

THE PURCHASING-POWER PARITY DOCTRINE: A REAPPRAISAL

BELA BALASSA

Yale University

I

THE purchasing-power parity doctrine has had its ebbs and flows over the years. Interest in the doctrine arose whenever existing exchange rates were considered unrealistic and the search began for the elusive concept of equilibrium rates. It was first invoked—although in somewhat ambiguous terms—in the period of the Napoleonic wars,¹ it received its christening at the hands of Gustav Cassel during World War I,² and it was resurrected after World War II.³ It has also had its critics, among others Taussig after World War I⁴ and Haberler after World War II,⁵ but it has managed to survive nevertheless.

In recent years, new efforts have been made to clothe the purchasing-power parity doctrine in the garments of respectability, and a proposal has also been put forward to use this doctrine as a guide in establishing equilibrium exchange rates.⁶ At the same time, new

statistical material has become available that has a bearing on the relationship between purchasing-power parities and exchange rates. It may be of interest, therefore, to reexamine the claims put in for the validity of the purchasing-power parity doctrine.

The purchasing-power parity doctrine means different things to different people. In the following, I shall deal with two versions of this theory that can be appropriately called the “absolute” and the “relative” interpretation of the doctrine. According to the first version, purchasing-power parities calculated as a ratio of consumer goods prices for any pair of countries would tend to approximate the equilibrium rates of exchange. In turn, the relative interpretation of the doctrine asserts that, in comparison to a period when equilibrium rates prevailed, changes in relative prices would indicate the necessary adjustments in exchange rates.

II

Although his name has come to be associated with the relative interpretation of the purchasing-power parity doctrine, Cassel also formulated the absolute hypothesis by arguing that “the rate of exchange between two countries will be determined by the quotient between the general levels of prices in the two coun-

⁶ L. B. Yeager, “A Rehabilitation of Purchasing-Power Parity,” *Journal of Political Economy*, December, 1958, pp. 516–30; and H. S. Houthakker, “Exchange Rate Adjustment,” *Factors Affecting the United States Balance of Payments* (Washington: U.S. Congress Joint Economic Committee), pp. 287–304.

¹ For references, see Gottfried Haberler, *A Survey of International Trade Theory* (rev. ed.; “Special Papers in International Economics,” No. 1 [Princeton, N.J.: International Finance Section, Princeton University, 1961]), pp. 46–47.

² Gustav Cassel, “Abnormal Deviations in International Exchanges,” *Economic Journal*, September, 1918, and further writings cited below.

³ Cf., for example, A. H. Hansen, “A Note on Fundamental Disequilibrium,” *Review of Economics and Statistics*, November, 1944 (reprinted in *Foreign Economic Policy for the United States*, ed. S. E. Harris [Cambridge, Mass., 1948]).

⁴ F. W. Taussig, *International Trade* (New York, 1927), chap. xxvi.

⁵ Gottfried Haberler, “The Choice of Exchange Rates after the War,” *American Economic Review*, June, 1945.

tries.”⁷ Further, “at every moment the real parity between two countries is represented by [the] quotient between the purchasing power of money in one country and the other. I propose to call this parity ‘the purchasing power parity.’ As long as anything like free movement of merchandise and a somewhat comprehensive trade between two countries takes place, the actual rate of exchange cannot deviate very much from this purchasing power parity.”⁸

Most recently, the absolute interpretation of the purchasing-power parity doctrine has been invoked by Hendrick Houthakker, who has expressed the opinion that the relative price levels of consumer goods provide an indication of the over- or undervaluation of individual currencies. Relying on purchasing-power parity calculations made by the German Statistical Office, Houthakker concludes that “in terms of purchasing power the dollar is now [in March, 1962] worth 22 cents less than it is at the official exchange rate of 4 German marks to the dollar. This implies a very substantial overvaluation of the dollar which can certainly not be wholly attributed to statistical defects of the calculation.”⁹ Houthakker also argues that, while the U.S. dollar appears to be overvalued as compared to the German mark, the mark itself is overvalued, and the Austrian shilling, the Danish crown, and especially the Dutch guilder, undervalued.¹⁰

⁷ Gustav Cassel, “The Present Situation of the Foreign Exchanges,” *Economic Journal*, March, 1916, p. 62.

⁸ “Abnormal Deviations . . .,” *op. cit.*, p. 413. See also *The World's Monetary Problems* (London: Constable, 1921), p. 36, and “The International Movements of Capital,” in *Foreign Investments, Lectures on the Harris Foundation* (Chicago: University of Chicago Press, 1928), pp. 8–9.

⁹ “Exchange Rate Adjustment,” *op. cit.*, p. 297.

¹⁰ *Ibid.*, p. 298.

If we were to apply this principle also to the less developed countries, their currencies would generally appear to be greatly undervalued. According to calculations made by M. F. Millikan, in comparison to the U.S. dollar, the ratio of purchasing-power parity to the exchange rate was 0.29 for southeast Asia and 0.27 for Africa in 1950.¹¹ Now, given that Houthakker proposes to correct the alleged overvaluation of the U.S. dollar by devaluation, the corresponding adjustment would entail a substantial appreciation of the currencies of the developing countries. Since this recommendation can hardly be taken seriously, the question arises what meaning can be attached to an international comparison of exchange rates and purchasing-power parities.

This question can be answered at various levels of abstraction. First, let us amend the traditional two-country, two-commodity model of international trade theory by introducing a non-traded good (services). Assume further the existence of one limiting factor, labor, and constant input coefficients *à la* Ricardo, when one of the countries has an absolute advantage in the production of all commodities but this advantage is greater in regard to traded goods (agricultural and manufacturing products) than for the non-traded commodity (services). Under the assumption of constant marginal rates of transformation, the relative price of the non-traded commodity will thus be higher in the country with higher productivity levels than in the other.

Since the prices of traded goods are equalized in the two countries through

¹¹ Statement before the Subcommittee on Foreign Economic Policy of the Joint Committee on the Economic Report, *Hearings, Foreign Economic Policy*, 84th Cong., 1st sess., 1955, pp. 21, 28 (cited in C. P. Kindleberger, *Economic Development* [New York: McGraw-Hill Book Co., 1958], pp. 2–3).

international exchange, this proposition can also be formulated in terms of absolute prices, for instance, by expressing prices in terms of wage units. Correspondingly, whether or not we use the first or the second country's consumption patterns as weights, the purchasing-power parity between the currencies of the two countries, defined as the ratio of the price level of the second country to that of the first, will be less than the equilibrium rate of exchange, expressed in terms of the currency of the first country. Thus,

$$\frac{\sum p_2 q_1}{\sum p_1 q_1} < r_1^2, \quad \text{and} \quad \frac{\sum p_2 q_2}{\sum p_1 q_2} < r_1^2. \quad (1)$$

In other words, assuming that international productivity differences are greater in the production of traded goods than in the production of non-traded goods, the currency of the country with the higher productivity levels will appear to be overvalued in terms of purchasing-power parity. If per capita incomes are taken as representative of levels of productivity, the ratio of purchasing-power parity to the exchange rate will thus be an increasing function of income levels.

$$\frac{PP_1^2}{r_1^2} = F(y_2^1). \quad (2)$$

In a more general model, additional factors of production are introduced and the assumption of constant coefficients in production is relaxed. Still, the relationship shown under equation (2) can be obtained if we retain the assumption that international differences in productivity are greater in the sector of traded goods than in the non-traded goods sector. Assuming that invisibles and capital movements do not enter the balance of payments, the following reasoning can be applied.

a) In the absence of trade restrictions, the exchange rate will equate the prices of traded goods, with allowance made for transportation costs.

b) Under the assumption that prices equal marginal costs, intercountry wage-differences in the sector of traded goods will correspond to productivity differentials, while the internal mobility of labor will tend to equalize the wages of comparable labor within each economy.

c) With international differences in productivity being smaller in the service sector than in the production of traded goods, and wages equalized within each country, services will be relatively more expensive in countries with higher levels of productivity.

d) Since services enter the calculation of purchasing-power parities but do not directly affect exchange rates, the purchasing-power parity between the currencies of any two countries, expressed in terms of the currency of the country with higher productivity levels, will be lower than the equilibrium rate of exchange.

e) The greater are productivity differentials in the production of traded goods between two countries, the larger will be differences in wages and in the prices of services and, correspondingly, the greater will be the gap between purchasing-power parity and the equilibrium exchange rate.¹²

These results can now be compared to those implicit in the absolute interpretation of the purchasing-power parity doctrine. According to the latter, purchasing-power parities calculated for any pair of countries would tend toward equality with exchange rates, while the above dis-

¹² This conclusion is further strengthened if we consider that services are relatively labor-intensive, since higher wages will raise the relative price of services in countries with high levels of productivity.

cussion points to the existence of systematic differences between purchasing-power parities and exchange rates. Were we to express exchange rates in terms of gold and calculate purchasing-power parities by using some standard system of weighting, the absolute interpretation of the doctrine would admit the possibility of purchasing-power parities being randomly distributed around exchange rates—at least in the short run. By comparison, the arguments of the present paper lead us to expect random deviations to occur around a curve indicating the relationship between the ratios of purchasing-power parities to exchange rates, on the one hand, and per capita income levels, on the other.

III

In attempting to provide an empirical verification of the above proposition concerning the relationship of purchasing parities, exchange rates, and income levels, some questions regarding the calculation of purchasing-power parities need first to be considered. By reason of inter-country differences in productive endowments and tastes, in these calculations we face the well-known index-number problem. The results will depend on the choice of weights—in the present case, the final bill of goods consumed in individual countries.

If differences in tastes do not counterbalance differences in productive endowments, there will be a tendency in each country to consume commodities with lower relative prices in larger quantities. Correspondingly, the purchasing power of Country II's currency will be underestimated, if Country I's consumption pattern is used as weights, and overestimated if the weights are the final bill of goods consumed in Country II. This result has, in fact, been obtained in an in-

vestigation of several industrial countries. The estimates derived by the use of the two measures in a comparison of European economies and the United States are shown in columns (3) and (4) of Table 1. It is customary to use a geometric average of the two values in empirical work, although this average lacks a specific economic meaning.

The importance of weighing can also be seen in a comparison of the cost of household services in the United States and Italy for the year 1950, as given in a study by M. Gilbert and I. B. Kravis (Table 2). After conversion at exchange rates, domestic services in Italy appear to have cost one-fifth of the amount paid in the United States, barber and beauty shop services one-fourth, and laundry and drycleaning about the same. At the same time, the purchasing-power equivalent for household services was 391 lira at U.S. weights and 165 at Italian weights, as against the exchange rate of 625 lira to the dollar.

Information provided by Gilbert and Kravis further provides evidence of the relatively high cost of services in countries with higher income levels that has been the cornerstone of my exposition. Ratios between purchasing-power equivalents and exchange rates for the year 1950 are shown in Table 3 with regard to groups of services for which information is available.

Taken in conjunction with available evidence on the tendency for interindustry wage equalization in individual countries,¹³ the data appear to bear out my contention that international productivity differences in the service sector are

¹³ I. B. Kravis, "Wages and Foreign Trade," *Review of Economics and Statistics*, February, 1956, pp. 14-30, and B. Balassa, "An Empirical Demonstration of Classical Comparative Cost Theory," *Review of Economics and Statistics*, August, 1963, p. 238.

considerably smaller than in the production of traded goods, raising thereby the cost of services in high-income countries. A uniform pattern is shown in comparisons of the United States and Europe, and within Europe services are by and large cheaper in countries with relatively low incomes.

In Italy, the country with the lowest income levels among those considered, services cost, on the average, one-third of their cost in the United States in 1950, while for Germany and the Netherlands the corresponding figures were 38-43 per cent, and for the remaining group of countries (Belgium, Denmark, France,

TABLE 1
PURCHASING-POWER PARITIES FOR GROSS NATIONAL PRODUCT IN 1960
(National Currency per U.S. Dollar)

Country	Currency Unit	Official Exchange Rate	At U.S. Quantity Weights	At National Quantity Weights	Geometric Mean of Cols. (3) and (4)	Purchasing-Power Parity as a Percentage of Exchange Rate $100 \times (5) \div (2)$	Income Per Capita
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
United States.	Dollar	1	1	1	1	100.0	2051
Canada.	Dollar	0.996	.....	.....	0.921	92.8	1550
Belgium.	Franc	50.0	44.4	36.5	40.2	80.4	1273
France.	Franc	4.903	4.47	3.23	3.80	77.4	1152
Germany.	Mark	4.171	3.86	2.73	3.25	77.9	1200
Italy.	Lira	620.6	574	330	435	70.1	704
Netherlands.	Florin	3.770	2.96	2.13	2.51	66.6	1166
United Kingdom.	Pound	0.357	0.338	0.225	0.294	82.4	1212
Denmark.	Krona	6.906	6.06	4.70	5.34	77.4	1269
Norway.	Krona	7.143	6.81	4.84	5.74	80.4	1186
Sweden.	Krona	5.180	.....	.....	4.66	90.0	1307
Japan.	Yen	359.6	.....	.....	225	62.6	507

Source: All countries, excepting Canada, Belgium, and Norway: I. B. Kravis and Michael W. S. Davenport, "The Political Arithmetic of International Burden-Sharing," *Journal of Political Economy*, August, 1963, pp. 327-29; Canada: *Wirtschaft und Statistik* (1962), p. 445; Belgium and Norway: our estimate derived from Milton Gilbert and Associates, *Comparative National Products and Price Levels* (Paris: OECD, 1958), p. 86, and national statistics.

TABLE 2
PURCHASING-POWER EQUIVALENTS IN HOUSEHOLD AND PERSONAL SERVICES IN 1950: UNITED STATES AND ITALY
(Lira per U.S. Dollars)

	PURCHASING-POWER EQUIVALENT		PURCHASING-POWER EQUIVALENT AS A PERCENTAGE OF EXCHANGE RATES	
	U.S. Quantity Weights	Italian Quantity Weights	U.S. Quantity Weights	Italian Quantity Weights
Domestic services.	136	136	21.8	21.8
Laundry, dry cleaning.	628	628	100.5	100.5
Barber, beauty shop.	176	176	28.2	28.2
Household and personal services, total.	391	165	62.6	26.4

Source: Milton Gilbert and I. B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies* (Paris: OEEC, 1954), pp. 113-20.

Norway, and the United Kingdom) 41–63 per cent.¹⁴ At the same time, in comparison with the United States, the prices of all services were relatively lower than average prices indicated by GNP deflators in the countries of western Europe, the only exception being recreation and entertainment in Belgium and Norway (Table 3).

I have suggested above that the higher level of service prices at higher income levels leads to systematic differences be-

and Figure 1, indicate a positive correlation between the two variables. The correlation coefficient is 0.92, statistically significant at the 2 per cent level.

The empirical results provide evidence for the validity of my proposition regarding the relationship between purchasing-power parities, exchange rates, and per capita income levels. And whereas the application of the purchasing-power parity doctrine is seen to give incorrect answers for determining equilibrium ex-

TABLE 3
PURCHASING-POWER EQUIVALENTS FOR SERVICES AS A
PERCENTAGE OF EXCHANGE RATES, 1950*

	Belgium	Denmark	France	Germany	Italy	Netherlands	Norway	United Kingdom
GNP per capita (\$)	956	989	831	650	418	798	929	995
Purchasing power equivalents:								
Household and personal services	60.8	41.7	51.7	45.1	40.6	36.7	48.5	46.1
Public transport services	53.2	63.4	47.7	51.3	42.4	42.8	64.0	43.9
Recreation and entertainment	90.2	66.0	70.0	51.5	46.7	55.4	84.3	56.4
Health	64.9	44.0	53.1	42.5	50.4	42.8	40.2	59.5
Education	65.5	65.4	41.1	62.4	33.0	50.9	54.2	59.5
Government administrative personnel	47.2	45.9	42.9	34.4	18.7	27.3	37.3	27.7
Defense personnel	26.9	19.8	36.0	(20.0)	19.7	16.3	20.6	32.7
Services, total	63.4	52.1	51.3	43.4	33.5	38.3	51.3	47.2
Gross national product	81.3	71.1	75.4	71.7	69.6	61.2	68.2	70.1

* The original data are expressed in terms of national currencies per U.S. dollar. All calculations have been made at U.S. and given-country weights, and a geometrical average of the results has been taken.

Source: Milton Gilbert and Associates, *Comparative National Products and Price Levels* (Paris: OEEC, 1960), pp. 30, 75–80.

tween purchasing-power parities and equilibrium exchange rates. To test this hypothesis, I have made a comparison for twelve industrial countries between the ratio of purchasing-power parities (calculated in terms of national currencies per U.S. dollar for the gross national product) to the rate of exchange, on the one hand, and per capita GNP, on the other. Data for 1960, shown in Table 1

¹⁴ An exact correspondence is not expected, considering that in various European countries, and especially in the United Kingdom, the postwar rationing and price controls still affected prices in 1950.

change rates, the observed relationship between purchasing-power parities and exchange rates may provide some clue as to the overvaluation or undervaluation of a currency. A consideration of information given in Table 4 points to the overvaluation of the French franc in 1955, for example, and indeed two devaluations followed in rapid succession in 1957 and 1958. Comparisons of purchasing-power parities and exchange rates will not, however, disclose under- and overvaluations of a few percentage points; hence the magnitude of the required revaluation.

IV

While the absolute interpretation of the purchasing-power parity doctrine appears unsatisfactory, it is a different question whether changes in the relative purchasing power of national currencies can provide an indication of the required

degree of adjustment in exchange rates. Since the nineteenth century this proposition has been indorsed by several writers, who have suggested that comparisons be made with some previous period taken as a norm.

This formulation of the purchasing-

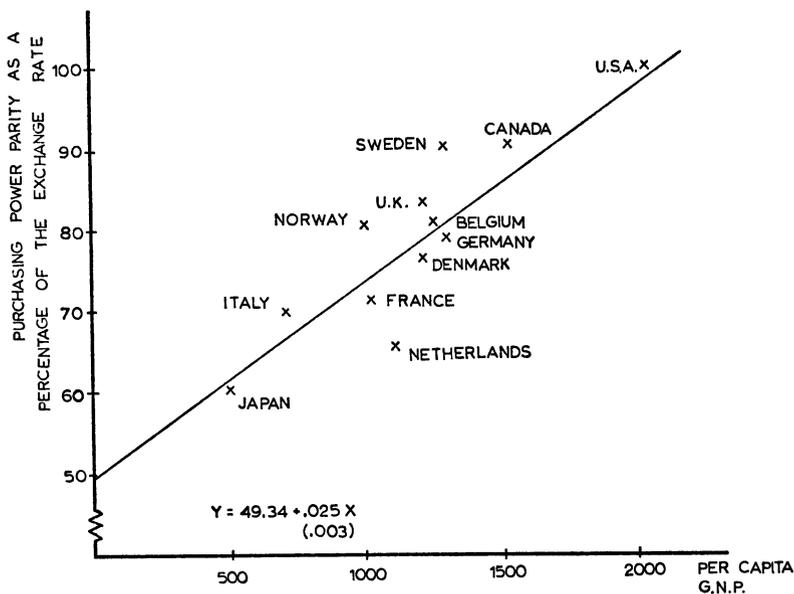


FIG. 1

TABLE 4

PURCHASING-POWER PARITIES FOR GROSS NATIONAL PRODUCT IN 1955

(Units of National Currency per U.S. Dollar)

COUNTRY	CURRENCY UNIT	OFFICIAL EXCHANGE RATE	PURCHASING-POWER PARITIES	
			U.S. Quantity Weights	European Quantity Weights
Belgium.....	Franc	50.2	44.9	37.6
France.....	Franc	350	394	287
Germany.....	Mark	4.20	3.51	2.54
Italy.....	Lire	625	605	337
United Kingdom.....	Pound	0.358	0.319	0.272
Netherlands.....	Florin	3.80	293	2.17
Denmark.....	Krona	6.91	5.94	4.57
Norway.....	Krona	7.14	6.58	4.78

Source: Milton Gilbert and Associates, *Comparative National Products and Price Levels* (Paris: OEEC, 1958), p. 30.

power parity doctrine is independent of its absolute version and can be stated as a comparative-statics proposition: If we compare two equilibrium positions which differ only in regard to the absolute price levels prevailing in the two countries under consideration, the change in the equilibrium exchange rate will equal the change in the ratio of price levels between the two positions. In claiming that this proposition is applicable to the real world, the proponents of this doctrine emphasize the importance of the monetary factors and see the line of causation running from the money supply to prices and to exchange rates; at the same time, they neglect changes in income levels and in supply and demand relationships.

The relative interpretation of the purchasing-power parity doctrine has been advocated, for example, following periods of war when the normal channels of international trade had been disrupted. But even though monetary factors might have been of great importance during such periods, the occurrence of structural changes can hardly be excluded. Thus, especially in the case of moderate inflation, changes in demand and supply relations will give rise to errors in applying the purchasing-power parity doctrine for determining the new exchange rates.

Among the proponents of the purchasing-power parity doctrine, L. B. Yeager argues, however, that a correspondence between changes in purchasing-power parities and in exchange rates is indicated by a comparison of the interwar and post-World War II period. To support this proposition, he points to the fact that the "actual-to-parity ratio fell inside the range 75-125 per cent for three-fourths of the [35] countries shown."¹⁵ But Yeager's alleged demonstration is open to serious objections.

¹⁵ Yeager, *op. cit.*, p. 527.

To begin with, it is not clear what degree of statistical significance this range represents. With changed emphasis, one may argue that the proposition is of little practical value since one-fourth of the cases do not even come within the 75-125 per cent range. Indeed, one could hardly rely on the relative interpretation of the purchasing-power parity doctrine for determining equilibrium exchange rates, if this were off the mark by over 25 per cent in one-fourth of the cases considered.

At the same time, the calculated range will depend on the standard of comparison chosen.¹⁶ Yeager takes the United States as this standard, but there is no a priori reason for this choice. In fact, greater interest attaches to comparisons between countries that have a substantial amount of trade with each other, such as Belgium and the Netherlands. If the Netherlands is taken as the standard, the actual-to-parity ratio is calculated as 156.2 for Belgium—a result which can hardly be said to support Yeager's thesis.

It should further be noted that the cause-and-effect relationship between exchange rates and purchasing-power parities is not clear, since the postwar year chosen (1957) followed one or more devaluations in almost all of the countries under consideration. Actually, the problem of causation will arise in every practical instance where international commerce has not come to a standstill.

Yeager suggests that "the causation . . . run[s] much more strongly from price levels to exchange rates than the other way around,"¹⁷ and uses two arguments to support his proposition: that trade flows affect domestic prices only slightly, and that movements in the general price

¹⁶ I am indebted to H. G. Johnson on this point.

¹⁷ Yeager, *op. cit.*, p. 522.

level are determined basically by changes in the money supply.¹⁸

The first argument appears to reject marginal-cost pricing and to deny the possibility of commodity arbitrage that would lead to an international equalization of the prices of traded goods. There is a curious asymmetry here: while Yeager contends that high elasticities will bring about immediate adjustments in the case of international price differences due to differing rates of domestic inflation, the adjustment mechanism is assumed to be inoperative if the initial change was in the rate of exchange.¹⁹

The assumption that constancy of the money supply would check "foreign-induced" inflation implies the acceptance of a simplified version of the quantity theory of money and appears to exclude the possibility of demand, as well as cost-push, inflation. But both of these types of inflation have relevance after a devaluation has taken place, since under conditions of full employment increased demand for the country's exports as well as the higher costs of imports is bound to lead to domestic price increases.²⁰

¹⁸ "A minor reason is that, for many commodities, changes in the quantity shipped internationally amount to only a small fraction of the quantities appearing on markets at home and abroad, so that changes in trade flows may affect domestic prices only slightly" (*ibid.*, p. 520). Further, "the main reason for doubting that causation runs predominantly from exchange rates to prices is that the buying power of a country's currency is, above all else, determined by the quantity of money and the demand for cash balances. In the absence of changes in the money supply, exchange rates could hardly govern a country's whole general price level." (*Ibid.*, p. 521.)

¹⁹ Cf. *ibid.*, pp. 521 ff.

²⁰ Cf. *ibid.*, pp. 521 ff. On the latter, see J. L. Burtle and W. Liege, "Devaluation and the Cost-of-Living in the United Kingdom," *Review of Economic Studies*, 1949 (1), pp. 1-28, and J. M. Fleming, "Exchange Depreciation, Financial Policy, and the Domestic Price Level," *International Monetary Fund Staff Papers*, April, 1958, pp. 288-322.

Should the authorities be unwilling to increase the money supply, there is no reason to assume that velocity would remain unchanged.

The problem of causation is especially relevant if an international comparison of changes in wholesale prices is made, since wholesale price indexes are often heavily weighted with traded goods. Nurkse cites the case of Czechoslovakia in the nineteen-twenties when the degree of devaluation necessary to restore balance-of-payments equilibrium had been gauged by using a wholesale price index, and the exchange adjustment undertaken proved to be insufficient because this index was heavily weighted with traded goods, the prices of which reflected changes in the world market rather than domestic inflationary pressures.²¹ Further, with regard to the overvaluation of the British pound in 1925, Haberler quotes Keynes's remark that Churchill's experts "miscalculated the degree of maladjustment of money values which would result from restoring sterling to its pre-war gold parity" by comparing the British and American wholesale price indexes.²²

According to Haberler, "the moral may seem to be that we should use an index of domestic prices (cost of living) or of costs (wages) which do not adjust so quickly and would show a disparity if equilibrium has not been reached."²³ But Haberler adds that structural changes may greatly affect the balance of payments and calls for the use of a model incorporating traded as well as non-traded goods. Such a model has been used in

²¹ Ragnar Nurkse, *International Currency Experience* (Geneva: League of Nations, 1944), chap. v.

²² J. M. Keynes, "The Economic Consequences of Mr. Churchill," in *Essays in Persuasion* (1941), p. 248, cited in Haberler, *op. cit.*, p. 49.

²³ Haberler, *op. cit.*, p. 49.

Part II in connection with the discussion of the absolute interpretation of purchasing-power parity theory, and this same model will not be utilized for intertemporal comparisons.

V

Assume that in one of the countries a uniform increase in productivity takes place in the sectors producing traded goods, accompanied by a smaller rise in productivity in the service sector. The marginal rate of transformation and the price ratio between the traded commodities will then remain unchanged, while

of productivity for the national economy as a whole as well as for agriculture and industry taken separately.

In a more general model, the impact on the general price level of productivity improvements in sectors producing traded goods can be examined under alternative assumptions with regard to changes in money wages. Should money wages remain unchanged and productivity improvements be translated into lower prices, the prices of traded goods will fall but service prices will not decline proportionately, restricting thereby the decrease in the general price level.

TABLE 5
ANNUAL RATES OF INCREASE OF PRODUCTIVITY IN INDIVIDUAL SECTORS, 1950-1960
(Per Cent)

	U.S.*	Belgium	Germany	Italy†	Netherlands	U.K.	Japan
Agriculture	5.9	5.0	6.5	3.7	4.5	4.0	4.7
Industry	2.9‡	3.4	5.7	3.6	3.8	2.2	4.9
Services	2.3	1.2	2.9	1.5	2.9	1.4	3.4
Private GNP per man..	3.1	2.5	5.3	3.6	3.5	1.9	5.8

* 1947-1960.

† 1955-1956.

‡ Manufacturing only.

Source: Bela Balassa, *Trade Prospects for Developing Countries* (Homewood, Ill.: Richard D. Irwin, 1964), Tables A 2.3.1.-2.6.1.

the relative price of the non-traded goods will rise. Now, since the latter does not enter international trade, purchasing-power parity calculations will incorrectly indicate the need for adjustment in exchange rates.

In fact, in present-day industrial economies, productivity increases in the tertiary sector appear to be generally smaller than the rise of productivity in agriculture and manufacturing. Data derived for the nineteen-fifties (shown in Table 5) indicate, for example, that in the seven major industrial countries examined, productivity increases in the service sector were in all cases lower than the rise

Alternatively, we may assume that money wages (and profits) rise in proportion to the growth of productivity so that prices of traded goods remain unchanged. Competition among labor groups will now raise wages in the tertiary sector where increases in productivity are smaller, and hence service prices will rise. Finally, in intermediate cases, the growth of productivity in the production of traded goods will exert a downward pressure on the prices of exports and import-competing goods and an upward pressure on the prices of services.

The purchasing-power parity doctrine could still find application if produc-

tivity increases and wage adjustments were identical in every country, and if we also assumed neutral production and consumption effects. Under these, admittedly restrictive, assumptions, parallel changes in the general price level will take place and the doctrine will give the correct answer: there is no need for adjusting the rates of exchange.

But the purchasing-power parity doctrine is asserted to provide guidance in cases where prices in individual coun-

ferred to above, we would expect productivity improvements in the sectors producing traded goods to be positively correlated with the ratio of the general price index to the index of the prices of traded goods.

To test this hypothesis, for seven major industrial countries I have compared changes shown by the index of output per man-hour in manufacturing, on the one hand, and the ratio between the GNP deflator and the wholesale price

TABLE 6
CHANGES IN PRODUCTIVITY AND PRICES IN SELECTED
INDUSTRIAL COUNTRIES, 1953-1961
(Index Numbers for 1961; 1953 = 100)

	Manufacturing Output per Man-Hour	GNP Deflator	Wholesale Prices of Manufactured Goods	GNP Deflator as Percentage of Wholesale Price Index of Manufactured Goods
	(1)	(2)	(3)	(4)
United States	124	117	111	105
Belgium	143	114	105	109
France	165	103	91	113
Germany	152	128	109	117
Italy	167	115	98	117
United Kingdom	122	127	116	109
Japan	197	115	91	126

Source: B. Balassa, "Recent Developments in the Competitiveness of American Industry and Prospects for the Future," *Factors Affecting the United States Balance of Payments* (U.S. Congress Joint Economic Committee [Washington, 1962]), p. 38.; W. Salant and Associates, *The United States Balance of Payments in 1968* (Washington: Brookings Institute, 1963), p. 73.

tries do not move in a parallel fashion, and such instances also have greater practical interest. In view of our previous discussion, changes in the general price level would be determined in the process of technological improvements and wage adjustments, neither of which can be assumed to follow the same course in every country. Correspondingly, an intercountry comparison of changes in the general price level cannot be used to indicate the need for modifications in exchange rate parities. At the same time, given the dual effect of productivity changes re-

index of manufactured products, on the other. Although traded goods include agricultural products too, I have chosen to restrict the investigation to the manufacturing sector, partly because productivity data for this sector are generally more reliable, and partly because agricultural prices are affected to a considerable extent by governmental policies. At any rate, the countries under consideration export chiefly manufactured goods. The results are shown in Table 6 and Figure 2, indicating a positive correlation between the growth of manufacturing

productivity and the ratio of the GNP deflator to the price index for manufactured goods. (The correlation coefficient is .91, statistically significant at the 5 per cent level.)

These results provide evidence for the importance of non-monetary factors in the process of price determination. In the presence of disparate changes in productivity and prices in the sectors of traded and non-traded goods, the reliance on

be achieved if, instead of attempting to rely on aggregate indexes, more attention is paid to the behavior of sectoral indexes with appropriate disaggregation.²⁴

VI

While this paper has highlighted some of the inadequacies of the absolute and the relative versions of purchasing-power parity theory, its main contribution is a positive one: the emphasis on the need

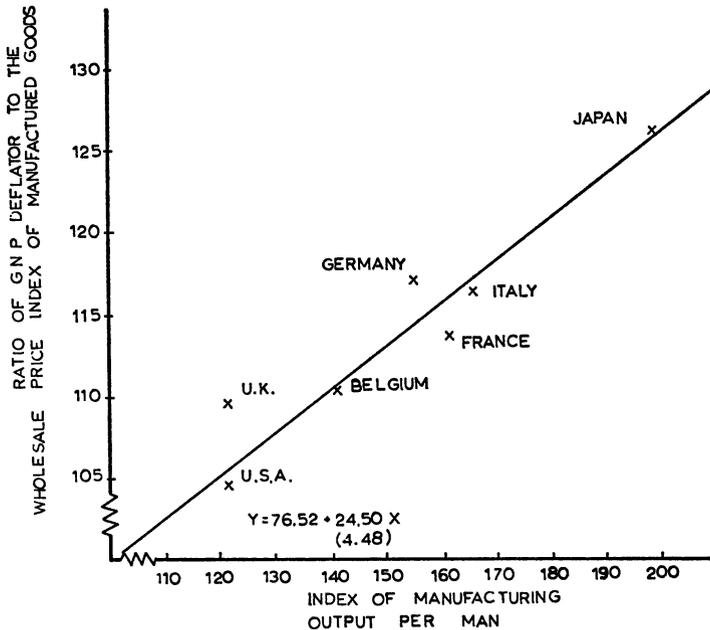


FIG. 2

general price indexes for deciding on exchange-rate adjustments appears to be misplaced. At the same time, for reasons mentioned above, price indexes heavily weighted with internationally traded goods will not appropriately indicate the need for modifications in exchange rates either.

This conclusion should not be construed as a denial of the sensitiveness of trade flows to changes in the prices of individual commodities. It appears likely, however, that more useful results can

for amending the familiar models of international trade by giving explicit consideration to non-traded goods. The introduction of non-traded goods can enhance the realism of these models and may also offer new theoretical insights.

In the present instance I have shown

²⁴ For a discussion of the effects of price changes on trade in manufactured goods, see my "Recent Developments in the Competitiveness of American Industry and Prospects for the Future," U.S. Congress Joint Economic Committee, *Factors Affecting the United States Balance of Payments* (Washington, 1962), pp. 27-64.

that, by incorporating non-traded goods in the model, the existence of a systematic relationship between purchasing-power parities and exchange rates is indicated in intercountry as well as in intertemporal comparisons. These relationships can be of some help in judging the overvaluation or undervaluation of a currency, and changes in the degree of over-(under)-valuation, although they cannot indicate the magnitude of the required revaluation.

The observed relationship between purchasing-power parities and exchange rates also provides guidance for the international comparison of national incomes and living standards. In general, the use of exchange rates as conversion ratios will overstate the GNP of high-income countries and understate that of low-income countries, with the degree of overstatement increasing as income lev-

els rise.²⁵ Further, the conclusions derived with respect to changes over time can be useful in interpreting disparate movements in the components of the GNP deflators and the cost-of-living index as well as in projecting future developments.

Note, however, that, while in the above discussion we have assumed that services cannot be traded, this assumption will have to be modified if account is taken of international tourism that involves international transactions in services. Tourism will affect service prices in the individual countries, and it will tend to reduce international disparities in these prices. But even if the cost of transportation involved in foreign travel is disregarded, tourism will not equalize service prices as long as it is restricted to periods of limited length, for example, those of annual vacations. An international equalization of service prices will, then, require the migration of labor in response to intercountry differences in living costs.

²⁵ Cf. my "Patterns of Industrial Growth: Comment," *American Economic Review*, June, 1961, pp. 394-97.