THEORETICAL NOTES ON TRADE PROBLEMS

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1. *Introduction.* One of the great pleasures in my life has been preparing chapters for various Seymour Harris symposia, and I should like nothing better than to spend the next hundred years doing the same at five-year intervals. In connection with the problem of the international balance of payments, it occurred to me to reread the 1948 theoretical essay I prepared for his *Foreign Economic Policy for the United States* (Harvard Press). It was a theoretical exercise because I didn't have the leisure then to prepare an empirical one. Finding that it stands up better than I had dared hope and again lacking leisure, I venture to jot down (on the back of an envelope, so to speak) some theoretical notes relevant to present balance-of-payments problems. It will be evident that I am not aiming at comprehensiveness, rigor, documentation, or unity.

Equilibrium of Prices, Wages, and Exchange Rates

2. *Currency Overvaluation.* In 1948 I shocked at least one of my teachers by saying that the theory of comparative advantage does not guarantee a country against balance-of-payments difficulties, nor does it even keep a country from being undersold in terms of every good.[1] Then it was a question of dollar shortage rather than of American gold loss, and I am not displeased to reread what was said there. But some elucidation may be useful.

Obviously, I do not interpret the theory of comparative advantage to include the full classical apparatus of the Hume gold-flow quantity-theory price-level mechanism. I do interpret it to include the Ricardo-Torrens arithmetic concerning various factor productivities. It will be useful to consider the simplest case of a labor model.

3. *A Simplest Model.* In the United States, let the unit labor requirements for goods 1,2,3 be given by $(A_1, A_2, A_3) = (1,1,1)$ by appropriate definition of commodity units. Else-

where, call it Europe, let unit labor requirements for those goods be given by $(a_1, a_2, a_3) = (2,3,5)$. We are more efficient in every good than they; but obviously our comparative advantage is greatest in good 3 and least in good 1, by virtue of the inequalities $5/1 > 3/1 > 2/1$. The whole content of the theory of comparative advantage is this:

We can never be exporting a good i while exporting a good j if our comparative advantage is in good j rather than in good i — that is, if $a_j/A_j > a_i/A_i$.

This does *not* say that our current balance must or will balance, or that our total balance of payments will be in any kind of equilibrium. In this two-country many-good case, the money wage rates here and abroad, W and w, together with the foreign exchange rate, R (that gives the \$ price of their currency — call it the £ but think of it as the Mark), determines completely the pattern of prices and of productions.

The price of a good at any place equals the lowest cost of production anywhere translated into commensurate currency units. (Transport costs and tariff impediments are assumed away.)

Using small letters for foreign variables and large letters for ours, we have

$$P_i = \text{Min}(WA_i, Rwa_i)$$
$$p_i = \text{Min}(A_iW/R, wa_i) \qquad (i = 1,2,3)$$
$$R = P_i/p_i \qquad\qquad\qquad (1)$$

4. *Limits When Both Regions Produce.* To illustrate, suppose that each country produces something. This restricts relative *real* wages in the two regions. Thus, we in the United States must have at least twice their real wage and at most five times theirs. In terms of money wages and the exchange rate, this implies

$$\text{Min}\left[\frac{a_i}{A_i}\right] = 2 \leqq \frac{W}{Rw} \leqq 5 = \text{Max}\left[\frac{a_i}{A_i}\right] \quad (2)$$

Or given the ratio of the money wages, W in \$ and w in £, we have the obvious limit on the exchange rate if neither country is to be undersold in every good:

$$\frac{1}{5}\frac{W}{w} \leqq R \leqq \frac{1}{2}\frac{W}{w}$$

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[1] Footnote 5 will show that rigidity of wage rates is not really basic to my assertion.

$$\frac{W}{w} \operatorname{Min}\left(\frac{A_i}{a_i}\right) \leqq R \leqq \frac{W}{w} \operatorname{Max}\left(\frac{A_i}{a_i}\right) \qquad (3)$$

Equivalent relations on $r = 1/R$, the £ price of the dollar, could be given.

5. *Superficial Equality.* Suppose instead of but three goods we had a large number of goods, so that the ratios (a_i/A_i) practically formed a continuum from the minimum, say 2, to the maximum, say 5. Then *some* critical j^{th} good will be on (or near) the borderline of indifference between being produced in either or both countries. Even if there are but few discrete goods, the well-known fact that the reciprocal demand functions form horizontal steps at each discrete $(A_i/a_i)(W/w)$ ratio, increases the probability that R will end where a jth good is *on* the borderline. Then, either as an exact equality or a good approximation, we can get the following equation for R:

$$R = \frac{W}{w}\left[\frac{A_j}{a_j}\right], \qquad (4)$$

for j the critical borderline good. Thus, if both countries are to be able to produce the $j = 2$ good at equal costs, we must have

$$R = \frac{W}{w}\frac{A_2}{a_2} = \frac{W}{w}\frac{3}{1} \qquad (4)'$$

This would permit a $3 foreign exchange rate for the £ if wages here were $3.00 per hour and there one-third of a £ (or $1).

This is a superficial equality because the identity of the borderline good will be an unknown that shifts with supply and demand changes.

6. *Deficits, Overvaluation, and Mercantilism.* It is well known that costs alone cannot determine, even in a barter system, where the real equilibrium $(W/R)/w$ ratio must fall. (This acts like a terms-of-trade parameter for us; any simple change *abroad* which raises its equilibrium level makes "us" better off.)

Tastes and demands must enter into the reciprocal-demand schedules. Even worse, once we leave barter equilibrium aside and admit capital movements and gold flows into the picture, the sky becomes the limit for R and $(W/R)/w$. If our wage levels stay high enough, we can be undersold in every good. Without transport protections, our employment could be zero. The whole of our imports would then have to be financed by capital movements or gold.

With employment less than full and Net National Product suboptimal, all the debunked mercantilistic arguments turn out to be valid. Tariffs can then reduce unemployment, can add to the NNP, and increase the *total* of real wages earned (or do the same for non-labor factors in an extended model).

Every teacher of elementary economics realizes the difficulty in selling free-trade notions when a bright student has sensed that overvaluation of the currency may be involved. That is why the new sixth edition of my *Economics* (McGraw-Hill, New York, 1964) has an appendix pointing out the genuine problems for free-trade apologetics raised by overvaluation — such as prevailed for non-dollar nations in 1948, and may have been prevailing for us in recent years.

Purchasing-Power Parity

7. *Cassel-Ricardo Neutral-Money Versions.* The above formulation can clear up confusions, old and new, in Cassel's purchasing-power parity doctrine. Originally, he and Ricardo meant no more than that money was "neutral," the absolute level of *all* prices being able to double or halve without affecting *any* price ratios or real magnitudes in a longest-run rigid classical model. Thus, in such a model the *real* ratio $(W/Rw) = Y^*$, independently of absolute $ or £ price levels.

Now, said Cassel, let a wartime government double M here and triple m there, doubling all P's and W here and tripling all p's and w there. Then, obviously, the dollar price of the pound will have to depreciate exactly by $2/3$. Using $t = 0$ for before and $t = t$ for now, we get the famous purchasing-power parity index-number formula:

$$\frac{R^t}{R^0} = \frac{P^t/P^0}{p^t/p^0} = \frac{W^t/W^0}{w^t/w^0}\frac{Y^{*t}}{Y^{*0}} \stackrel{?}{=} \frac{W^t/W^0}{w^t/w^0}. \qquad (5)$$

Note that this last is valid only if the real magnitude Y^* is unshiftable by the purely money changes, so that $Y_t^*/Y_0^* \equiv 1$. Cassel argued that in war inflations, the M changes were likely to be much greater than the real changes, and that hence the last formula would be a good intermediate-run approximation.

8. *Spatial Arbitrage of Prices.* Already in World War I, Keynes altered this simple doctrine, by interpreting purchasing-power parity (PPP) as simply the doctrine of spatial arbitrage for each good (in the absence of transport costs). In one domestic market wheat can have but one P_i. With an exchange rate available to all, arbitrage similarly ensures that

$$R = P_i/p_i, \tag{6}$$

$$\frac{R^t}{R^0} = \frac{P_i^t}{P_i^0} \bigg/ \frac{p_i^t}{p_i^0} \qquad (i = 1,2,3, \ldots) \tag{6$'$}$$

Note that this contains no arbitrage relations for wage rates or production costs. If it holds for each good, it will hold trivially for a ratio of *any* equally-weighted price index numbers. For index numbers (written always without subscripts) generally — if the separate countries' indexes use different weights, and even if (6) always holds —

$$\frac{(P/p)^t}{(P/p)^0} \neq \frac{P^t/P^0}{p^t/p^0} , \tag{7}$$

a fact widely overlooked. No wonder that readers of Keynes from 1915 to 1930 generally held simultaneously the view that PPP was a trivial truism of arbitrage *and* besides was quite untrue.

Actually, had Cassel tried to calculate PPP for mobile goods by $R_i^t = P_i^t/p_i^t$, he would have always found the ruling rate to be the correct one! If he calculated it in the non-truistic, historical index-number form (inclusive of domestic goods)

$$R^t = \frac{P^t/P^0}{p^t/p^0} R^0 , \tag{8}$$

we can provide the following rationale:

Suppose *each* P_i^t/P_i^0 (whether i represents a mobile good or a domestic one) will *in time* settle down toward a *common* ratio foreshadowed by the *present* index-number ratios P^t/P^0; and likewise for the foreign small p's. Then the present index-number calculation could have some long-run predictive value for the future exchange rate — the best defense I can make for Cassel.

9. *Cost-of-Living Version.* An alternative cross-space rather than cross-time PPP calculation is sometimes made.[2] It is apparently thought that

[2] H. Houthakker, "Should We Devalue the Dollar?"

$$R = \frac{\$ \text{ cost of a good}}{\pounds \text{ cost of a good}}$$

$$\tag{9}$$

$$= \frac{\$ \text{ cost-of-living-of-standard-basket-of-goods}}{\pounds \text{ cost-of-living-of-standard-basket-of-goods}} .$$

Were all trade costs and impediments zero, these would hold for each good and for every composite good. But, if the computation is made correctly, every ruling exchange rate would turn out to be the PPP equilibrium rate, bringing us back again to the trivial Keynes arbitrage version. Two mistakes by prewar writers permitted the computed result to differ from the ruling rate. First, the American and European costs of living were sometimes computed with *different* goods weightings; such index numbers should not be used together in (9).

There is a second factor. Heavy transport costs and impediments do exist. So geographical price ratios are not uniform. (That is one reason why Americans weight Bourbon heavily in our cost-of-living and Europeans weight Scotch heavily!) Hence, the instantaneous truism need not even be true.

None of this would matter in an artificial neutral-money model, for that model has no need to rule out transport costs, domestic goods, quotas, or even *ad valorem* tariffs, since it is *not* a model dependent on arbitrage.

But, at this point, Cassel nods; indeed he lies down. Suddenly he argues in the following vein, "People will pay for a currency only its *worth*, which halves when its cost-of-living index doubles. PPP exists when the exchange rate equalizes the costs-of-living of the two countries." Evidently a new, and bizarre, kind

Challenge, Vol. 11 (Oct., 1962), 11. Houthakker says: ". . . recent figures indicate that an average basket of commodities bought for $1 in the U.S. would cost only 3.11 marks in Germany, while the official exchange rate is four marks to the dollar. We may say, *therefore*, that the dollar was overvalued with respect to the mark by 22 per cent." [My emphasis.] From BLS data I find that by this reasoning the San Francisco dollar has been overvalued relative to the Houston dollar by (106.0–83.3)/83.3, or by 27 per cent. Betting these many years on a return to PPP would not have been rewarding, nor would prediction of heavier San Francisco unemployment. The change since 1948 in German p's is indeed significant but, I think, not so much for reasons connected with equation (9) as with my later equation (14). None of my criticisms in these next few sections apply to Houthakker's work, which is discussed in Section 12 and beyond.

of arbitrage is tacitly envisaged: somebody demands £'s whenever something (a market basket?) called COL can be bought more cheaply than can something called (our?) COL can be bought for $. This goes on until the $ price of the £ has been bid up to bring about equality and equilibrium.

Patently, I cannot import cheap Italian haircuts, nor can Niagara-Falls honeymoons be exported. We are left with the minute grain of truth that tourism may move in the direction of cheaper prices, thereby tending to lower in some fractional degree the net price differentials of tourists' items. It is bizarre to think that there are enough retired *rentiers*, who will move to Germany to bid up their cheap prices, and who will only cease to move in either direction when COL PPP has been achieved. What is true is that some footloose people and absentee landlords do move. Those with "American tastes" tend to move here where the things they like are relatively cheap, and those with "foreign tastes" tend to become expatriates.

Some theorists become prey to the traveller's paradox: It costs more to live away from home. Parisians complain of fantastic New York prices, while New Yorkers — who have never even visited the Waldorf-Astoria — complain about three-star restaurant prices. The female shopper is subject to the opposite paradox: everything is cheaper abroad than at home for everybody. (The rational basis for this is the inequality theorem: It can only help to be able to buy from two separate catalogues or price systems.)

Professors, particularly cultured ones, are particularly prone to infer an overvaluation of the dollar by the cheapness abroad of personal services (maids, tenors, and Doctors of Philosophy). By this reasoning, every prosperous region has a chronically overvalued currency. By it, as noted earlier, California ought to devalue its dollar relative to that of New England. They take in each other's laundry at higher price tags out there, but also wear finer linen. Somehow the cheap sunshine does not get fully into the PPP price indexes.

10. *What Chases What?* The California gold rush provides a reminder that equilibrium can be restored by changes on either side of the equation. In 1849 the dollar in California sold for close to a dollar in Vermont, gold being cheap to ship. The wrong kind of PPP calculation would include an egg-price differential of 800 per cent and a man-day differential of 1,000 per cent; the wheat differential was 200 per cent. It might come up with the erroneous prediction of a PPP of California's $ at one-third the Vermont $. Since, as Marshall has taught, short-run price equilibrium isn't long-run price equilibrium, the proper prediction should have been in this case: wheat prices will soon fall out West to near the Eastern level; fresh egg prices, by transport-cost *addenda* to comparative advantage theory, will not fall to quite such parity; real wages, through labor mobility, will eventually come much nearer to parity. In $R < P/p$, instead of R's adjusting, it is the numerator of California's price index that primarily adjusts to restore the equilibrium.

If California were a sovereign state and could triple its nonconvertible currency, Cassel would predict that this could validate its high price level and validate the prediction that the California dollar would depreciate relative to the United States dollar. These days, when contemplating an apparently overvalued currency of a mixed economy, it is a pretty good bet that the electorate and government will not force upon itself a general deflation of the P numerator; less certain is the guess that the other sovereign country will manage its affairs well enough to prevent an inflation in the p denominator. In such a case, the odds favor either trade controls or eventual currency depreciation.

But all this chasing around assumes one has fastened on some defensible $R = P/p$ equilibrium goal. I must return to investigation of this problem.

11. *Relative Export-Price Indexes.* It was once in vogue to try to save PPP from being trivial and/or wrong by rephrasing it in terms of ratios of the export price indexes of the two countries. Thus, Bresciani-Turroni considered

$$R \text{ index} = \frac{\text{American Export Price Index}}{\text{European Export Price Index}}.$$

(10)

This unequal weighting can hardly lead to an exact relationship. Suppose we export good 3

alone, bread, and Europe exports good 1 alone, cloth. (Banish good 2 from existence.) The above equation then says, no more and no less than this:

The terms of trade between bread and cloth is a universal constant (like the speed of light, one presumes, not like the ratio of a circle's perimeter to its diameter).

Once PPP theorists had this pointed out to them, they saved face at the expense of mind by adding a codicil: "So long as there are no 'substantive' changes in real factors or supply and demand, PPP is true."

This last truism is saved from being a fatuity by the mentioned fact that in some interludes of strong inflation and dislocated exchanges, there is a likelihood that the *transient* distortions of the disturbed periods will settle back toward the previous real equilibria. This is not a reed to lean too heavily on.

Here is a good place to warn anew against a recurrent source of fallacy in international trade theory. Transport costs and *all* trade impediments aside, prices must everywhere be the same when expressed in commensurate units. So it is *not* true that classical writers like Hume expected that gold-standard disequilibria would be corrected by differential movements of prices at home and abroad. With transport costs zero, the gold points coincide as do all "goods-points," and no differentials in the prices of the same goods are ever possible. What Hume needs is differential (geographically-identical) movements in the prices of certain goods *produced* by one of the countries relative to the prices of other goods produced by other countries. (This disposes of the Laughlin fallacy that rapid telegraph and cheap transport annihilates the classical mechanism.) But precisely the above movements in relative prices are what Cassel originally had to rule out in the neutral-money version of PPP.

Obviously, a point-of-time equality like (10) is complete nonsense, since $R = P_3/p_1$ is like saying that the $2.80 price per £ must equal the ratio of the price of a California sherry to the price of a European Volkswagen. On the other hand, forgetting PPP, we should suspect that the relative rise of our export prices in the 1950's compared to those of the surplus coun-

tries did contribute to the drop in our share of world exports.

12. *Production-Cost Parities*. Each generation must rekill its phoenixes. These various issues about PPP and exchange equilibrium were discussed (one dare not say settled) in the 1920's and again in the 1940's. Now scholars [3] have again suggested use of costs instead of prices in PPP calculations. In a loose sense, one might argue that costs are more indicative of "normal long-run prices" than short-run prices are; if profits can be squeezed or bloated in the short run but must ultimately be restored to normal patterns, this way of estimating parity might be useful. But what is the exact theoretical meaning of such cost or factor-price comparisons?

Professor Houthakker in Congressional testimony, advances the following interesting ideas:

> . . . For foreign trade to be in longrun balance (still abstracting from capital movements) it is necessary, roughly speaking, that unit labor costs, converted at official exchange rates, be the same everywhere. This implies that the equilibrium exchange rate between two countries must be equal to the ratio of unit labor costs or, more generally, unit factor costs if other inputs are taken into account. If the official value of country A's currency in terms of country B's currency is higher than the ratio of unit factor costs, A's currency is overvalued; as a result, A's balance of trade will show a long-term deficit, or its domestic economy will be depressed, or both. Countries A and B will then be in fundamental disequilibrium, except possibly for offsets from other items in the balance of payment.

> The introduction of capital movements modifies the above conclusion to some extent. If these movements are unrelated to relative costs (as is the case with foreign aid or reparation payments) the capital-exporting country will have to have a surplus of

[3] H. Houthakker, op. cit.; also his "Problems of International Finance," *Agricultural Policy Review*, Vol. 3, No. 3 (July–Aug.–Sept., 1963) 12–13; "Exchange Rate Adjustment," *Factors Affecting the U.S. Balance of Payments* Joint Economic Committee compilation of studies: 87th Congress, 2d Session (Dec. 14, 1962) 289–304, particularly 293–294. Since these are non-technical writings I disclaim any right to criticize his writings from a finicky perfectionist platform: I cite them only as sources of interesting questions.

The previously cited 1948 Harris volume contains remarks by Alvin Hansen favorable to cost parities, 380 *ff.*, and by Gottfried Haberler against, 395 *ff.* See G. Haberler, *A Survey of International Trade Theory*, Special Papers in International Economics No. 1 (July, 1961), International Finance Section, Princeton University, 1961, revised and enlarged edition for discussion and bibliography of PPP.

commodity exports, and its unit factor costs, calculated in terms of foreign currency, will have to be correspondingly lower, except to the extent that the capital-importing country increases its demand for current imports from the capital-exporting countries. Conversely, if a country receives foreign aid, it may be able to afford a somewhat overvalued currency. (pp. 293–294)

. . . Information about unit factor costs in different countries is hard to obtain directly but there is an indirect and much simpler way of making the necessary comparisons. In the long run wages are equal to the marginal product of labor in terms of commodities sold locally and for export. Domestic production competes with imports, which means that prices are equalized and that marginal product can also be measured in terms of commodities consumed rather than commodities produced. The competitive position of different countries can therefore be evaluated from the relative price levels of consumption goods. For this purpose it is necessary to look not only at commodities that enter into international trade, but also at all other commodities in the proportions in which they are normally consumed in each country . . . .

. . . The theory just outlined is not new (though this particular justification apparently is). It is known as the purchasing power parity theory and was popular in the early 1920's when it was often applied uncritically; later the pendulum swung the other way, but its critics usually overlooked the relation between prices and costs which is basic to the theory. . . . If used with circumspection the PPP theory (for short) is still the only approach to a limited but important problem. It is not a general theory of international trade, nor does it give absolute prescriptions for correct exchange rates. It applies only to the long run, and in fact does not really refer to purchasing power at all but to productivity (or, to save the initials, to "production power"). (p. 296)

We must not deride commonplace notions just because they are true. From my subsequent equation (14) and irrespective of PPP terminology, the following simple conclusions seem valid.

It can hardly be disputed that a rise in our money wage rates relative to those abroad will, other things equal, tend toward overvaluation of the dollar or lessened undervaluation of it; or that superior productivity improvement abroad, unmatched by commensurate increase in money wage rates there, will tend in the same direction.

It ought not to be disputed that a spontaneous increase in United States government off-shore expenditures for defense and aid will, unless offset, conduce toward overvaluation of the dollar and require a commensurately larger current surplus on private account.

A recognition at home of improved investment opportunities abroad will also convert a previous equilibrium exchange rate into an overvalued one.

13. *Critique.* I take it that Professor Houthakker is trying to express more than these sturdy commonplaces in the above quotation. And it is those *additional* notions that raise serious questions in my mind. All my queries refer to Houthakker's interesting new theoretical formulations and not to his general position, which in consequence does not receive a balanced appraisal.

First, costs of production are not universally equalized. It is the irreducible differential in costs that leads to importing rather than producing at home. This banality is, of course, less relevant to a world of increasing cost than to my simple Ricardian model. But let me first refer back to my equations (1). In them American and European costs are definitely unequal except for the singular case of the borderline goods discussed in (4).

It is true that (4) calls for equality, or approximate equality of borderline goods. For such goods, a Houthakker equality of the exchange rate to the ratio of unit costs of production does hold, but it has been pointed out that this is both a superficial equality *and* one that involves implicit theorizing. Actually it is the wide inequalities of (3) that give the only limits on wage levels and exchange rates that are implied by the existence of some production going on in each country. It would be arbitrary to argue that, since the borderline good is likely to be "intermediate" between the broad limits, we are entitled to take an index number average of all the productivity ratios on each side and apply them to some index number of relative wages. The borderline is not guaranteed to be in the middle, and it is precisely when an exchange rate goes out of kilter that the borderline shifts so as to invalidate any simple quantitative comparison.

Thus, let the United States government increase its demand for foreign goods so much

that good 1 becomes our borderline good instead of good 2; let full equilibrium be restored with the same W and w as before — which is possible in a variety of ways. Then $R = \$2$ for R is the *true* equilibrium level now. With no productivity or wage change, a simple Houthakker parity would stay unchanged at $3, giving rise to the surmise (false by hypothesis!) that the dollar is now undervalued.

Let me now leave the constant-cost case, which has been quite unfavorable to the $R =$ Cost here/Cost there approach. If labor is kept the *only* factor, or approximately the only factor — as where every good i is produced by a Cobb-Douglas production function of the form $Q_i = A_i^{-1} L^{.99}$ (capital)$^{.01}$ — we have not been able to leave this case. However, assume that there are some important unspecified factors in the background, and that our labor requirements are actually increasing functions of Q_i (and perhaps dependent on still other factors). In this case, it is marginal and not unit cost which equals price. Notationally, then, let $A_i(Q_i)$ represent MC not AC and $a_i(q_i)$ the mc abroad.

Now in equilibrium (1)–(4) can be summarized by

$$\frac{W}{w}\frac{A_k}{a_k} < R = \frac{W}{w}\frac{A_j}{a_j} < \frac{W}{w}\frac{A_q}{a_q} ; \qquad (3)'$$

where goods k are those America cannot afford to produce in competition with exports, goods q are those Europe must import, and goods j are a wide array that are being produced in both countries (and possibly being shipped from one or the other country).

Since the A's and a's are now variables not constants, $(3)'$ is again a mere surface relation, one of the many needed to define equilibrium. At a point of time, transport costs aside, if Houthakker uses the ruling MC's, the existing exchange rate is always his parity rate. If he uses some pre-existing MC's, corrected by some putative changes in average wage levels and in productivity index changes, there is no necessity of his getting the correct answers. (Try our previous case where W, w, and all production functions stay the same. But now let us desire more of European exports, restoring the true equilibrium by having R go from \$3 to \$2. Using index numbers that record *no* change in

wages or productivity, Houthakker parity remains at \$3, depicting a fictitious undervaluation.)

Thus far, I have neglected transport costs. It will not change the issue if I assume all ranges of relative transport costs (or trade impediments), from prohibitive charges for domestic goods (of all degrees of comparative advantage), to zero costs for all kinds of mobile goods, to all in-between cases for transport costs in either direction. Evidently the equalities in $(3)'$ now become widened by transport inequalities; with goods that are being actually exported being at points analogous to the familiar gold points. The reader can verify that all of the difficulties for Houthakker parity remain, and some are compounded, in this more general model.

Let me denote as a general "arbitrage" relation the competitive requirement that price anywhere equals lowest delivered cost there. Calling T_i and t_i the transport costs of American and European exports respectively expressed in \$ and £ I write (1) as

$$P_i = \text{Min} \ (MC_i, \ (mc_i + t_i)R), \text{ etc.} \qquad (1)'$$

At first I thought Professor Houthakker was confusing the equalities and inequalities that result from surface arbitrage under free competition with the conditions for clearing-of-the-market of over-all balance of payments and R. But I must have been wrong. Because if that had been the case, his statement that the above holds only under zero capital movements (and is modified in the systematic direction of requiring lower United States prices than these if we are exporting capital) would lead to the fantastic conclusion that the laws of arbitrage and Gresham are abrogated by unilateral capital movements. (Example: for zero transport costs, write $R = k(P_i/p_i) = k(P/p)$, where $k = 1$ holds when capital movements balance but $k \neq 1$ holds when they don't balance. No one would continue to believe in that version of PPP.[4])

[4] An alternative interpretation occurs to me. Let our investment abroad rise, thereby increasing the amount and range of our exports. Then more goods will sell abroad at prices that exceed our prices by positive transport costs (and with the transport differential enhanced if the one-way shipping cost-supply schedule is a rising one). Thus, if capital outflow is to be matched by an equilibrium export surplus, our price level must fall a little relative to

I make one last attempt to interpret the novel PPP doctrine. Suppose *all* A_i/a_i back in (1) remain identical, so that there is never a difference in comparative advantage. Then zero capital movements with non-zero production everywhere would yield the simple wage parity form of PPP. This doctrine though would hold without any of the indicated modifications for capital movements (save for the extreme case where one nation produces nothing, living completely on the other's trade surplus). However, this rather odd defense will not really work; for great disequilibrium will be possible even when PPP holds, provided one nation is willing to take the other's proffered I.O.U.s and gold.

The case of no comparative advantage in Ricardo's model is of no empirical interest. Results like it occur, however, in my unrealistic model of complete factor price equalization between two countries with geographically similar production functions in terms of labor and "Kapital," and almost similar factor endowments. Even without capital funds flowing, such a model will equalize both the real wage and the interest rate so long as one export and one import good have uniformly different factor intensities. In that case

$$R = \frac{MC_i}{mc_i} \qquad (11)$$

for *every* good, domestic or mobile. This equality of costs does *not* destroy trade, but rather holds *at* the equilibrium pattern of specialization (which is determined, in its essentials, by demand conditions). If this is what Houthakker meant, the following observations are in order.

(a) The case is not realistic. (Even if we generalize it, from identical production functions $Q_i(x,y) \equiv q_i(x,y)$ to functions identical only in efficiency units of factors $Q_i(x,y) \equiv q_i(\alpha x, \beta y)$ where $\alpha > 1 < \beta$ in recognition of Yankee ingenuity, the result would not seem realistic enough for empirical calculations.

(b) The parity in (11) is *not* one that would have to be modified by unilateral capital movements or anything else.

(c) It would hold in disequilibrium as well as in equilibrium, so long only as trade were

theirs, a transport-cost effect which crude PPP calculations might miss.

free and even if we had mass unemployment or not-long-sustainable gold losses.

(d) Finally, if we rewrite it in the form

$$R = \left(\frac{MC_i}{W} \Big/ \frac{mc_i}{w} \right) \frac{W}{w} \qquad (12)$$

the expression cannot, I believe, be usefully approximated by index numbers of productivity changes. Any PPP calculation so arrived at may be empirically lucky in some cases, but lacks a valid theoretical basis.

(e) We are back then to the valuable commonplaces that began this section and we still lack precise numerical guidance of the PPP type.

While I have stated these matters rather dogmatically, it has been merely to avoid the awkward circumlocution of interrogation. I express doubt rather than disagreement.

14. *Equilibrium parity.* Writers such as Mill, Mangoldt, Marshall, Edgeworth, Taussig, Viner, Graham, Haberler, and G. A. Elliott have analyzed my 2-country many-good constant-labor-cost model. It is the one case where Marshall's "bales of goods" really can be used. First forbid all capital and gold movements. Then knowledge of the A's and a's, of each man's indifference contours and labor supply, will (with suitable adjustments for transport costs) enable the net current balance of America B, as expressed in any *numeraire* units, to be written as a function solely of W/Rw, the real ratio of wage rates expressed in a common currency:

$$B(W/Rw) = 0 \qquad (13)$$

A similar relation can be deduced from this for the other country. If the "normal" Marshall-Lerner elasticities prevail, raising W with R and w fixed will lead to an American deficit on current account. If non-current items N are also a decreasing function of W/Rw — as for example when a wage rise here makes wanted net investment outflow greater — equilibrium [5] can be written symbolically as

[5] I have been asked whether my argument that comparative advantage is no guarantee of balance-of-payments equilibrium depends upon an assumption of rigid wage rates. My answer is, not essentially. Of course, if we are to be outsold in terms of everything and our employment is to be zero, that does imply that our wage rates are kept rigidly so high as to prevent full (or indeed *any*) employment. But my point is a different one: even if the domestic

$$B(W/Rw) + N(W/Rw) = F(W/Rw) = 0, \quad (14)$$

and an autonomous outflow of capital or aid will call for an equilibrating drop in our relative wage level. (But recall from the Ohlin and Pigou discussions of the transfer problem that a shift in N payments may have important "income effects" on the current-payments function B.)

Naive PPP must assume that the function F is not a changing function with time. Sophisticated PPP asserts that F has not changed much or estimates how it has changed. Unless very sophisticated indeed, PPP is a misleadingly pretentious doctrine, promising us what is rare in economics, detailed numerical predictions. Few doubt that long-run wheat prices are determined by supply and demand equations rather like the one above; but who ever expects from this analysis detailed numerical predictions based upon simple historical calculations?

Finale

15. *Conclusions.* My own diagnosis of the dollar problem can be illuminated by this theoretical discussion.

(1) The dollar has been somewhat overvalued in this last decade. This does not imply that we should depreciate. It does imply that economists everywhere would prefer, if they could rerun history, that the 1949 depreciations abroad had been somewhat less sharp.

(2) The overvaluation has hampered a high-employment policy at home; it has unduly limited America's freedom to spend abroad *in an efficient manner* what our citizenry deems

money wage falls flexibly to produce full employment, there is no reason why the full-employment money wage should produce a zero "basic deficit." Spontaneous or induced capital movements may finance this algebraic deficit; or gold may flow out; or if gold payments are suspended, the exchange rate R may move to restore the equilibrium; or the Hume gold-flow price-level mechanism may work eventually to restore the equilibrium. In no case is it the comparative advantage mechanism itself which does the trick. This is really a prosaic conclusion, for its paradoxical appearance evaporates once it is understood.

Professor Bela Balassa of Yale, who has independently written a paper arriving at similar theoretical conclusions and who has presented empirical evidence to show that COL PPP tends to show a spurious overvaluation for higher-income currencies, suggests that I may be reading more sense into Cassel than is there and may be too hard on Keynes. I fear he is right.

to be desirable for our military security, altruistic and Machiavellian foreign aid, and profit-seeking investments.

(3) The productivity improvements abroad since 1949 (which represent a relative lowering of a_i/A_i ratios) have not yet been matched by commensurate rises in foreign money wages relative to ours (i.e., in w/W). As a result, we have not been able to develop the colossally large surplus on private current account needed for equilibrium offsetting of legitimate private investment and government spending on foreign-aid and security. (Note how close I come to the general spirit of Professor Houthakker's forceful writings.)

(4) Our overvaluation has had one effect that some will deem a virtue: it has kept pressure on our price levels. This anti-inflation benefit has been dearly bought in terms of unemployment, excess capacity, slow growth, and low domestic profits.

(5) Our overvaluation has helped to redistribute our disproportionate share of world gold, thus providing the miracle nations of Europe and Japan with needed secular increases in liquidity.

(6) Our overvaluation has put some upward pressure on foreign price and cost levels. By voluntary currency appreciation, the surplus countries could choose to offset this.

(7) Overvaluation pushes American capital abroad, and in turn is intensified by foreign investment. These are secondary reactions to the technological miracles of growth abroad. *The prime element in all this is the reducing of the technological gap between America and the less-than-most-affluent nations.* Their labor now has access to the best production functions. Our labor had a quasi-monopoly access to scientific management methods and to our capital. But capital and knowledge have become footloose.

If you think American capitalists will reap the reward of their foreign ownerships, our National Product may have been increased by the miracle abroad. But labor's monopoly position, and hence its *share* of the total real product, would seem to have been hurt (compared to what otherwise would have been the case). Literally, we have exported jobs and

(what is not the same thing) have lowered the imputed real wage of immobile American labor needed to repatriate those jobs.

(8) Finally, has the narrowing of the technical gap hurt or helped America's total equilibrium GNP? Pollyannas say prosperity abroad swells trade volume and has to help everybody. Economists say, "It all depends." If my hypothesis is correct — that narrowing our technological gap is the prime clue to postwar international economics — the earlier theoretical models have the following implications.

Our comparative advantage (in the goods we usually specialize on for export and home production) has been narrowed down by forces originating abroad. The basic gain from international trade — its consumers surplus, so to speak — should thereby be lessened. (In my Ricardian model this would show itself in a deterioration of the equilibrium terms-of-trade factor, $Y^* = W/Rw$.) This effect may not be large, and it may be swamped by other factors making for a rising trend in United States living standards; but compared to what otherwise would be the case, an externally-caused lowering of a_i/A_i ratios which is biassed toward

our goods for which this ratio is already high, presumptively lowers our well being.[6]

If true, this is not to me a discouraging conclusion. As a man of good will, living in the most affluent country, I must cheer the material progress abroad.

[6] A balanced fall in a_i/A_i yields no easy presumptions. Note that my logic cannot be used to prove that the narrowing of comparative advantages hurts *both* regions, Europe as well as America. It does tend to lessen the consumers-surplus-from-trade of both regions; but the country in which biassed innovation originated, Europe, will presumptively gain more from domestic efficiency than she will lose in c-s-f-t (absolutely or compared to what otherwise would have been the case).

When I published the present thesis in my regular *Nihon Keizai Shimbun* column (and in other financial journalism), a New York bank economist wrote in a letter: "How can the American terms of trade deteriorate when, as you do not deny, America has been pricing herself out of the market by too-high export wages and prices (steel, etc.) ?" My answer goes as follows: "It is precisely the maintenance of higher-than-equilibrium terms of trade that perpetuates trade deficits. When we restore final equilibrium by somehow bringing our relative prices down, the indicated deterioration of the terms of trade (over what they otherwise would have been) will only *then* be observable." Because we are a great continental economy, not much dependent on external trade, the indicated modest drop in terms of trade ought not to mean a great welfare loss (not nearly as great as, say, an extra 2 per cent of unemployment or 4 per cent of real GNP).