EXCHANGE RATE AND FISCAL POLICIES WITH LESS THAN PERFECT COMPETITION

by

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1. Introduction.

Exchange rate adjustments have not always produced the expected results. For example, it is not easy to explain why West-Germany's trade surplus has been growing until recently in spite of strong revaluations of the real exchange rate. Similarly, trade deficits in the United Kingdom and the United States were growing for a number of years during which time, the real exchange rate depreciated. These experiences are too pronounced and durable to be simply explained with a J-curve effect. In this paper some arguments are developed that may contribute to un understanding of such "perverse" phenomena.

An important issue in the analysis of exchange rate adjustments is whether they produce "real effects", i.e., increase or decrease the current account surplus (or deficit) durably.

Traditionally, such effects were considered to exist and to be a result of the change in the terms of trade induced by a devaluation. In particular, if the country under analysis cannot influence import prices, then the terms of trade deteriorate whenever export prices in local currency are not increased by the full percentage change of devaluation. Domestic industry can then be expected to compete more effectively with imports and to be able to increase exports. In addition to these direct price effects, a deterioration of the terms of trade would reduce real national income and, if savings behavior remains unchanged, imports would be reduced due to lower aggregate domestic demand. Whether the trade deficit is reduced or not then depends on the respective elasticities and the income effect on imports.

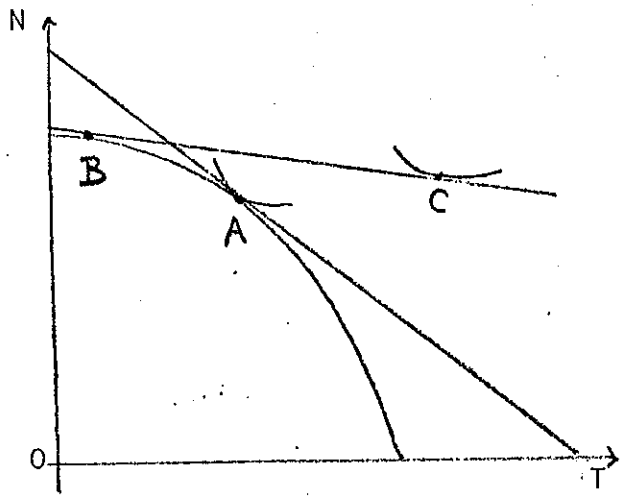
One difficulty with the above argument is that it assumes that export prices can be set below world market prices and, simultaneously, that the domestic economy is a small competitor in these markets.

If one wishes to maintain the second assumption then one would have to admit that export prices cannot diverge from world market prices ; hence the relative price effect of a devaluation would be zero.[1] Another problem with the elasticity approach is its partial equilibrium nature. Since not all markets can be independent without violating the budget constraint there must be another market in the background of the analysis. A by now popular interpretation is that there exist nontraded goods.

With this modification a simple general equilibrium analysis can be undertaken.[2] Since the terms of trade should be considered fixed for the small country all traded goods can be aggregated into a composite good. Attention is thus focused on the relative price between traded and nontraded goods.

Figure 1, the Salter-diagram, is an illustration using a transformation curve between tradeables (T) and nontradeables (N).

Figure 1



At point A excess demands for traded and nontraded goods are equal to zero and the economy is in internal (full employment) and external (balanced trade-account) equilibrium.

Consider now the effects of an increase in the relative price of nontraded goods.[3] Production moves to B and consumption to C : there is excess demand for traded goods, hence a trade deficit, and excess supply of nontraded goods. Such a situation can only arise in competitive markets if fiscal demand absorbs the excess supply of nontraded goods. Thus, if the increase in the relative price of nontraded goods is brought about

by a revaluation and fiscal policy clears the market for nontraded goods at their initital price then a revaluation unambiguously creates a trade deficit. However, the trade deficit is exactly equal to the increase in the budget deficit so that it is the result of fiscal policy and not of the revaluation per se. As Dornbusch (1975) points out this makes the elasticity approach fully consistent with the absorption approach since it explains how expenditure declines with respect to income. Moreover, the ambiguity of the effects of devaluation in the elasticity approach can therefore only be due to variations in the terms of trade.

From both conceptual and empirical points of view, however, the distinction between tradeables and nontradeables is problematic in many ways.

Above all, how does one define a nontradeable commodity ? All commodities even government services, are in principle tradeable. However, trade is not observed due to government monopoly, trade barriers, high transport or information costs, etc. In such cases imperfections in domestic markets are also very likely to exist. Cassing (1977) therefore analyzes the case of pure monopoly in the nontraded goods sector. In the Scandinavian model (see Aukrust, 1969) it is assumed that cost-plus pricing is the rule in this sector.

By constrast, Dornbusch (1973, 1975), Corden (1977) and Jones and Corden (1976) either assume that the market for nontraded goods is competitive or that nominal prices of nontraded goods are fixed. The market is then cleared by government intervention.

Related to this conceptual difficulty is the empirical one of classifying goods as tradeables or nontradeables. A commodity that is neither exported nor imported cannot be considered as nontradeable. An analytical criterion is needed to carry out such a classification.

As was argued before, markets for nontradeables are often non-competitive. Therefore, the natural distinction to make seems to be one between industries that are price-takers and those that are price-makers. Such a distinction is not only more consistent but offers two additional advantages.

One is that the theory can be extended to larger countries. There, important export branches may not be price-takers in world markets. Some trade theories, such as the theory of the product-cycle, or the Linder-theory imply oligopolistic behavior on export markets. Also trade within multinational companies is to a large extent carried out at internal transfer prices and already accounts for a large share of world trade. Another advantage resides in the possibility of dichotimizing industries according to a precise analytical criterion. In another paper (MOREL-STEINHERR, 1978) we have classified German industries on the basis of regression experiments, i.e., whether an industry is able to roll over costs to prices or not.

In this paper a distinction between price-takers and price-makers is therefore made independently of whether these industries trade internationally or not. It is then shown with a simple general equilibrium model that this dichotomy leads to some important implications for the effects of exchange rate adjustments. In particular, there is no general presumption anymore that a revaluation will reduce a trade surplus.

The analysis is to a certain extent the result of an effort to understand the balance of payments adjustment mechanism in West Germany. Initial full employment is therefore assumed shamelessly and revaluation is anlyzed. With the exception of the role of income effects and of wage rigidity the case of devaluation would, however, be symmetrical most of the time. The model is most relevant for a medium-sized country that has some control over its terms of trade but is still small enough so that induced income changes in the rest of the world can be neglected. Some additional assumptions about policy and foreign trade are also pertinent to the West-German economy.

The organization of this paper is as follows. In section 2 the model is described. In the following sections the effects of exchange rate adjustments are derived. In section 3 output prices are flexible, but production is fixed. The latter assumption is relaxed in section 4. Price rigidities are introduced in section 5. In section 6 attention is directed toward rigidities in the factor market. The main results are then summarized in the final section.

2. The Model

Consider an economy that produces quantity X_N at unit price P_N in the non-competitive sector and X_C at unit price P_C in the competitive sector. The law of one price implies (with P_C^* denoting world market prices) :

$$P_C = P_C^* e. \tag{1}$$

At any point in time factor supply is given. With only two factors of production, labor (L) and capital (K), the production possibilities of X_N and X_C (measured as value-added) are obtained from

$$T(X_N, X_C ; K,L) = 0. \tag{2}$$

Since P_C^* is exogenous and can be considered fixed we set $P_C^* = 1$ and define relative prices as

$$q = P_N/e. \tag{3}$$

This definition is identically expressed in domestic or foreign currency.

In units of the competitive good, real domestic product is then equal to

$$X = qX_N + X_C. \tag{4}$$

It is assumed that competitive goods are imported. For small changes in q the change in real domestic income is equal to :

$$dX = (X_N + qX_{Nq} + X_{Cq})dq. \tag{5}$$

Consumption and savings are assumed to be functions of relative prices and disposable income. To define the latter the government sector has to be introduced. Government expenditures (D) on competitive (D_C) and non-competitive goods (D_N) are taken as exogenous[4] and are assumed to be financed by taxes (T) and savings. A balanced budget would require

$$T = D = D_C + qD_N. \tag{6}$$

Disposable income (Y) is then equal to

$$Y = X - T. \tag{7}$$

Sectoral production depends on relative prices only, as long as factor markets are competitive and producers maximize profits. Differences between sectoral productions and private demands define private domestic excess supplies.

$$S_i(q,T) = X_i(q) - E_i\left[q,\ Y(q,T)\right];\ i = C,N \tag{8}$$

$$S_{Nq} = X_{Nq} - E_{Nq} - E_{NY}Y_q$$

$$= \frac{X_N}{q}(\varepsilon_N + \eta_N \frac{E_N}{X_N}) - \mu_N Y_q \gtrless 0$$

(> 0 if the assumption of gross substitutability is made);

$$S_{Cq} = X_{Cq} - E_{Cq} - E_{CY}Y_q \tag{9}$$

$$= \frac{X_C}{q}(\varepsilon_C + \eta_C \frac{E_C}{X_C}) - \mu_C Y_q < 0\ ;$$

where

$\varepsilon_i = qX_{iq}/X_i$ is the elasticity of supply in sector i ; $\varepsilon_N \geq 0$, $\varepsilon_C \leq 0$. In the short run both elasticities are assumed equal to zero.
$\eta_i = -\ qE_{iq}/E_i$ is the elasticity of demand in sector i ; $\eta_N \geq 0$, $\eta_C < 0$.
$\mu_i = E_{iY}$ is the marginal propensity to consume good i ; $0 \leq q\mu_N + \mu_C \leq 1$. This means that all goods are considered to be normal goods.

In the competitive sector, any domestic excess supply $(S_C - D_C)$ can be sold, and any excess demand purchased, on foreign markets at the world price. Hence, excess supply determines exports (or imports) of competitive goods.

Adjustment in the market for non-competitive goods is different. World demand (W_N) has to be introduced explicitly.

$$W_N = W_N(q)\ ;\ W_{Nq} < 0. \tag{10}$$

With the exchange rate fixed by policy, market clearing for non-competitive goods determines the equilibrium terms of trade. A sufficient condition for market stability is gross substitutability, albeit even less necessary than in closed economy models since foreign demand is added to domestic demand.

Alternatively, non-competitive prices may be sticky. Excess supply is then reduced by bringing production down to demand.

The trade account surplus (in units of C-goods) can be defined by adding domestic excess supplies over all markets :

$$B = qW_N + (S_C - D_C). \tag{11}$$

Equivalently, the trade surplus can be defined as goods produced but not consumed by the domestic economy :

$$B = s(q)Y + T - D \tag{12}$$

where the average propensity to save, s, is a function of q (in virtue of the expenditure functions in (8) and (9)). Balance of payment equilibrium requires that savings (or excess savings over investment) be absorbed by a fiscal deficit, i.e., underspending of the private sector either results in a trade surplus or in government overspending.

3. Flexible prices. Fixed production

In the model with tradeables and nontradeables, price flexibility leads to automatic equilibrium adjustment through relative prices since a trade disequilibrium implies disequilibrium in the market for home goods. Exchange rate adjustments in that model are only useful if either some prices are rigid or if policy makers have a particular price level objective.

In the present model relative prices are determined by world market prices for competitive goods and the exchange rate, on the one hand, and the condition of market clearing for non-competitive goods, on the other. A trade surplus may be perfectly compatible with these relative prices. Automatic adjustment is exclusively driven by accumulation of foreign assets. Revaluation can be looked at as an alternative to internal inflation for reducing a trade surplus.

Resource reallocation can take considerable time so that one may consider the production point fixed for a short-run analysis. Alternatively due to immobility of factors or the cost of resource transfers government may wish to maintain the actual production mix. Equation (5) reduces then to the terms-of-trade effect on income : $dY = X_N dq$.

After a revaluation of the exchange rate ($de < 0$) the new equilibrium terms of trade are obtained from the condition of zero excess supply in non-competitive markets :

$$\left[S_{Nq}(q,T) - W_{Nq}(q)\right] dq = 0 \Rightarrow dq = 0. \qquad (13)$$

With fiscal policy unchanged, and non-competitive firms acting as short-run profit-maximizers, the price of non-competitive goods has to fall by the full percentage of revaluation (if the initial equilibrium point is stable and unique). Otherwise, the market would not be cleared. With relative prices unchanged, the real trade account surplus remains unchanged by revaluation[5]. (In domestic currency the surplus falls, of course, by the percentage of revaluation). This may already be one answer to the question why exchange rate movements in countries like Germany, the United Kingdom, or the United States have not had a strong impact in the trade account. None of these countries has implemented budget policies specifically for trade targets.

Suppose that the government, recognizing the inefficiency of revaluation in the absence of an expenditure policy, increases exogenous demand. From equation (12) it is obvious that a trade imbalance could be corrected with fiscal policy alone. The only important difference with respect to a policy mix resides in the impact on the domestic price level and for that reason a policy mix may be preferred.

As pointed out before, balanced budget and deficit policies should be distinguished. First consider balanced budget policies. If expenditures on non-competitive goods are increased then the amount that will bring about a desired increase in relative prices can be computed from (13), using (6) and (7) :

$$dD_N = (S_{Nq} - W_{Nq})\, dq/(1 - q\mu_N). \tag{14}$$

A similar result can be obtained for higher exogenous demand for competitive goods :

$$dD_C = -(S_{Nq} - W_{Nq})\, dq/\mu_N. \tag{15}$$

Equation (15) shows that higher fiscal expenditures on competitive goods tend to decrease relative prices. Hence, if government is able to clearly discriminate these two sectors, the terms of trade could be improved either proved by higher expenditures on non-competitive goods or by reduced expenditures on competitive goods. If the government is unable to discriminate and raises overall expenditures, the outcome on the terms of trade will in fact depend on the proportions of either commodity in the overall fiscal expenditure increase.

When taxes are kept at their original level and expenditure is allowed to vary, disposable income remains unaffected.[6] Therefore, a variation in expenditure on competitive goods ceases to have an influence on relative prices. However, the trade account is directly affected via the impact of higher or lower demand on imports.

By contrast, for a change in fiscal demand for non-competitive goods,equation (14) reduces now to

$$dD_N = (S_{Nq} - W_{Nq})\,dq. \tag{16}$$

Note that as a particular case, the government could always set expenditures at a level such that dq = de.

Various balance of trade responses to revaluation are possible depending on the type of fiscal policy.

With taxes constant, the only case of interest is the one where expenditures on non-competitive goods are increased ; the other case was mentioned above. From (11) the change in the trade account is equal to

$$\begin{aligned} dB &= (qW_{Nq} + W_N + S_{Cq})\,dq \\ &= (\Omega - \mu_C X_N)\,dq \end{aligned} \tag{17}$$

where $\Omega = \left(\overset{(-)}{\eta_W} + \overset{(-)}{\eta_C} \frac{E_C}{qW_N} + 1 \right) W_N$

using the expressions derived in (9) and defining η_W as the elasticity of world demand for exports of non-competitive goods. Supply elasticities are set equal to zero and are therefore absent in (17).

In general, the sign of (17) is ambiguous. The term Ω resembles the Marshall-Lerner condition for successful revaluation.

Non-competitive goods are typically highly differentiated, technologically sophisticated and with an important service component. World demand may therefore be quite inelastic.(7)

If the demand for imports is also inelastic then Ω is positive. Since this is the old elasticity pessimism argument, we assume henceforth $\Omega > 0$ although in the present context elasticity pessimism may be warranted.

The second term in (17), $\mu_C X_N$, represents the impact of higher income on domestic demand for competitive goods and hence on imports. This term is reminiscent of the multiplier approach to the balance of payments, but is solely due to a terms-of-trade gain in the present analysis.

Equation (12) allows us to look at the change of the trade surplus from another perspective : the trade surplus decreases after revaluation, if domestic savings does not increase more than the fiscal deficit - a result perfectly in agreement with the absorption approach.

We now turn to the analysis of a balanced budget policy. It is first assumed that only D_N is increased. Equation (17) then becomes :

$$dB = \Omega dq + \mu_C(qdD_N - X_N dq) = (\Omega - \mu_C X_N)dq + q\mu_C dD_N. \qquad (18)$$

$qdD_N - X_N dq$ can be positive so that the surplus of the trade account may increase after revaluation. The possibility of such a result can be more clearly seen by rewriting (18), making use of (14):

$$dB = \left[\overset{(-)}{(\eta_W}(1 - \overset{(+)}{\mu_C}) + \overset{(-)}{\eta_C}\frac{E_C}{qW_N} + 1)W_N - \mu_C X_N(1 - \overset{(+)}{\frac{\eta_N}{1+q\mu_N}}\frac{E_N}{X_N}) \right] dq. \qquad (19)$$

The first parenthesis is positive if the marginal propensity to consume competitive goods is close to unity and if domestic consumption of competitive goods small compared to exports. The second parenthesis (preceded by a negative coefficient) is negative if

$$\eta_N > \frac{X_N(1+q\mu_N)}{E_N}$$

i.e., if the elasticity of domestic demand for non-competitive goods exceeds a number much larger than one. Thus, particularly when μ_C is close to one and therefore $q\mu_N$ is close to zero can both terms in (19) become positive so that the trade surplus would increase.

The mechanism of revaluation here is as follows. The relative price of non-competitive goods increases due to revaluation and is sustained by higher fiscal demand. The latter compensates for the fall in domestic and world demand for these goods and hence for lower exports. In the competitive market domestic demand increases with higher disposable income. If disposable income increases (this is the case where the positive terms of trade effect on income exceeds the negative effect of higher taxation) then the combined price and income effects tend to increase domestic demand and consequently imports of competitive goods. In case taxation exceeds the terms of trade effect domestic demand and imports may decrease so that the trade account change is ambiguous.

The possibility of an increase of the trade surplus is depicted in Figure 2. X_C and X_N are the fixed levels of production in the two sectors. E_C and E_N are initial private domestic demands with public demand equal to zero. The trade account is in equilibrium. Revaluation shifts the original terms of trade q to the new level q'. The decrease in domestic and foreign demand for non-competitive goods, assumed equal to the distance E_N' (the new domestic demand) and D_N, is compensated by public expenditures. On the other hand private demand for competitive goods increases. Z and Z' are the respective income-expenditure lines. Trade equilibrium would be maintained at the point of intersection of the Z'-line and the new budget line q'. With fiscal expenditures financed by taxation the domestic consumption point lies inside the budget set. Depending on the reduction of the volume of exports and increased demand for imports due to price and income effects the trade surplus increases or decreases.

If the increase of the terms of trade is brought about by lower expenditures on competitive goods equation (17) becomes

$$dB = \Omega dq - \mu_C(X_N dq + dD_C) + dD_C = (\Omega - \mu_C X_N)dq + (1-\mu_C)dD_C. \qquad (20)$$

Especially with μ_C small, the risk that revaluation increases the surplus cannot be ignored. Even worse is the case where government increases expenditures on competitive goods. From (15) we know that in this case $dq < 0$ so that all terms in (20), except the last, become positive. Since policy-makers seldom can, or do, select expenditures on an analytical basis such as the one suggested in this paper, these results are not just theoretical possibilities.

It is now assumed that the government is adverse to an increase of its overall expenditures and simply shifts its demand from competitive to non-competitive goods, so that

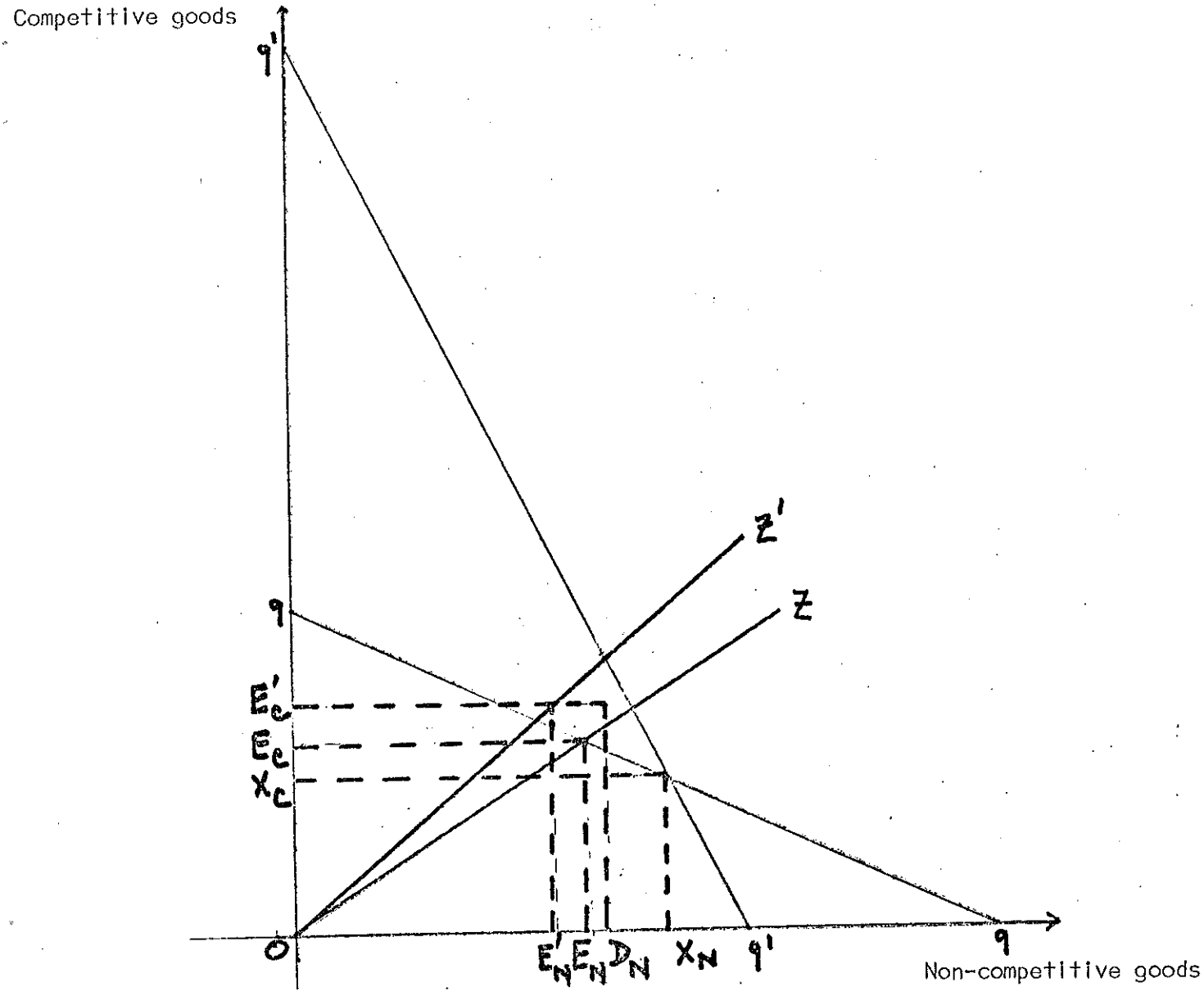
$$D_N + qdD_N + dD_C = 0 \qquad (21)$$

where $dD_C < 0$.

The change in the trade account is now

$$dB = (\Omega - \mu_C X_N)dq - dD_C \qquad (22)$$

Figure 2 : An example of the effects of revaluation



Comparison with (18) and (20) shows that the trade surplus is now still more likely to increase. Decreased fiscal demand for competitive goods lowers imports. Since the increase of fiscal demand for non-competitive goods necessarily exceeds the fall in exports (for domestic excess supply increases after revaluation), (21) implies that the reduction of imports due to lower fiscal demand exceeds the entire drop in exports. To reduce the trade surplus, price and income elasticities of imports would have to be fairly high.

It may also be possible that a government revalues and, simultaneously, decreases overall expenditures, particularly in situations where a trade surplus is matched by internal price inflation.

With a balanced budget policy the change in the terms of trade is, as was pointed out earlier, ambiguous when overall expenditures change. With fixed taxes the terms of trade deteriorate and the trade surplus unambiguously increases, if $\Omega < 0$:

$$dB = (\Omega - \underset{(-)}{\mu_C} \underset{(+)}{X_N})\, dq + dD_C. \qquad (23)$$

Lower fiscal expenditures on competitive goods lower imports directly; lower expenditures on non-competitive goods require a decrease in the terms of trade to clear the market. This means that higher exports are substituted for lower government demand. The unambiguous increase of exports is an example of "exported unemployment" : the impact of restrictive domestic demand and exchange rate policies on employment is avoided by greater efforts to sell abroad.

It should again be stressed that the foregoing results are additional to the J-curve effect characterized by $\Omega > 0$. Perverse effects are thus possible even if $\Omega < 0$, and are of course reinforced by low elasticities of demand during some time after revaluation.

4. Flexible prices and production

In an analysis of the long run, supply responses must be considered. The results obtained sofar require adjustment, in two respects. First, the supply elasticity of competitive goods (ε_C), is now positive so that Ω is redefined as :

$$\Omega = (\eta_W + \eta_C \frac{E_C}{qW_N} + \varepsilon_C \frac{S_C}{qW_N} + 1)\ W_N. \qquad (24)$$

Second, the change in real domestic income is now given by equation (5). The additional terms appearing in (5) are $qX_{Nq} + X_{Cq}$. Under competitive conditions in the market for goods the relative price would be equal to opportunity costs so that $q = X_{Cq}/X_{Nq}$. With a non-competitive sector the relative price exceeds opportunity costs so that $q > - X_{Cq}/X_{Nq}$. Consequently $qX_{Nq} + X_{Cq} > 0$ so that $dX > 0$. Both long-run factors tend, therefore, to reinforce successful revaluation, but a long-run increase of the trade surplus remains still a possibility depending on the type of fiscal policy mix.

In the model based on a distinction between tradeables and nontradeables a revaluation leads to a resource shift into the nontradeable sector. In the present model resources are being shifted into the non-competitive sector, i.e., in our example into the export sector. This difference is rich in consequences particularly if these sectors have different productivity or demand growth rates. For example, if the export sector is the leading sector with higher productivity growth and higher growth of demand revaluation tends to increase macroeconomic and export growth. In the long run revaluation is then likely to increase the trade surplus.

5. Price rigidities

To maintain full unemployment resources liberated in one sector must be absorbed by another. As long as factor markets are competitive and producers maximize profits this should indeed happen, although with possibly considerable time lags during which unemployment could exist.

Let us now turn to a situation where prices in the non-competitive sector are not market clearing. For simplicity, assume they are fixed in domestic currency. Revaluation, even unaccompanied by fiscal changes, can now lead to increased terms of trade. Reduced production in the competitive sector frees resources that are not absorbed by the non-competitive sector since demand for output of the latter has fallen.

Price stickiness is by no means an uninteresting particular case but seems to be widespread. Nordhaus and Godley (1972) have extended the long-standing controversy about administered prices with a study that indicates quite convincingly that mark-up pricing on a "normal cost" basis is predominating in U.K. manufacturing. Morel and Steinherr (1978) come to the conclusion that in the case of West-Germany cost-plus pricing is applied in most domestic markets for industrial goods, and even in a large number of export sectors. It seems therefore worthwhile to investigate this case.

The previous results can again be used as starting point. Fiscal expenditures are assumed constant and the initial change in disposable income is now the sum of the terms of trade gain(X_N) and an income loss from unemployment. The latter is equal to reduced production in the competitive sector (X_{Cq}) and reduced production in the non-competitive sector ($qW_{Nq} + qE_{Nq}$). This initial change is then amplified by the multiplier. Thus

$$dY = \frac{\overset{(+)}{X_N} + \overset{(-)}{X_{Cq}} + \overset{(-)}{qW_{Nq}} + \overset{(-)}{qE_{Nq}}}{1 - q\mu_N} dq \qquad (25)$$

where $1/(1-q\mu_N)$ is the multiplier. The terms of trade improve since non-competitive industries only increase prices proportional to costs.

Substituting (25) for the change in disposable income into equation (17) yields :

$$dB = (\Omega - \mu_C Y_q)dq \qquad (26)$$

The more pronounced the fall in disposable income, the greater the risk of a perverse effect of revaluation.

Finally, consider the case where before revaluation world demand for non-competitive goods was not entirely satisfied : consumers on world markets were rationned. This is an important and relevant case from an empirical point of view[8]. Several phenomena could lead to such a situation. Rapid internal of external demand growth with production lagging behind would be one. Search costs and higher risks in foreign markets could be another, explaining why priority may be given to sales on domestic markets.

This hypothesis implies or is at least consistent with, the view that production adjusts to growing foreign demand with some delay and that prices do not always clear the market. Indeed, it is often suggested that growth in West-Germany has been "export-led"[9].

In such a case a revaluation, producing a shift of resources into the non-competitive sector as well as reduced domestic demand for these goods, could lead to increased exports in spite of higher terms of trade.

Since foreign demand for non-competitive goods is rationned by domestic excess supply, one can substitute $S_N - D_N$ for W_N in the definition of the trade account surplus :

$$B = q(S_N - D_N) + S_C + D_C.$$

After substitution from (8) and (9) and differentiation one obtains :

$$dB = \left[\overset{(+)}{(S_N - D_N)} - (q\mu_N + \overset{(+)}{\mu_C})Y_q + (\overset{(+)}{\varepsilon_N} + \overset{(-)}{\varepsilon_C}\frac{X_C}{qX_N} + \overset{(+)}{\eta_N}\frac{E_N}{qX_N} + \overset{(-)}{\eta_C}\frac{E_C}{qX_N})X_N \right] dq. \qquad (27)$$

The first term, $S_N - D_N$, represents the positive terms of trade effect on the trade account. The second term represent increased domestic consumption, and thus higher imports and lower exports, due to increased income.

A sufficient condition for the sum of the two to be negative is that the aggregate marginal propensity to consume be close to unity as shown by (28).

$$S_N - D_N - (q\mu_N + \mu_C)Y_q = X_N\,(1 - q\mu_N - \mu_C) - E_N$$

$$- D_N - (q\mu_N + \mu_C)\,(qX_{Nq} + X_{Cq}). \qquad (28)$$

The third parenthesis in (27) expresses the difference between the volume increases in exports and imports due to direct price effects. For aggregated sectors there is little information on the respective supply elasticities. If one assumes that they are roughly the same for each sector then the sum of the first two terms in the parenthesis is positive if $qX_N > X_C$; the sum of the second two terms is positive if $qE_N > E_C$. Thus, the larger the non-competitive as compared to the competitive sector (as measured by domestic production and consumption), the less successful revaluation tends to be.

A summary of the various results obtained in Section 3 to 5 is contained in Table 1.

TABLE I

EFFECTS OF REVALUATION UNDER ALTERNATIVE ASSUMPTIONS ABOUT FISCAL POLICY AND PRICING BEHAVIOR

Behavioral assumption for the N - sector	Fiscal policy	change in terms of trade	change in real disposable income	Change in trade balance surplus (the most likely sign is indicated in parenthesis)
Profit-maximizing monopoly	$dD = 0, dT = 0$	0	0	0
	$dD_N > 0,\ dT = 0$	> 0	$X_N dq > 0$	$(\Omega - \mu_C X_N)dq < 0$
	$dD_C > 0,\ dT = 0$	0	0	$- dD_C < 0$
	$dD_N = dT > 0$	> 0	$- qdD_N + X_N dq \gtrless 0$	$(\Omega - \mu_C X_N)dq + \mu_C qdD_N \gtrless 0$
	$dD_C = dT > 0$	< 0	$- dD_C + X_N dq \lessgtr 0$	$(\Omega - \mu_C X_N)dq - (1 - \mu_C)dD_C \gtrless 0\ (> 0)$
	$qdD_N + D_N dq + dD_C = 0$	> 0	$X_N dq > 0$	$(\Omega - \mu_C X_N)dq - dD_C \gtrless 0$ (with $dD_C < 0$)
	$dD < 0, dT = 0$	< 0	$X_N dq < 0$	$(\Omega - \mu_C X_N)dq - dD_C \gtrless 0\ (> 0)$
Cost-plus pricing	$dD = 0, dT = 0$	> 0	$\frac{X_N + X_{Cq} + qW_{Nq} + qE_{Nq}}{1 - q\mu_N} dq < 0$	$(\Omega - \mu_C Y_q)dq \gtrless 0\ \ (> 0)$
Rationning on foreign markets	$dD = 0,\ dT = 0$	> 0	$Y_q d_q > 0$	$(S_N - D_N) - (q\mu_N + \mu_C)Y_q + (\varepsilon_N + \varepsilon_C \frac{X_C}{qX_N} + \eta_N \frac{E_N}{qX_N} + \eta_C \frac{E_C}{qX_N})X_N\ dq \gtrless 0\ (>0)$

6. Wage rigidities

So far it has been assumed that wages are flexible. The complications due to (downward) wage rigidities are now briefly outlined.

In the analysis of devaluation rigidity of real wages prevents switching effects and results solely in a reduction of absorption and hence in unemployment. Downward rigidity of money wages prevents an automatic adjustment process, justifying then a devaluation, but does not hinder the effectiveness of devaluation.

With a revaluation rigidity of the nominal wage is the difficult problem.[10] Empirically it is also the most relevant one. After revaluation, domestic currency prices of competitive goods fall. With rigid wages profits decrease. With cost-plus pricing, unit profits remain constant. Higher terms of trade reduce demand for non-competitive goods. Thus, there will be unemployment in both sectors. In the previous section we saw already that a revaluation creates unemployment with cost-plus pricing; wage rigidity intensifies this unemployment problem to an even greater degree. Simultaneously, the trade surplus is still more likely to increase.

If firms in the non-competitive sector maximize profits they may again lower their prices to leave the terms of trade unchanged. But the present case is different from the case of flexible wages in two respects. First, profits in both sectors go down (whereas before wages were decreased) so that domestic investment will be discouraged (and foreign investment stimulated) and thereby long-run growth. Second, unemployment arises due to wage rigidity. Thus, in the short run, exports may not change at all. Imports decrease due to lower domestic income and the trade surplus unambiguously increases.

7. Summary of results and conclusions

Whereas the elasticity approach yields ambiguous trade effects from an exchange rate adjustment, more recent approaches relying on a distinction between tradeables and nontradeables come to the conclusion that a revaluation unambiguously reduces a trade surplus.

In this paper the general equilibrium methodology of the latter approaches is retained but a distinction is made between competitive and non-competitive goods. This has the advantage of incorporating terms of trade changes and many aspects that are particularly important for larger economies such as the existence of monopolies, cost plus pricing, rationning, etc. The model comes close to the traditional elasticities and income approaches without sharing, their partial equilibrium character. The conditions for terms of trade adjustments are also more carefully justified. As soon as the firm ground of competitive markets is left many possible situations arise, of course,such that no general results can be obtained. However, insights into some possible adjustments can be gained and the importance of concomitant policies and of conditions in factor and product markets is more clearly seen.

If firms in the non-competitive sector are profit-maximizers the terms of trade remain unaffected by revaluation and therefore the trade surplus remains unaffected as well. This is one possible explanation of the inefficiency of exchange rate adjustments.

To change the terms of trade a revaluation must be combined with fiscal policy. The outcome depends on the kind of fiscal policy, whether the budget is balanced or not, and on the type of goods purchased by the public sector. In general, if authorities increase expenditure on both types of goods the terms of trade may increase or decrease and so does the trade surplus. These results do not rely on elasticity pessimism alone. If expenditures on non-competitive goods is increased the terms of trade improve and resources will be shifted into the export sector. This is contrary to the popular belief that revaluation shifts resources away from export industries. This in the case,for example, in the model with traded and nontraded goods.

As a second example of non-competitive behavior cost-plus pricing is analyzed. Revaluation now leads to unemployment in the absence of adequate fiscal policies and there is now a strong income effect on imports. Hence

fiscal policy is necessary in both cases. In the first, to change the terms of trade; in the second, to maintain full employment.

An empirically important case for some fast-growing leading sectors is rationning. If foreign consumers are rationned, a revaluation, by shifting resources into the non-competitive sector, can easily lead to a higher trade surplus.

Finally, the importance of wage rigidities is shown to be different for a revaluation than for a devaluation. Rigid nominal wages, and not rigid real wages, lead to unemployment and to similar results as in the case with cost-plus pricing. With profit maximization in the non-competitive sector, profits in all industries fall, so that long-run growth may be negatively affected (also because capital exports are stimulated) and the trade surplus would then be lowered in the long-run.

Thus, for economies, for which the model proposed in this paper is pertinent, there is no general presumption anymore that revaluation reduces a trade surplus.

Footnotes

(1) A devaluation would, of course, still have an effect on the balance of payments via the increase in the general price level and the corresponding increase in the excess demand for money. Since the focus of this paper is on structural effects we leave this aspect out of consideration.

(2) For a detailed exposition of this model see Corden (1977).

(3) There is an important case where it would be difficult to produce an adjustment of relative prices : If wages were indexed to the general price level. A devaluation would then lead to an equal percentage increase of costs in the nontradeable sector and, if profit rates were maintained, prices of nontradeables would increase to the some degree as prices of tradeables.

(4) D_C and D_N can also be interpreted as other exogenous variables such as investment, with an appropriate change of the sectoral budget constraints.

(5) In Dornbusch (1975) the same result is obtained with a model of tradeables and nontradeables.

(6) This requires, of course, that the private sector suffers from some money illusion.

(7) If world demand were elastic domestic exporters may be tempted to discriminate and maintain their world market shares by keeping q fixed abroad and letting q rise on domestic markets. Ω would then reduce to $\eta_C E_C < 0$. Such a policy would, of course, not make any sense if exporters knew that the government stands ready to clear the market for non-competitive goods.

(8) The importance of rationning in commodity and factor markets is stresed by Malinvaud (1976). Younes (1977) analyzes in great detail the effects of devaluation with rationning and also comes to the conclusion that devaluation could produce an increase in the balance-of-payments deficit.

(9) See for example Kaldor (1971).

(10) Since domestic prices decrease any nominal wage rigidity implies a real wage increase. Reduction of the real wage is neither empirically feasible in this case, nor required for the effectiveness of revaluation.

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