Marxist theory of the capitalist socioeconomy actually synthesizes the partial and therefore superficial views of mainstream liberals and conservatives. The story interrelating the various sites suggests, further, that investigators working at the different sites are actually contributing toward a 'unified field theory' on a higher plane (even if we forego the possibility of some sort of ultimate or complete unification).

To illustrate: the workplace is the site of numerous excavations, from classical to present-day, including the work of Marxism-inspired labor economists and institutionalists. The consumption site, home of the legitimation and stagnation barriers, has been explored in detail by the Keynesian tradition,

the literature on the sociology of consumption and on lifestyles of the social upper classes. The classical profit-rate terrain (the financial site) has a long line of investigators. Financial crisis and stagnation call to mind the extremely rich post-Keynesian tradition plus any number of Marxist writers on finance. Finally, Marxist, near-Marxist, and non-Marxist but anti-neoclassical writers have addressed the issues of effective demand in relation to growth. The attempt at a comprehensive secular crisis model thus contributes to overcoming sectarianism and isolation among the many laborers in the diverse vineyards of the political economy of capitalism.

Finally, the model speaks to the crucial issue of the relation between determinism and contingency. The central paradigm, consisting of the progressive confrontation of a critical tendency with a set of barriers, suggests a view in which the contradictions of capitalism unfold with iron logic, almost independent of human will and political action. Examination of both tendencies and barriers, however, shows that, despite the invocation of necessity and determinacy at many points, the processes described – especially the barriers – are ultimately based on political and cultural factors. Whether and when an incentive/control crisis develops in the workplace (at the 'point of production'), for example, depends crucially on whether and to what extent the working class has achieved ideological and organizational independence; similarly for legitimation crisis, politicization crisis, and, perhaps less obviously, for the forces determining the minimum growth rate. A central question at each site, as previously noted, is: How much will the working class tolerate?

While there can be no simple answer to that question, it is important to establish that capitalist accumulation – in general, not necessarily in every conjuncture or at every moment in time – is forced to ask the working class to tolerate *more and more* as it proceeds. We are here theorizing the concept that capitalism is indeed a maturing, and therefore historically delimited, form of social and economic organization. This matters not only (or even mainly) for the purpose of assuring ourselves that working-class conscious will, in time, emerge to new levels and open up new political possibilities.

It is vital for Marxists to learn *how* the pressures build up, so that we can better organize resistance and opposition and assist in the process leading from class experience to consciousness, confidence, and action. Studying the 'laws of motion' of capitalism, not only in the immediacy of particular struggles and political formations but also in the abstract, remains an essential task. It is all the more crucial that this task be approached using all the available tools of modern social and economic analysis.

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The 'sites' geometry is my own. The most important suggestion provided by the comprehensive model is the possibility of unification of perspectives and interchange of ideas among those working at the various sites.

The point of production (workplace) site was a major interest of Marx (1967, Volume I, parts III–V). Recent investigators include Braverman (1974); Gordon *et al.* (1982); Edwards (1979); Schor (1991).

The consumption site, effective demand aspect: Keynes (1961); Kalecki (1968). Also, Robinson (1962); Kaldor (1960); Garegnani (1991). Consumption site, legitimation aspect: Veblen (1975); Habermas (1975); Domhoff (1967); Lundberg (1968).

The terrain of the trend in the profit-rate has already been referenced extensively. Substantiation of liquidation crisis and the financial barrier, however, must draw heavily on the post-Keynesian financial tradition (Minsky, 1982; Davidson, 1972), and on some Marxist writers (de Brunhoff, 1978; Foley, 1986).

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