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The Terms of Trade The Balance of Payments and Exchange Rates

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by

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In the analysis of tariffs it has been argued that the imposition of a tariff may improve the terms of trade at the same time that it improves the balance of payments. The argument depends upon the specification of the home and the foreign elasticities of supply and demand. The dependence of the change in the balance of payments, given a change in the exchange rate, upon these elasticities is well known. The effect of a change in the exchange rate upon the terms of trade is dependent upon the same "variables" as the balance of payments, at a point conditions can be derived. The essential results are, that there are three possible types of "worlds", defined by the reaction of the terms of trade and the balance of payments to a change in the exchange rate; one in which both the terms of trade and the balance of payments improve, one in which they both deteriorate, and a third in which the balance of payments improves while the terms of trade deteriorates.[1] Which world exists depends upon the elasticities of demand and supply.

The analysis which follows takes as its point of departure the supply and demand curves for imports and exports of "two countries" This means that the world with which we are concerned is one in which international liquidity exists. That is, neither country has a budget equation in the sense that it has an "income" that is the upper limit to its expenditures on imports; neither country, during the time period concerned, is constrained to balance its imports by its exports. Therefore the price-quantity relations reflected in the demand curves of each country represent the quantity that will be taken at the indicated price. If a country were constrained to the spending of on foreign commodities only the amount that it can earn by its exports, then

at any moment its demand curve for imports is a rectangular hyperbole with unit elasticity, the total expenditure that the curve represents being determined by the supply of foreign currency, which in turn is determined by the supply curve of exports and the demand in the second country for imports. A change in either the supply condition of exports or the foreign demand for imports would result in a shift of the first countries demand curve, so that the fixed expenditure represented by the demand curve is equal to the new value of exports. The price quantity taken will be the intersection of this demand curve with the foreign supply curve of exports ; the changes in the quantity taken would represent either shifts in the supply curve(exogenous to our analysis) or they would trace out the second countries supply curve and would be the result of changes in the value of exports. In such a case we do not have the four independent elasticities , the constraint that for one country the demand for imports is limited to the value of exports eliminates the demand curve for imports as an independent variable.

(11) If we also constrain the second country to importing only the total value of its exports then the equilibrium point is the intersection of the two supply curves and we are close to the Marshallian barter analysis, where there are only two independent determinents of the exchange balance; the supply curves in each country. Such barter conditions may exist for a bankrupt country, but the usual case is that the period to period payments do not have to balance. This means that the demand and supply curves for exports and imports do not include all of the items which enter

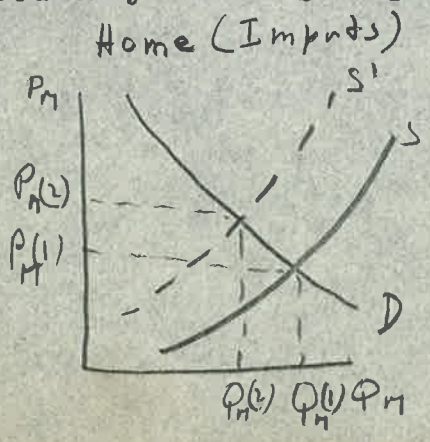
into the balance of payments and which makes the proposition that the balance of payments balances a trueism. Outside of the demand and supply curves that we are analysing there are all the movements of international liquidity such as gold movements, interest payments and both long and short term capital movements. With the recognition that the demand and supply curves that we are about to analyse only cover the current trade items , we can take the demand and supply curves as a given, assuming that any discrepency in the current account can be made up in the financial sphere. Of course it is possible for a single country to run out of its ability to finance a discrepency in its current account. Such an occurrence can be used as a definition of an international monetary crisis.

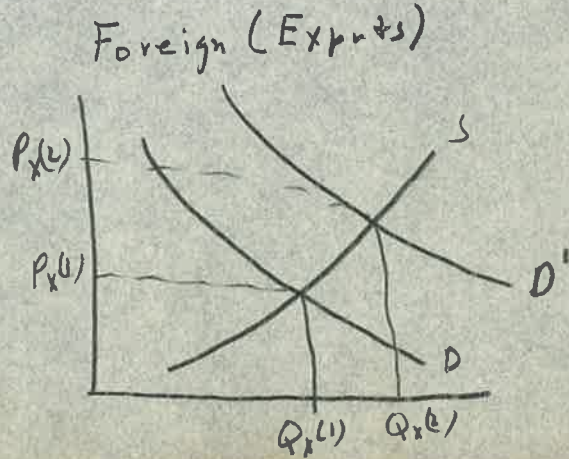
There is another and perhaps more serious omission in the analysis which follows, income shifts in the two countries are ignored. As is well known the induced shifts in income are supposed to counteract any change in that arises from an equilibrium in the balance of payments. If a country depreciates or deflates in order to improve its balance of payments, one of the effects will be to alter the level of income in both countries. The depreciating country will export more which should result in a higher income and therfore more imports, the appreciating country will have a reduction in its level of income and therefore it will import less.The net effect will tend to establish the previous balance of payments position. As an example, if Britain attempts to eliminate its import surplus from the United States by cutting imports, the effect will be to lower income in the United States which in turn will lower British exports, tending to re-establish the previous position. In the analysis that follows it is assumed that the level of income is maintained in each country

independent of the trade balance. The country whose trade balance deteriorates increases internal investment, the country whose trade balance improves decreases internal investment. This means that some form of international monetary cooperation is postulated.

5 The problem that we are going to be concerned with in particular is the effect of a change in the exchange rate upon the balance of payments, defined to include only current items, and the terms of trade, which is also defined to include only current items. The exclusion of the financial sphere will mean that we can use invariant supply and demand curves for imports and exports, that we have four independent determinents of the effect of a change in the exchange rates. The elimination of non current items from the terms of trade analysis means that it is possible that in cases where our analysis indicates an improvemnt in the terms of trade , the fixed interest payments etc which constitute a part of the total terms of trade may result in the total terms of trade deteriorating.

6 The diagrams used in the analysis of the effect of a change in the exchange rate upon the terms of trade and the balance of payments are the same. If a country depreciates in the ratio K, the home demand curve and the home supply curve will be unchanged, the foreign demand curve will shift upward (a larger quantity will be taken at the same price in the domestic currency) and the foreign supply curve will also shift upward(the same quantity will be offered only at a higher price)





In the above diagram, the balance of payments , before depreciation is given by $P_x(1)\,Q_x(1) - P_m(1)\,Q_m(1)$. If depreciation is to improve the balance of payments we must have that

$$\left[P_x(2)\,Q_x(2) - P_m(2)\,Q_m(2)\right] > \left[P_x(1)\,Q_x(1) - P_m(1)\,Q_m(1)\right]$$

This same condition can be stated in the form:

$$\frac{d}{dR}\left(P_x\,Q_x - P_m\,Q_m\right) > 0 \text{ for improvement}$$
$$= 0 \text{ for no change}$$
$$< 0 \text{ for deterioration}$$

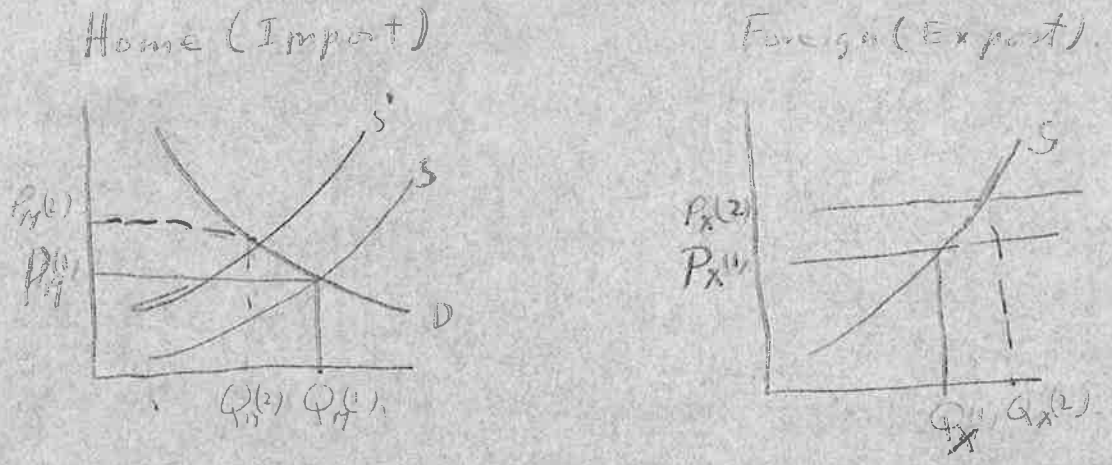
of the trade balance.

In the same diagram, the terms of trade, before depreciation is $\frac{P_x(1)}{P_m(1)}$. If depreciation is to improve the terms of trade we must have $\frac{P_x(2)}{P_m(2)} > \frac{P_x(1)}{P_m(1)}$. This same condition can be stated in the form:

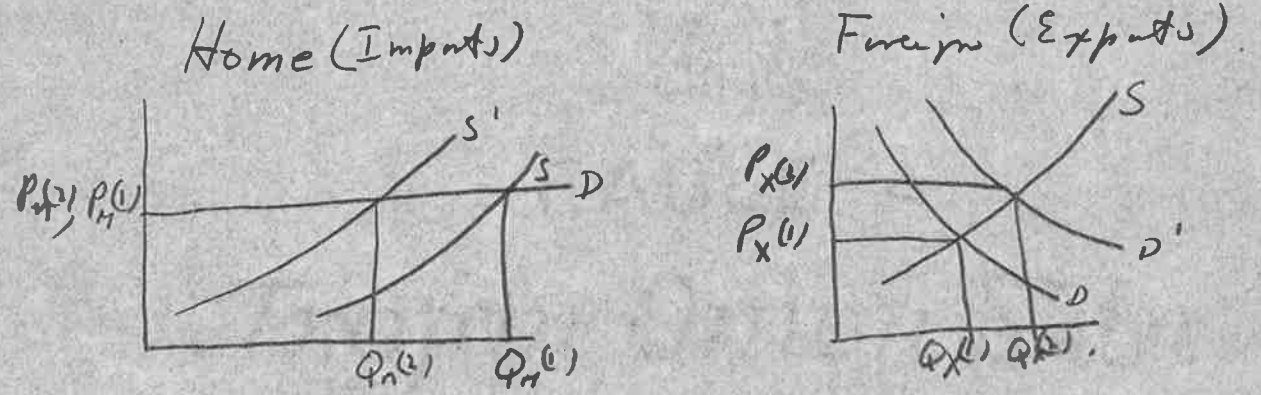
$$\frac{d}{dR}\left(\frac{P_x}{P_m}\right) > 0 \text{ for improvement}$$
$$= 0 \text{ for no change}$$
$$< 0 \text{ for deterioration}$$

in the terms of trade.

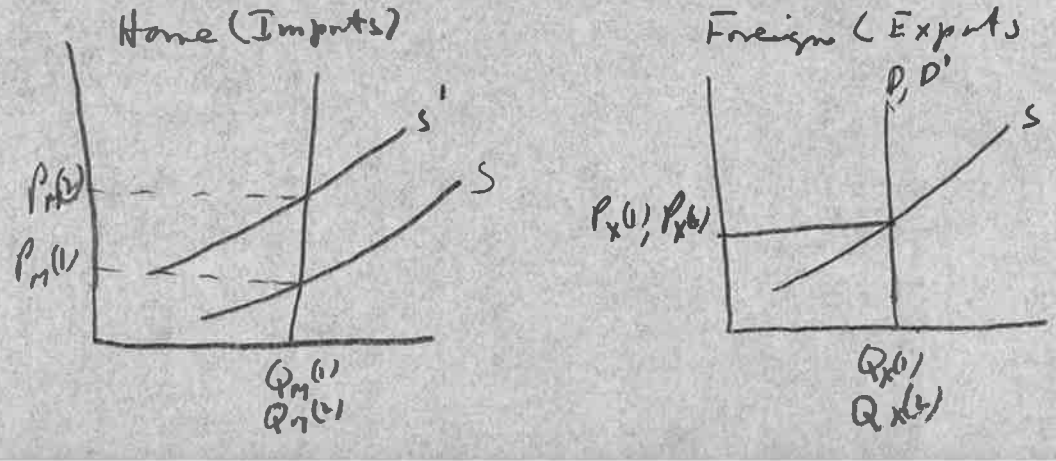
It is obvious that the effect of a change in the exchange rate upon the terms of trade and the balanace of payments depends upon the home and foreign elasticities of demand and supply: that is, upon the slopes of the supply and demand curves at the intersection and to the shift in the curves due to the depreciation. If we assume that the elasticity of demand in the foreign country is ∞ the price of exports in the home currency will rise by the full amount of the depreciation, that is the price in the foreign currency will remain unchanged . The price of imports will rise less than proportionately to the depreciation. The terms of trade will improve. The value of imports will vary as the home elasticity of demand, the value of exports will increase at least in proportion to the depreciation. Whatever the domestic elasticity of supply of exports, the balance of payments will improve.



If the elasticity of demand in the home country is infinite the price of imports will remain unchanged, the price of exports will rise, the terms of trade will improve. The value of exports will increase, the value of imports will decrease, the balance of payments and the terms of trade both improve.



If the elasticity of demand in both countries is zero, the price of imports will rise by the full depreciation ratio, the foreign price remaining unchanged; the terms of trade deteriorate; similarly the value of imports increases, the value of exports remains unchanged ; the balance of payments deteriorates.



By means of a very simple manipulation of the balance of payments relation and the terms of trade relation given above, the result of a change in the exchange ratio upon the balance of payments and the terms of trade can be derived. If we write as above;

P_M = Price of Imports
Q_M = Quantity of Imports
P_X = Price of Exports
Q_X = Quantity of Exports

we can by using the familar relations of Joan Robinson write

Elasticity of supply of exports $\varepsilon_x = \frac{P_x\, dQ_x}{Q_x\, dP_x}$.

Elasticity of demand for exports $\eta_x = \frac{dQ_x}{Q_x} / K - \frac{dP_x}{P_x}$ (4.

Elasticity of supply of imports $\varepsilon_m = -\frac{dQ_M}{Q_M} / K - \frac{dP_M}{P_M}$

Elasticity of demand for imports $\eta_m = -P_M / dP_M / Q_M / dQ_M$.

The depreciation ratio $K = \frac{dP_x}{P_x}$ from η_x and ε_x above is:

$$K = \frac{dQ_x P_x + \eta_x dP_x Q_x}{\eta_x P_x Q_x}$$

and

$$K = \frac{\varepsilon_m dP_M Q_M - dQ_M P_M}{\varepsilon_m P_M Q_M}$$

If we differentiate $P_x Q_x - P_M Q_M$ with respect to R, multiply numerator and denominator by K from above we get that the balance of payments will improve if (assuming $P_x Q_x = P_M Q_M$) at the old exchange rate and ignoring second order differentials throughout)

1) $$K P_M Q_M \left\{ \frac{\varepsilon_m \varepsilon_x (\eta_x + \eta_m - 1) + \eta_x \eta_m (1 + \varepsilon_x + \varepsilon_m)}{(\varepsilon_x + \eta_x)(\varepsilon_m + \eta_m)} \right\} > 0$$ (5

will deteriorate if the above expression is < 0, will be unchanged if it is = 0.

The above gives us the by now familiar condition that $\eta_x + \eta_m > 1$ is sufficient for an improvement in the balance of payments.

If we differentiate with the terms of trade p_x/p_m with respect to K, substituting the expressions for K given above

we get that the terms of trade will improve if

2) $K \frac{p_x}{p_m}\left(\frac{\eta_x\eta_m - \varepsilon_x\varepsilon_m}{(\varepsilon_x+\eta_x)(\varepsilon_m+\eta_m)}\right) > 0$ (6

will deteriorate if the above expression is <0, will be unchanged if it is $=0$.

As $\varepsilon_x, \varepsilon_m, p_x, Q_x, p_y, Q_y$ and K are all > 0, the conditions given above for the terms of trade and the balance of payments depend solely upon the numerator. For the balance of payments we have that if

3) $\varepsilon_x\varepsilon_m(\eta_x+\eta_m-1)+\eta_x\eta_m(\varepsilon_x+\varepsilon_m+1) > 0$ (improvement)

$= 0$ (no change)

< 0 (deteriorate)

and for the terms of trade we have that if

4) $\eta_x\eta_m - \varepsilon_x\varepsilon_m > 0$ (improvement)

$= 0$ (no change)

< 0 (deteriorate)

Let us assume that the terms of trade improve

$\eta_x\eta_m - \varepsilon_x\varepsilon_m > 0$

$\eta_x\eta_m = \varepsilon_x\varepsilon_m + \lambda \quad (\lambda > 0)$

Substituting this value of $\eta_x\eta_m$ in 3 above we get

$\varepsilon_x\varepsilon_m(\eta_x+\eta_m-1)+(\varepsilon_x\varepsilon_m+\lambda)(\varepsilon_x+\varepsilon_m+1)$

$= \varepsilon_x\varepsilon_m(\eta_x+\eta_m+\varepsilon_x+\varepsilon_m)+\lambda(\varepsilon_x+\varepsilon_m+1)$ which is always > 0. Therefore we have theorem I

THEOREM I: If the terms of trade improve, or remain unchanged, as a result of a depreciation, the balance of payments will improve. (b)

Let us assume that the balance of payments deteriorates:

$\eta_x\eta_m(1+\varepsilon_x+\varepsilon_m)+\varepsilon_x\varepsilon_m(\eta_x+\eta_m-1) < 0$

or $1 > \eta_x+\eta_m+\frac{\eta_x\eta_m}{\varepsilon_x\varepsilon_m}(1+\varepsilon_x+\varepsilon_m)$.

This implies $\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} < 1$; or $\eta_x \eta_m - \varepsilon_x \varepsilon_m < 0$ which means , with all the elasticities > 0 that we have:

Theorem II. If the balance of payments deteriorates, or remains unchanged as a result of a depreciation, the terms of trade must deteriorate. 8

Theorems I and II leave a range within which the terms of trade may deteriorate while the balance of payments improves. That is , a deterioration in the terms of trade implies nothing about the balance of payments and an improvement of the balance of payments implies nothing about the terms of trade. However by using the familiar proposition that if $\eta_x + \eta_m > 1$ the balance of payments must improve as a dividing line, we can set up values of the elasticities of demand and supply for which the terms of trade improve or deteriorate.

If the balance of payments improves we have, from 3 above;

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}.$$

and $1 > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$.

If the terms of trade improve we have from 4 above

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > 1$$

So for the balance of payments to improve while the terms of trade improve we have $\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > 1 > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$. 5)

If $\eta_x + \eta_m > 1$ then the only restriction upon the elasticities of supply is the same as held for an improvement in the terms of trade without taking the balance of payments into account:

$$\eta_x \eta_m > \varepsilon_x \varepsilon_m.$$

If $\eta_x + \eta_m < 1$, the maximum value of $\eta_x \eta_m$ is $1/4$.
So for the improvement in the balance of payments, given $\eta_x + \eta_m < 1$ to be consistent with an improvement in the terms of trade, it is necessary to have $\varepsilon_x \varepsilon_m < 1/4$. This means that ~~either~~

either a) $\varepsilon_x + \varepsilon_m < 1$

or b) either ε_x or ε_m is almost zero.

If the terms of trade deteriorate, we have $1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}$ from 4 above. So for the balance of payments improving to ~~imply that~~ the terms of trade deteriorate we have:

6) $$1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$$

If $\eta_x + \eta_m > 1$, no restrictions are implied on the ε's, except that

$$\varepsilon_x \varepsilon_m > \eta_x \eta_m.$$

If $\eta_x + \eta_m < 1$, then ~~for~~ as for large elasticities of supply $\varepsilon_x \varepsilon_m$ increases faster than $1 + \varepsilon_x + \varepsilon_m$, we have, with any fixed numerator a maximum value to the ε's for which

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$$

holds. Obviously the lower limit to the ε's is the value of $\eta_x \eta_m$. With $\eta_x + \eta_m < 1$, $\eta_x \eta_m < 1/4$ so that $\varepsilon_x \varepsilon_m > 1/4$ is sufficient for $1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}$.

If we specify values for $\eta_x \eta_m$ we can by assuming $\varepsilon_x = \varepsilon_m$ solve the equation

$$\frac{\eta_x \eta_m}{\varepsilon^2} = \frac{1 - \eta_x - \eta_m}{1 + 2\varepsilon}$$

to get the maximum values for which the balance of payments improves. A table of values of maximum ε's for specified values of $\eta_x \eta_m$ follows. (9)

Maximum values of $\varepsilon_x = \varepsilon_m$ for which balance of payments improves given that the demand elasticities $\eta_x + \eta_m < 1$

η_m \ η_x	.1	.25	.33	.4	.7	.8
.1	.125	.24	.3	.4	1.0	2.0
.25	.24	.5	.69	1.1	7.5	XXX
;33	.3	.69	1.0	1.3	x	X
.4	.4	1.1	1.3	2.0	X	X
.7	1.0	7.5	X	X	X	X
.8	2.0	X	X	X	X	X

Minimum values of $\varepsilon_x = \varepsilon_m$ for which ~~terms~~ terms of trade deteriorate given demand elasticities $\eta_x + \eta_m < 1$..

η_m \ η_x	.1	.25	.33	.4	.7	.8
.1	.1	.16	.18	.2	.26	.28
.25	.16	.25	~~.25~~ .29	~~.29~~ .32	~~.32~~ .42	~~.42~~
.33	.18	.29	.33	.37	X	X
.4	.2	.32	.37	.4	X	X
.7	.26	.42	X	X	X	X
.8	.28	X	X	X	X	X

If the sum of the elasticities of demand is less than 1, there is a relatively restricted range of values of the supply elasticities which will result in the terms of trade deteriorating at the same time that the balance of payments improves. For example, from the tables above if $\eta_x = .25, \eta_m = .7$ we get that the ~~ma~~ maximum value of $\varepsilon_x = \varepsilon_m = 7.5$ the minimum value is .42 . The nearer $\eta_x + \eta_m$ is to 1 the greater the range, for example if $\eta_x = .5, \eta = .4$ the maximum value of $\varepsilon_x = \varepsilon_m = .4$ the minimum value is .2.

In the analysis of a classical gold standard mechanism, the effect of an unfavorable balance of payments is to depress internal prices in the "unfavorable" country, raise them in the "gaining" country; the quantity taken and the price in each country would change so that automatically an equilibrium position would result at which there would be a balanced payment position at an altered (deteriorated from the view of the "unfavorable" country) terms of trade. With inelastic demand the quantity taken changes but slightly in both countries; the value of imports may therefore increase, of exports decrease for the "unfavorable" country. If export supply varies greatly with changes in price, the higher foreign price shifting supply from domestic to foreign demand, in the deflating country, or shifting supply from foreign to domestic demand in the inflating country, we would have that both the terms of trade and the balance of payments move against the deflating country. The same supply and demand conditions which result in an unfavorable movement of both the terms of trade and the balance of payments when a country depreciates will result in an unfavorable movemnt with the classical gold standard mechanism; fixed and flexible exchanges are equivalent with respect to their dependence upon the home and foreign elasticities of demand and supply.

The traditional theory of international payments asserted that a depreciation would improve the balance of payments , but only at the price of a deterioration in the terms of trade. In the reconsideration of the theory of exchanges , following the first World War, as a result of the German reparations problem, it was recognised that "a sufficiently inelastic demand for a country's

exports may lead to a shrinkage in the favorable balance of trade in consequences of sacrifices in the terms of trade" and that a " " highly inelastic demand for imports on the part of Germany would serve to augment the difficulty."[10] Even though incomplete in not recognising the dependence of the result upon the supply conditions , it marked a break with the traditional theory.

In the traditional theory the unfavorable balance of payments really was a measure of the too high price level or exchange rate for the deficit country; the unfavorable balance of payments was a measure of the deficit country getting more than it was giving in the terms of trade. Depreciation or deflation would correct both the terms of trade and the balance of payments. On the other hand, the "fact" that depreciation results in a movement in the terms of trade against the depreciating country would act as a constraint upon the use of depreciation for anything but a fundamental disequilibrium.

In order for the above normative view to hold in the world, it is ~~necessary and~~ sufficient that the sum of the demand elasticities be greater than one and that the product of the supply elasticities be greater than the product of the demand elasticities; that is elastic demand and even more elastic supply conditions.

If the demand elasticities are large and the supply elasticities small, then we would have that the balance of payments would improve and the terms of trade would also improve as a result of a depreciation. That would seem to be a world in which true beggar-my-neighbor policies would seem to work.

If the demand elasticities are small, $\eta_x + \eta_m < 1$, and the supply elasticities are large , then both the terms of trade and

the balance of payments would deteriorate upon depreciation, we have a world in which appreciation (or internal inflation) would work; that is , in which if a country raised its internal price level it would be better off. However, the usual result of such a situation has been the imposition of direct controls, arbitrarily limiting imports or by systems of blocked accounts trying to force exports, artificially raising the elasticity of demand for exports.

The above analysis leaves us with three possible types of worlds: one in which both the terms of trade and the balance of payments improve; a second in which the terms of trade deteriorate while the balance of payments improves; and a third in which both the terms of trade and the balance of payments deteriorates as a result of depreciation.

The conventional policy recommendations of economists, centering around free or at least non-discriminatory trade where fundamental disequilibria in the balance of payments are met with either depreciation of deflation is consistent with the second type of world. If you are in the second type of world, where the balance of payments and the terms of trade do not move together, each country can be left to set its own exchange rate; for any surplus on current account would be the result of a country taking more unfavorable terms of trade than it could have, which results in a lowering of the domestic standard of living.

If the world is of the first kind, where both the terms of trade and the balance of payments improve upon depreciation unilateral control of exchange rates would be undesirable for true beggar -my-neighbor trade policies are possible. Although such a world may exist, with elastic demand and inelastic supply, it is not the same as the beggar-my-neighbor world of business cycle policy (11) for in a depression it can be assumed that the supply elasticities are

high. Although for a single underemployed country in a full employment world, it may be true that , due to the supply elasticities of imports being almost zero, both may improve.

The present international monetary difficulties may revolve around the possibility that the world really is of the third kind, where the effect of a depreciation is to deteriorate both the terms of trade and the balance of payments. If we take the hard currency countries and the soft currency countries as units, we may have a situation in which the demand conditions are inelastic, the supply conditions elastic between them. The inelasticity of demand for hard currency commodities may be due to two causes. The commodities exported by the hard currency countries may be those conventional necessities whose demand is "normally" inelastic. The soft currency countries may so regulate the importation of hard currency commodities by means of import licenses that any "reasonable" price increase would not affect the quantity taken. The inelasticity of demand for soft currency commodities by hard currency countries may be due to the small part that the foreign price is in the domestic price of foreign produced goods.

It is usually overlooked in the discussion of the effect of a depreciation or a deflation that there is a difference between the elasticity of demand for imports and the elasticity of demand for foreign commodities.(14) The export price is but a part, and sometimes a small part, of the the price of the commodity to the buyer in the foreign country. In addition to the export price the final price includes transportation costs, both within and outside of the buying country, the tariff and the processing and selling costs within the buying country. If the costs within the importing country are fixed , then any change in the export price will result in a smaller percentage change in the final selling

price. The foreign consumer reacts to the domestic selling price of the foreign commodity, so given any elasticity of demand by the importing country consumers the elasticity of demand for the export will be smaller.

As an example we can take the well documented case of "Scotch Whiskey". The British export price of Scotch Whiskey is £1. The final selling price within the United States is, let us say, £5. Let us assume that the entire difference in the two prices is dollar costs, and that they are fixed. If the elasticity of demand for Scotch Whiskey in the United States is 2, and if the British depreciate by 20% , the United States price would be £4.80. The American price changes by 4%, the amount taken will increase by 8%. The elasticity of demand for the export Scotch Whiskey is this 8% divided by the British price change 20% or .4, which is considerably less than 1. [13]

Of course the example chosen is an extreme one due to the high tax on alcoholic beverages in the United States. However if the major part of a countries exports are commodities sold at retail in the foreign country, the effect of a high tariff barrier , combined with the large part that domestic costs are to total costs is to make the elasticity of demand for exports small, even though the elasticity of demand for the exported commodity in the importing country may be high.

Thus a circle is completed. Beginning with an analysis of the monetary mechanism in international trade we find that the monetary mechanisms behavior is determined by trade policy. The ability of a country to affect its balance of payments position by means of the monetary mechanism is slight if (1) the other countries have restrictive trade practices as the classical mechanism of adjustment by means of relative price changes depends upon the nature of foreign demand elasticities.

nature of foreign demand elasticities which are determined in part by trade policy, and (2) the deficit countries demand for imports is inelastic either as a result of the nature of the imports or as a result of policy.

If the monetary techniques as outlined in the International Monetary Fund are to work it is necessary that demand ~~conditions~~ elasticities be sizeable. In the present world that may be possible only by increasing the demand elasticities in the hard currency countries for soft currency goods. If this is true the foundation of international monetary stability is in trade policy; and if we put content into the hard currency, soft currency language used above, in the United States Tariff Policy.

FOOTNOTES

1 p1. As is proven below (p.9 Theorem II) balance of payments deteriorating implies that the terms of trade deteriorate, therefore the fourth possible combination, of the balance of payments deteriorating while the terms of trade improve cannot exist.

2 p3. The quantity of exports will not decrease, although the value of exports may. Increased exports will mean that , with the internal price level being unchanged , income in the home currency will increase.

3 p4 This paper will be carried out in terms of the home currency. Identical results are obtained in the foreign currency.

Footnotes to page 7.

4. (for the following analysis see diagram 1 pg4 above)

When country 1 depreciates the demand for imports in the second country, in its own currency , will not change. In translating this invariant foreign demand curve at the new exchange rate into the currency of country 1, the pre-depreciation quantity will be taken at a higher price. This quantity however will be offered only at a higher price, therefore there is a decrease in the quantity taken.; a movement along the demand curve. The net result is a % price change in the domestic currency of $K-\frac{dp_x}{p_x}$. The change in the quantity taken is $\frac{dz_x}{\delta x}$. The elasticity of demand for exports $\eta_x = \frac{dQ_x}{Q_x} / K - \frac{dp_x}{p_x}$. A similar argument holds for the elasticity of supply of imports: an invariant foreign supply price, translated into the domestic currency x at the new exchange rate, will result in a net % change in in price of $K-\frac{dp_m}{p_m}$.

Or a greater quantity will be taken at the same price.

5. This formula appears in Metzler's article in the Survey of Contemporary Economics p. 226. It is equivalent to the formula whih appears in a footnote to Joan Robinson's chapter on the foreign Exchanges(Pp 91 in the reprint of the chapter in Readings in The Theory of International Trade, The Blakiston Company, Philadelphia 1949) To get the Metzler form from the Robinson form you set ~~Robinsons~~ Robinsons Eq=Ip and cross multiply. As is usual in Economics it is necessary to translate symbolism.

A.O. Hirschman in The Review of Economics and Statistics, February 1949 operates by keeping the value of exports not equal to the value of imports, but by setting the elasticities of supply ∞. His results are obtainable from the above formula. It is necessary to make either the simplifying assumption that exports equal imports or that the supply elasticities are ∞ in order to reduce the number of variables to a more manageable number

in this argument we can readily assume that exports equal imports by by setting appropriate "zero" levels for the current account items at the level of the net financial transactions.

Footnotes

6 p. 8 The numerator, which is all that is pertinent to the following analysis is equivalent to the numerator in given in JOan Robinson "Beggar my Neighbor Policies" p400 Readings in INternational Trade.

7 p.8. With $\lambda=0$ in the proof above, the balance of payments must improve.

8p.9. With $1 = \eta_+ + \eta_- + \frac{\eta_+\eta_-}{\varepsilon_+\varepsilon_-}(1+\varepsilon_+ + \varepsilon_-)$, $\frac{\eta_+\eta_-}{\varepsilon_+\varepsilon_-} < 1$ which implies that the terms of trade deteriorate.

9p 10. $$\varepsilon = \frac{-2\eta_+\eta_- - \sqrt{4(\eta_+\eta_-)^2 - 4(\eta_+ + \eta_- - 1)(\eta_+\eta_-}}{2(\eta_+ + \eta_- - 1)}$$

10 p 12. Professor Ellis "The Equilibrium Rate of Exchange" in Explorations in Economics.

11 p 14. The beggar-my neighbor business cycle policy involves a sacrifice in the terms of trade.

12 p 15. Tse Chun Chang "Review of Economic Studies 1945-46 International Comparison of Demand for Imports" p62 "From the point of view of home consumers the cost of buying imported commodities is not the price quoted by the foreign sellers, but the quoted price c.i.f. plus import duties. Any change in Tariff is equivalent to an increase or decrease in import price.". On p63 he also says (footnote) that import price= price + customs revenue/ quantity.

Mr Chang's price seems to be midway between the two prices I would argue are pertinent: the price recieved by the exporting country and the final selling price in the importing country. Mr. Chang's price seems to be the wholesale purchasers price. If we wish to analyse the effect of a depreciation upon the receipts of foreign currency, then as the entire change must be assumed to take place in the export price , Mr Changs measured elasticities of demand have an upward bias due ot the inclusion of the tariff. Even including this bias his measured elasticities are <1

Footnotes

13 p 16. If all costs except the export price are fixed, and if the export price is 1/n th of the final selling price, the elasticity of demand for exports is 1/n th of the elasticity of demand for the import.

THE TERMS OF TRADE THE BALANCE OF PAYMENTS AND EXCHANGE RATES

by

Hyman P Minsky

Haberler, Kyklos, 1950-51

In the analysis of tariffs it has been argued that the imposition of a tariff may improve the terms of trade at the same time that it improves the balance of payments. The argument depends upon the specification of the home and the foreign ex elasticities of supply and demand. The dependence of he change in the balance of payments, given a change in the exchange rate, upon these same elasticities is well known. The effect of a change in the exchange rate ofx upon the terms of trade is dependent upon the same "variables" as the balance of payments, therefor joint conditions can be derived. The essential results are that there are are three possible types of "worlds", defined by the reaction of the the terms of trade and the balance of payments to a change in the exchange rate, one in which both the terms of trade and the balance of payments improve. one in which they both deteriorate, and a third in which the balance of payments improves while the terms of trade deteriorates. Which world exists depends upon the elasticities of demand and supply.

The analysis which follows takes as its point of departure the supply and demand curves for imports and exports of "two countries" This means that the world with which we are concerned is one in which international liquidity exists. That is neither country has a budget equation in the sense that it has an "income" that is the upper limit to its expenditures on imports; neither country, during the time period we are concerned with, is constrained to balance its imports by its exports. Therefore the price-quantity relations reflected in the demand curves of each country represent the quantity that will be taken at the indicated price. If a country were constrained to the spending of on foreign commodities only the amount that it can earn by its exports, then

at any moment its demand curve for imports is a rectangular hyperbole with unit elasticity, the total expenditure that the curve represents is determined by the supply of foreign currency... which in turn is determined by the supply curve of exports and the demand in the second country for imports. A change in either the supply condition of exports or the foreign demand for imports would result in a shift of the first countries demand curve, so that the fixed expenditure represented by the demand curve is equal to the new value of exports. The price quantity taken will be the intersection of this demand curve with the foreign supply curve of exports ; the changes in the quantity taken would represent either shifts in the supply curve(exogenous to our analysis) or they would trace out the second countries supply curve and would be the result of changes in the value of exports. In such a case we do not have the four independent elasticities , the constraint that for one country the demand for imports is limited to the value of exports eliminates the demand curve for imports as an independent variable.

If we also constrain the second country to importing only the total value of its exports then the equilibrium point is the intersection of the two supply curves and we are close to the Marshallian barter analysis, where there are only two independent determinents of the exchange balance; the supply curves in each country. such barter conditions may exist for a bankrupt country, the usual case is that in the period to period payments do not have to balance. This means that the demand and supply curves for exports and imports do not include all of the items which enter into

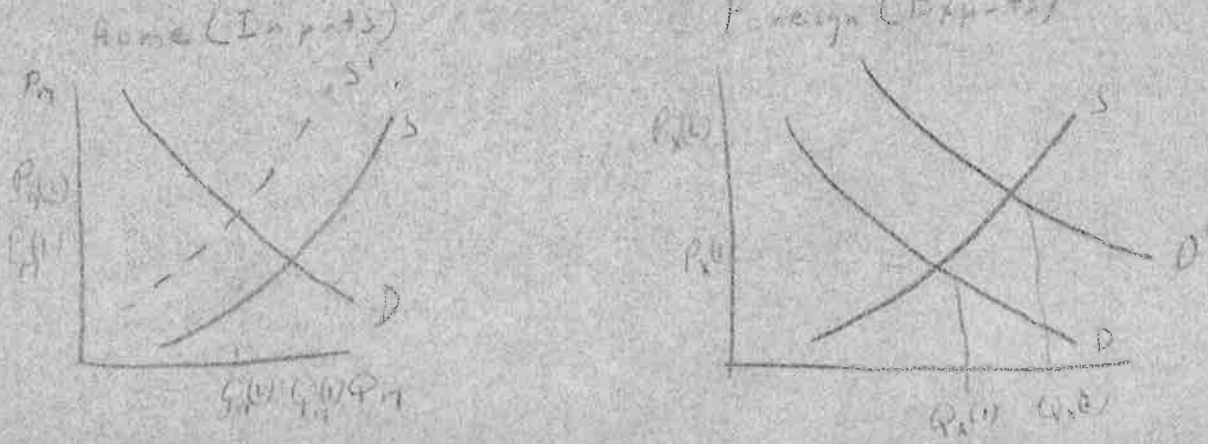
into the balance of payments and which makes the proposition that the balance of payments balances a trueism. Outside of the demand and supply curves that we are analysing there are all the movements of international liquidity such as gold movements, interest payments and both long and short term capital movements. With the recognition that the demand and supply curves that we are a bout to analyse only cover the current trade items , we can take the demand and supply curves as a given, assuming that any discrepency in the current account can be made up in the financial sphere Of course it is possible for a single country to run out of its ability to finance a discrepency in its current account. Such an occurrence can be used as a definition of an international monetary crisis.

There is another and perhaps more serious omission in the analysis which follows, income shifts in the two countries are ignored. As is well known the induced shifts in income are supposed to counteract any change in that arises from an equilibrium in the balance of payments. If a country depreciates or deflates in order to improve its balance of payments, one of the effects will be to alter the level of income in both countries. The depreciating country will export more which should result in a higher income and therfore more imports, the appreciating country will have a reduction in its level of income and therefore it will import less.The net effect will tend to establish the previous balance of payments position. As an example, if Britain attempts to eliminate its import surplus from the United States by cutting ists imports, the effect will be to lower income in the United States which in turn will lower British exports, tending to re-establish the previous position. In the analysis that follows it is assumed that the level of income is maintained in each country

independent of the trade balance. The country whose trade balance deteriorates increases internal investment, the country whose trade balance improves decreases internal investment. This means that some form of international monetary cooperation is postulated.

The problem that we are going to be concerned with in particular is the effect of a change in the exchange rate upon the balance of payments, definrd to include only current items, and the terms of trade, which is also defined to include only current items. The exclusion of the financial sphere will mean that we can use invariant supply and demand curves for imports and ~~exports~~ exports, that we have four independent determinents of the effect of of a change in the exchange rates. The elimination of non current items from the terms of trade analysis means that it is possible that in cases where our analysis indidates an improvemnt in the terms of trade , the fixed interest payments etc which constitute a part of the total terms of trade may result in the total terms of trade deteriorating.

The diagrams used in the analysis of the effect of a change in the exchange rate upon the terms of trade and the balance of payments are the same. If a country depreciates in the ratio K, the home demand curve and the home supply curve will be unchanged,[1] the foreign demand curve will shift upward (a larger quantity will be taken at the smae price in the domestic currency) and the foreign supply curve will also shift upward(the smae quantity will be offered only at a higher price)



In the above diagram, the balance of payments, before depreciation is given by $P_{X0}Q_{X0} - P_{M0}Q_{M0}$. If depreciation is to improve the balance of payments we must have that $[P_{X(1)}Q_{X(1)} - P_{M(1)}Q_{M(1)}] > [P_{X0}Q_{X0} - P_{M0}Q_{M0}]$

This same condition can be stated in the form:

$\frac{1}{P_M}(P_X Q_X - P_M Q_M) > 0$ for improvement

$= 0$ for no change

< 0 for deterioration

of the trade balance.

In the same diagram, the terms of trade, before depreciation is $\frac{P_{X0}}{P_{M0}}$. If depreciation is to improve the terms of trade we must have $\frac{P_{X(1)}}{P_{M(1)}} > \frac{P_{X0}}{P_{M0}}$. This same condition can be stated in the form:

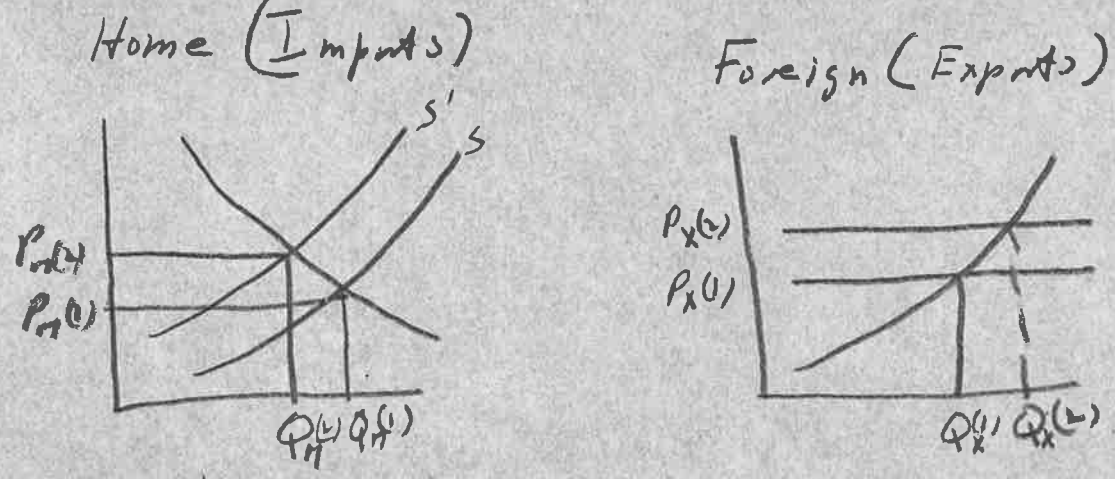
$\frac{\partial}{\partial P_M}\left(\frac{P_X}{P_M}\right) > 0$ for improvement

$= 0$ for no change

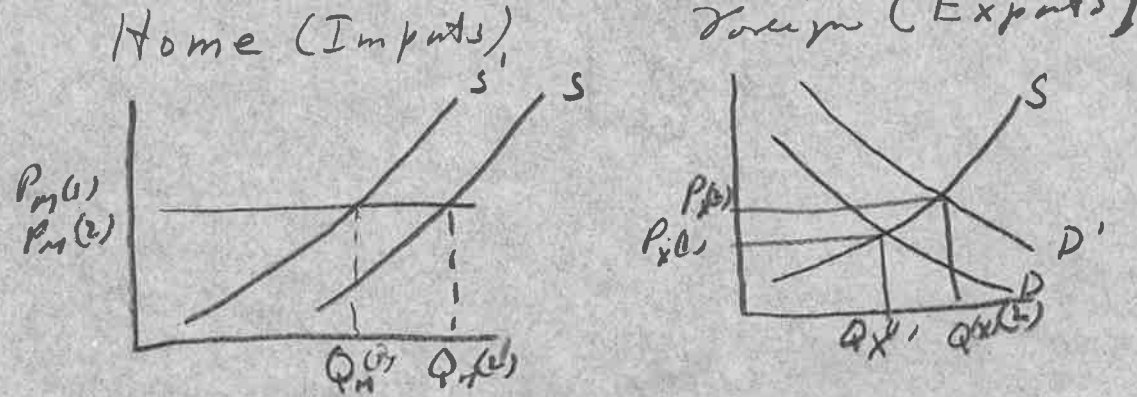
< 0 for deterioration

in the terms of trade.

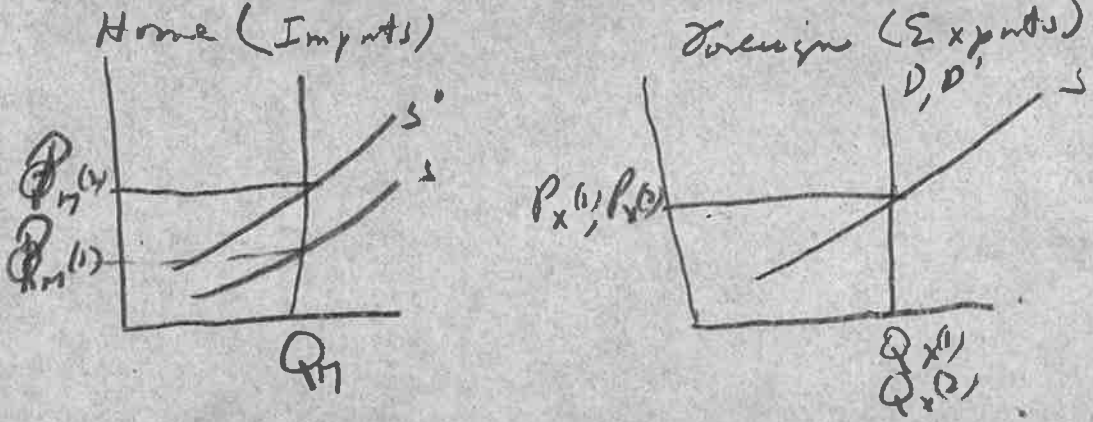
It is obvious that the effect of a change in the exchange rate upon the terms of trade and the balanace of payments depends upon the home and foreign elasticities of demand and supply: that is, is the slopes of the supply and demand curves at the intersection and to the shift in the curves due to the depreciation. If we assume that the elasticity of demand in the foreign country is ∞ the price of exports in the hame currency will rise by the full amount of the depreciation, that is the price in the foreign currency will remain unchanged. The price of imports will rise less than proportionately to the depreciation. The terms of trade will improve. The value of imports will vary as the home elasticity of demand, the value of exports will increase at least in proportion to the depreciation. Whatever the domestic elasticity of supply of exports, the balance of payments will improve.



If the elasticity of demand in the home country is infinity the price of imports willremain unchanged, the price of exports will will rise , the terms of trade will improve. The value of exports will increa se, the value of imports will decrease, the balance of payments and the termd of trade bothe improve.



If the elasticity of demand in both countries is zero, the price of imports will rise by the full depreciation ratio, the foreign price remaining unchanged; the terms of trade deteriorate; simila rily the value of imports increases, the value of exports remains unchanged ; the balance of payments deteriorates.



By means of a very simple manipulation of the balance of payments relation and the terms of trade relation given above, the result of a change in the exchange ratio upon the balance of payments and the terms of trade can be de rived. If we write as above;

P_M = Price of Imports
Q_M = Quantity of Imports
P_X = Price of Exports
Q_X = Quantity of Exports

we can by using the familar relations of Joan Robinson write

Elasticity of supply of exports $\varepsilon_x = \frac{P_x\, dQ_x}{Q_x\, dP_x}$

Elasticity of demand for exports $\eta_x = \frac{dQ_x}{Q_x} \Big/ \frac{dP_x}{P_x}$

Elasticity of supply of imports $\varepsilon_m = -\frac{dQ_m}{Q_m} \Big/ \frac{dP_m}{P_m}$

Elasticity of demand for imports $\eta_m = -\frac{P_m\, dQ_m}{Q_m\, dP_m}$

The depreciation ratio $K = \frac{dR}{R}$ from η_x and ε_m above is:

$$K = \frac{dQ_x P_x + \eta_x\, dP_x Q_x}{\eta_x P_x Q_x}$$

and

$$K = \frac{\varepsilon_m\, dP_m\, Q_m - dQ_m P_m}{\varepsilon_m P_m Q_m}$$

If we differentiate $R = P_x Q_x - P_m Q_m$ with respect to R, multiply numerator and denomina tor by K from above we get that the balance of payments will improve if (assuming $P_x Q_x = P_m Q_m$ at the old exchange rate and ignoring second order differentials throughout)

$$\frac{d(P_x Q_x - P_m Q_m)}{dR} = K P_m Q_m \left\{ \frac{\varepsilon_m \varepsilon_x (\eta_x + \eta_m - 1) + \eta_x \eta_m (1 + \varepsilon_x + \varepsilon_m)}{(\varepsilon_x + \eta_x)(\varepsilon_m + \eta_m)} \right\} > 0$$

will deteriorate if the abover expression is < 0, will be unchanged if it is $= 0$.

The above gives us the by now familiar condition that $\eta_x + \eta_m > 1$ is sufficient for animprovement in the balance of payments

If we differentiate ~~with~~ the terms of trade $\frac{P_x}{P_m}$ with respect to K, substituting the expressions for K given above

we get that the terms of trade will improve if

2) $K \frac{P_x}{P_m}\left(\frac{\eta_x \eta_m - \varepsilon_x \varepsilon_m}{(\varepsilon_x + \eta_x)(\varepsilon_m + \eta_m)}\right) \gtrless 0$ $\frac{\partial}{\partial R}\left(\frac{P_x}{P_m}\right)$

will deteriorate if the above expression is < 0, will be unchanged if it is $= 0$.

As $\varepsilon_x, \varepsilon_m, P_x, Q_x, \eta_m, Q_m$, and K are all > 0, the conditions given above for the terms of trade and the balance of payments depend solely upon the numerator. For the balance of payments we have that if

3) $\varepsilon_x \varepsilon_m (\eta_x + \eta_m - 1) + \eta_x \eta_m (\varepsilon_x + \varepsilon_m + 1) \gtrless 0$ (improvement)
$= 0$ (no change)
< 0 (deteriorate)

and for the terms of trade we have that if

4) $\eta_x \eta_m - \varepsilon_x \varepsilon_m \gtrless 0$ (improvement)
$= 0$ (no change)
< 0 (deteriorate)

Let us assume that the terms of trade improve or remain unchanged

$\eta_x \eta_m - \varepsilon_x \varepsilon_m \geq 0$

$\eta_x \eta_m = \varepsilon_x \varepsilon_m + \lambda \quad (\lambda \geq 0)$

Substituting this value of $\eta_x \eta_m$ in above we get

$\varepsilon_x \varepsilon_m (\eta_x + \eta_m - 1) + (\varepsilon_x \varepsilon_m + \lambda)(\varepsilon_x + \varepsilon_m + 1)$

$= \varepsilon_x \varepsilon_m (\eta_x + \eta_m + \varepsilon_x + \varepsilon_m) + \lambda (\varepsilon_x + \varepsilon_m + 1)$ which is

always > 0. Therefore we have theorem I

THEOREM I: If the terms of trade improve, or remain unchanged, as a result of a depreciation, the balance of payments will improve.

Let us assume that the balance of payments deteriorates or remains unchanged:

$\eta_x \eta_m (1 + \varepsilon_x + \varepsilon_m) + \varepsilon_x \varepsilon_m (\eta_x + \eta_m - 1) \leq 0$

or $1 \geq \eta_x + \eta_m + \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}(1 + \varepsilon_x + \varepsilon_m)$

This implies $\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} < 1$; that is, or $\eta_x \eta_m - \varepsilon_x \varepsilon_m < 0$ which means, with all the elasticities > 0 that we have:

Theorem II. If the balance of payments deteriorates, or remains unchanged as a result of a depreciation, the terms of trade must deteriorate.

Theorems I and II leave a range within which the terms of trade may deteriorate while the balance of payments improves. That is, a deterioration in the terms of trade implies nothing about the balance of payments and an improvement of the balance of payments implies nothing about the terms of trade. However by using the familiar proposition that if $\eta_x + \eta_m > 1$ the balance of payments must improve as a dividing line, we can set up values of the elasticities of demand and supply for which the terms of trade improve or deteriorate.

If the balance of payments improves we have, from 3 above;

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$$

and $$1 > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$$ always

If the terms of trade improve we have from 4 above

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > 1$$

So for the balance of payments to improve while the terms of trade improve we have 5) $\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > 1 > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$.

If $\eta_x + \eta_m > 1$ then the only restriction upon the elasticities of supply is the same as held for an improvement in the terms of trade without taking the balance of payments into account:

$$\eta_x \eta_m > \varepsilon_x \varepsilon_m$$

If $\eta_x + \eta_m < 1$, the maximum value of $\eta_x \eta_m$ is $1/4$.
So for the improvement in the balance of payments, given $\eta_x + \eta_m < 1$ to be consistent with an improvement in the terms of trade, it is necessary to have $\varepsilon_x \varepsilon_m < 1/4$. This means that either

a) $\varepsilon_x + \varepsilon_m < 1$

or b) either ε_x or ε_m is almost zero.

If the terms of trade deteriorate, we have $1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}$ from 4) above. So for the balance of payments improving to imply that the terms of trade deteriorate we have:

$$1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}. \qquad 6)$$

If $\eta_x + \eta_m > 1$, no restrictions are implied on the ε's, except that

$$\varepsilon_x \varepsilon_m > \eta_x \eta_m.$$

If $\eta_x + \eta_m < 1$, then as for large elasticities of supply $\varepsilon_x \varepsilon_m$ increases faster than $1 + \varepsilon_x + \varepsilon_m$, we have, with any fixed numerator, a maximum value to the ε's for which

$$\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} > \frac{1 - \eta_x - \eta_m}{1 + \varepsilon_x + \varepsilon_m}$$

holds. Obviously the lower limit to the ε's is the value of $\varepsilon_x \varepsilon_m = \eta_x \eta_m$. With $\eta_x + \eta_m < 1$, $\eta_x \eta_m < 1/4$ so that $\varepsilon_x \varepsilon_m > 1/4$ is sufficient for $1 > \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}$.

If we specify values for $\eta_x \eta_m$ we can by assuming $\varepsilon_x = \varepsilon_m$ solve the equation

$$\frac{\eta_x \eta_m}{\varepsilon^2} = \frac{1 - \eta_x - \eta_m}{1 + 2\varepsilon}$$

to get the maximum values for which the balance of payments improves. A table of values of maximum ε's for specified values of η_x, η_m follows.

Maximum values of $\varepsilon_x : \varepsilon_m$ for which balance of payments improves given that the demand elasticities $\eta_x + \eta_m < 1$

η_m \ η_x	.1	.25	.33	.4	.7	.8
.1	.125	.24	.3	.4	1.0	2.0
.25	.24	.5	.69	1.1	7.5	XXX
.33	.3	.69	1.0	1.3	X	X
.4	.4	1.1	1.3	2.0	X	X
.7	1.0	7.5	X	X	X	X
.8	2.0	X	X	X	X	X

Minimum values of $\varepsilon_x : \varepsilon_m$ for which ~~terms~~ terms of trade deteriorate given demand elasticities $\eta_x + \eta_m < 1$ ..

η_m \ η_x	.1	.25	.33	.4	.7	.8
.1	.1	.16	.18	.2	.26	.28
.25	.16	.25	~~.25~~ .29	~~.29~~ .32	~~.32~~ .42	~~.42~~
.33	.18	.29	.33	.37	X	X
.4	.2	.32	.37	.4	X	X
.7	.26	.42	X	X	X	X
.8	.28	X	X	X	X	X

If the sum of the elasticities of demand is less than 1, there is a relatively restricted range of values of the supply elasticities which will result in the terms of trade deteriorating at the same time that the balance of payments improves. For example, from the tables above if $\eta_x = .25, \eta_m = .7$ we get that the ~~maximum~~ maximum value of $\varepsilon_x = \varepsilon_m = 7.5$ the minimum value is .42 . The nearer $\eta_x + \eta_m$ is to 1 the greater the range, for example if $\eta_x = .1$ the $\eta_m = .4$ maximum value of $\varepsilon_x = \varepsilon_m = .7$ the minimum value is .2.

In the analysis of a classical gold standard mechanism, the effect of an unfavorable balance of payments is to depress internal prices in the "unfavorable" country, raise them in the "gaining" country; the quantity taken and the price in each country would change so that automatically an equilibrium position would result at which there would be a balanced payment position at an altered (deteriorated from the view of the "unfavorable" country) terms of trade. With inelastic demand the quantity taken changes but slightly in both countries; the value of imports may therefore increase, of exports decrease for the "unfavorable export country. If supply varies greatly with changes in price, the higher foreign price shifting supply from domestic to foreign demand, in the deflating country, or shifting supply from foreign to domestic demand in the inflating country, we would have that both the terms of trade and the balance of payments move against the deflating country. The same supply and demand conditions which result in an unfavorable movement of both the terms of trade and the balance of payments when a country depreciates will result in an unfavorable movemnt with the classical gold standard mechanism; fixed and flexible exchange s are equivalent with respect to their dependence upon the home and foreign elasticities of demand and supply.

The traditional theory of international payments asserted that a depreciation would improve the balance of payments , but only at the price of a deterioration in the terms of trade. In the reconsideration of the theory of exchanges , following the first World War, as a result of the German reparations problem, it was recognised that "a sufficiently inelastic demand for a country's

exports may lead to a shrinkage in the favorable balance of trade in consequences of sacrifices in the terms of trade" and that a " " highly inelastic demand for imports on the part of Germany would serve to augment the difficulty." Even though incomplete in not recognising the dependence of the result upon the supply conditions, it marked a break with the traditional theory.

In the traditional theory the unfavorable balance of payments really was a measure of the too high price level or exchange rate for the deficit country; the unfavorable balance of payments was a measure of the deficit country getting more than it was giving in the terms of trade. Depreciation or deflation would correct both the terms of trade and the balance of payments. On the other hand, the "fact" that depreciation results in a movement in the terms of trade against the depreciating country would act as a constraint upon the use of depreciation for anything but a fundamental disequilibrium.

IN order for the above normative view to hold in the world, it is necessary and sufficient that the sum of the demand elasticities be greater than one and that the product of the supply elasticities be greater than the product of the demand elasticities; that is elastic demand and elastic supply and even more elastic demand and supply conditions.

If the demand elasticities are large and the supply elasticities small, then we would have that the balance of payments would improve and the terms of trade would also improve as a result of a depreciation. That would seem to be a world in which true beggar-my-neighbor policies would seem to work.

If the demand elasticities are small, $N_x + N_m < 1$, and the supply elasticities are large, then both the terms of trade and

the balance of payments would deteriorate upon depreciation, we have a world in which appreciation (or internal inflation) would work; that is , in which if a country raised its internal price level it would be better off. However, the usual result of such a situation has been the imposition of direct controls, arbitrarily limiting imports or by systems of blocked accounts trying to force exports, artificially raising the elasticity of demand for exports.

The above analysis leaves us with three possible types of worlds: one in which both the terms of trade and the balance of payments improve; a second in which the terms of trade deteriorate while the balance of payments improves; and a third in which both the terms of trade and the balance of payments deteriorates as a result of depreciation.

The conventional policy recommendations of economists, centering around free or at least non-discriminatory trade where fundamental disequilibria in the balance of payments are met with either depreciation of deflation is consistent with the second type of world. If you are in the second type of world, where the balance of payments and the terms of trade do not move together, each country can be left to set its own exchange rate; for any surplus on current account would be the result of a country taking more unfavorable terms of trade than it could have, which results in a lowering of the domestic standard of living.

If the world is of the first kind, where both the terms of trade and the balance of payments improve upon depreciation unilateral control of exchange rates would be undesirable for true beggar -my-neighbor trade policies are possible. Although such a world may exist, with elastic demand and inelastic supply, it is not the same as the beggar-my-neighbor world of business cycle policy for in a depression it can be assumed that the supply elasticities are

high. Although for a single underemployed country in a full employment world, it may be true that , due to the supply elasticities of imports being almost zero, both may improve.

The present international monetary difficulties may revolve around the possibility that the world really is of the third kind, where the effect of a depreciation is to deteriorate both the terms of trade and the balance of payments. If we take the hard currency countries and the soft currency countries as units, we may have a situation in which the demand conditions are inelastic, the supply conditions elastic between them. The inelasticity of demand for hard currency commodities may be due to two causes. The commodities exported by the hard currency countries may be those conventional necessities whose demand is "normally" inelastic. The soft currency countries may so regulate the importation of hard currency commodities by means of import licenses that any "reasonable" price increase would not affect the quantity taken. The inelasticity of demand for soft currency commodities by hard currency countries may be due to the small part that the foreign price is in the domestic price of foreign produced goods.

It is usually overlooked in the discussion of the effect of a depreciation or a deflation that there is a difference between the elasticity of demand for imports and the elasticity of demand for foreign commodities. The export price is but a part, and sometimes a small part of the the price of the commodity to the buyer in the foreign country. In addition to the export price the final price includes transportation costs, both within and outside of the buying country, the tariff and the processing amd selling costs within the buying country. If the costs within the importing country are fixed , then any change in the export price will result in a smaller percentage change in the final selling

price. The foreign consumer reacts to the domestic selling price of the foreign commodity, so given any elasticity of demand by the importing country consumers the elasticity of demand for the export will be smaller.

As an example we can take the well documented case of "Scotch Whiskey". The British export price of Scotch Whiskey is £1. The final selling price within the United States is, let us say, £5. Let us assume that the entire difference in the two prices is dollar costs, and that they are fixed. If the elasticity of demand for Scotch Whiskey in the United States is 2, and if the British depreciate by 20%, the United States price would be £4.80. The American price changes by 4%, the amount taken will increase by 8%. The elasticity of demand for the export Scotch Whiskey is this 8% divided by the British price change 20% or .4, which is considerably less than 1.

Of course the example chosen is an extreme one due to the high tax on alcoholic beverages in the United States. However if the major part of a countries exports are commodities sold at retail in the foreign country, the effect of a high tariff barrier, combined with the large part that domestic costs are to total costs is to make the elasticity of demand for exports small, even though the elasticity of demand for the exported commodity in the importing country may be high.

Thus a circle is completed. Beginning with an analysis of the monetary mechanism in international trade we find that the monetary mechanisms behavior is determined by trade policy. The ability of a country to affect its balance of payments position by means of the monetary mechanism is slight if (1) the other countries have restrictive trade practices as the classical mechanism of adjustment by means of relative price changes depends upon the nature of foreign demand elasticities

nature of foreign demand elasticities which are determined in part by trade policy, and (2) the deficit countries demand for imports is inelastic either as a result of the nature of the imports or as a result of policy.

If the monetary techniques as outlined in the International Monetary Fund are to work it is necessary tha t demand ~~conditions~~ elasticities be sizeable. In the present world that may be possible only by increasing the demand elasticities in the hard currency countries for soft currency goods. If this is true the foundation of international monetary stability is in trade policy; and if we put content into the hard currency, soft currency language used above, in the United States Tariff Policy.

Footnotes to page 7

4. (for the following analysis see diagram 1 pg4 above)

When country 1 depreciates the demand for imports in the second country, in its own currency , will not change. In translating this invariant foreign demand curve at the new exchange rate into the currency of country 1, the pre-depreciation quantity will be taken at a higher price. This quantity however will be offered only at a higher price, therefore there is a decrease in the quantity taken.; a movement along the demand curve. The net result is a price change in the domestic currency of $K\frac{dp_x}{p_x}$. The change in the quantity taken is $\frac{dq_x}{q_x}$. The elasticity of demand for exports $\eta_x = \frac{dQ_x}{Q_x} / K \cdot \frac{dP_x}{P_x}$. A similar argument holds for the elasticity of supply of imports: an invariant foreign supply price, translated into the domestic currency x at the new exchange rate, will result in a net change in price of $K\frac{dP_m}{P_m}$.

or a greater quantity will be taken at the same price.

3. This formula appears in Metzler's article in the Survey of Contemporary Economics p. 226. It is equivalent to the formula which appears in a footnote to Joan Robinson's chapter on the foreign Exchanges(Pp 91 in the reprint of the chapter in Readings in The Theory of International Trade, The Blakiston Company, Philadelphia 1949.) To get the Metzler form from the Robinson form you set Robinsons Eq=Ip and cross multiply. As is usual in Economics it is necessary to translate symbolism.

A.O. Hirschman in The Review of Economics and Statistics, February 1949 operates by keeping the value of exports not equal to the value of imports, but by setting the elasticities of supply ∞. His results are obtainable from the above formula. It is necessary to make either the simplifying assumption that exports equal imports or that the supply elasticities are ∞ in order to reduce the number of variables to a more manageable number

In this argument we can readily assume that exports equal imports by setting appropriate "zero" levels for the current account items at the level of the net financial transactions.

Footnotes

6 p. 8 The numerator, which is all that is pertinent to the following analysis is equivalent to the numerator ~~in~~ given in JOan Robinson Beggar my Neighbor Policies p400 Readings in INternational Trade.

7 p.8. With $\lambda=0$ in the proof above, the balance of payments must improve.

8p.9. With $I > \eta_x + \eta_m + \frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m}(1+\varepsilon_x+\varepsilon_m)$; $\frac{\eta_x \eta_m}{\varepsilon_x \varepsilon_m} < 1$ which implies that the terms of trade deteriorate.

9p 10. $\varepsilon = \frac{-2\eta_x\eta_m - \sqrt{4(\eta_x\eta_m)^2 - 4(\eta_x+\eta_m-1)(\eta_x\eta_m)}}{2(\eta_x+\eta_m-1)}$

10 p 12. Professor Ellis "The Equilibrium Rate of Exchange" in Explorations in Economics.

11 p 14. The beggar my neighbor ~~policy~~ business cycle policy involves a sacrifice in the terms of trade.

12 p 15. Tse Chun Chang "Review of Economic Studies 1945-46 International Comparison of Demand for Imports" p63 "From the point of view of home consumers the cost of buying imported commodities is not the price ~~of~~ quoted by the foreign sellers, but the quoted price c.i.f. plus import duties. Any change in tariff is equivalent to an increase or decrease in import price.". On p63 he also says (footnote) that import price= price + customs revenue/ quantity.

Mr Chang's price seems to be midway between the two prices I would argue are pertinent: the price ~~to~~ recieved by the exporting country and the final selling price in the importing country. Mr. Chang's price seems ot be the wholesale purchasers price. If we wish to analyse the effect of a depreciation upon the receipts of foreign currency, then as the entire change must be assumed to take place in the export price , Mr Changes measured elasticities of demand have an upward bias due to the inclusion of the tariff. Even including this bias his measured elasticities are < 1

Footnotes

13 p 16. If all costs except the export price are fixed, and if the export price is 1/n th of the final selling price, the elasticity of demand for exports is 1/n th of the elasticity of demand for the import.

See Meade, p. 133