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Commercial Policy, Terms of Trade and the Equilibrium Real Exchange Rate

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In modern theories of real exchange rate behavior movements in the *equilibrium* value of the real exchange rate will respond to changes in its determinants, including the terms of trade, underlying sustainable capital flows, and long term desired levels of protection (see Edwards, forthcoming). An important implication of this modern approach is that equilibrium movements in the real exchange rate do not require policy interventions. On the contrary, under these circumstances, policy actions aimed at precluding real movements will interfere with equilibrium changes, rendering the adjustment process more difficult. From a policy perspective a crucial aspect of real exchange rate analysis is to understand how the equilibrium real rate changes when the economy is subject to policy-induced or external disturbances. Once the behavior of the equilibrium real exchange rate is understood, it is possible to determine whether the real exchange rate, in a particular moment in time, is overvalued or undervalued.

In this paper the effects of reforms of commercial policies (i.e., trade liberalization reforms) and terms of trade changes on the behavior of the equilibrium real exchange rate are analyzed in detail.[1] The paper deals with some important theoretical aspects, and reviews the empirical literature on the subject. The paper is organized in the following form : In Section I the traditional theoretical aspects of the relationship between long run commercial policies and the equilibrium real exchange rate are reviewed. The discussion focuses first on the long-run case, where it is assumed that all factors of production can move freely across sectors next the short-run effects are analyzed ; here it is assumed that only one factor(labor) can move freely across sectors. The transition period is

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1. Some developing countries have experienced very dramatic tariff changes. For example, between 1976 and 1979 Chile eliminated all QRs and reduced import tariffs from an average well above 100 percent to a uniform import tariff of 10 percent. On the other hand, terms of trade shocks have also been very substantial. For example, all developing countries were affected···either positively or negatively···by the oil shocks of the 1970s.

then briefly discussed. In Section II the effect of exogenous changes in the external terms of trade on the equilibrium real exchange rate are analyzed. It is shown that this case is similar to that of tariff changes. The main difference between them lies in the fact that changes in tariffs and changes in world terms of trade generate income effects of different magnitudes. In this section the Dutch Disease case is also discussed. In Section III the empirical literature on the subject is reviewed, and finally, in Section IV some concluding remarks are offered.

I. Commercial Policy and Real Exchange Rate Behavior

In this section we deal with the effects of changes in the long run desired(sustainable) commercial policies on equilibrium real exchange rates. By focusing on these *long-run* sustainable levels of protection···stemming from a process of trade liberalization for example···we are deliberately ignoring the interaction between short-term trade restrictions, usually aimed at combating a balance of payments crisis, and the real exchange rate. In this way, our analysis can be considered as dealing with the effects of commercial policies on the long-run equilibrium real exchange rate.

The relationship between commercial policy and real exchange rates has been previously discussed in the literature on economic liberalization attempts in developing countries.[2] The traditionally accepted view is that a reduction (incresase) in tariffs in a small country will result in an equilibrium real depreciation (appreciation). The argument usually given is based on the elasticities approach to exchange rate determination, and runs along the following lines : A lower tariff will reduce the domestic price of importables, and consequenely increase the demand for imports [see Balassa 1971, 1982].[3] This, in turn, will generate an external imbalance (i.e., a current account deficit), which assuming that the Marshall-Lerner condition holds, will require a (real) devaluation to restore equilibrium. This view is clearly captured by the following quote from Balassa (1982, p.16) :

> [E]liminating protective measures would necessitate a devaluation in order to offset the resulting deficit in the balance of payments.

2. See, for example, Corden (1971), Krueger(1978), Mckinnon (1973, 1982), Balassa (1971, 1976, 1982), Michaely (1982) and Edwards (1984).

3. This, of course, assumes away the Metzler paradox.

On the other hand, according to Harry Johnson(1966, p.159):

> One of the assumptions commonly made in the context of liberalization of trade by underdeveloped countries is that such liberalization would necessarily involve a balance of payments deficit and the consequent necessity of devaluation…

The proposition that a reduction (or elimination) of tariffs will necessarily result in an equilibrium real depreciation has also been made in the shadow pricing literature. Some authors have proposed that the shadow exchange rate should be computed as the equilibrium real exchange rate under conditions of free trade (Bacha and Taylor 1971). It has been postulated that an elimination of existing trade impediments will result in a higher equilibrium real exchange rate (i.e., in a real depreciation). More recently using a slightly different model, Taylor (1979, p.207) has insisted on this point (where the same notation applies):[4]

> [S]uppose that a preexisting tariff is reduced or removed altogether…[t]hen e will rise… [T]he result can be called the *free-trade* exchange rate [e^F]. [N]aturally, e/e^F is less than 1…

One of the shortcomings of most traditional models that postulate a negative relationship between tariffs and the real exchange rate (i.e., a higher tariff results in a lower e), is that they have ignored, among other things, the presence of intermediate inputs. This problem was first acknowledged by Harry Johnson (1966) in an article that uses effective rates of protection to analyze the effect of tariff changes on the equilibrium exchange rate (see also Corden 1971, ch. 5). Johnson pointed out that once intermediate goods were allowed into the picture the reduction or removal of tariffs could result either in a devaluation or in an *appreciation*. In Johnson's words (1966, p.159):

> [T]ariffs structures may bring about a situation in which appreciation rather than depreciation would be necessary to preserve equilibrium under liberalization…

The reason for this is intuitively clear. With intermediate goods it is possible that some activites will have a negative effective rate of protection; that is the tariff *structure* will impose a tax on value-added in those activities. Consequently, the removal of tariffs will reduce the magnitude of this tax and, according to Johnson's model, will result in higher production of these goods. The effects of eliminating the negative rates

4. It should be noted that Bacha and Tayloe (1971) and Taylor (1979) are using slightly different models. See the original references for details.

of effective protection could be such that a balance of payments surplus could result, with the consequent required *appreciation* [see also Corden (1971)]. Johnson derives the following formula for the required rate of depreciation or appreciation resulting from complete tariff removal (1966, 1967):

$$(1+d)=\sum w_J(1+r_J)$$

where d is the required adjustment of the exchange rate to maintain external equilibrium. A positive d indicates depreciation, while a negative d represents an appreciation. r_J is the rate of effective protection in sector j, and the w_J are weights. From equation (2) it is clear that to the extent that there are negative effective rates of protection (i.e., $r_J<0$), and their weights are high enough a trade liberalization can result in an appreciation ($d<0$). Even though Johnson's model is subject to the modern criticisms to the concept of effective rate of protection, it emphasizes a very important point: in the presence of intermediate goods, once tariffs are removed, the equilibrium real exchange rate can either increase or decrease.[5]

Most traditional treatments of the relationship between commercial policy and the real exchange rate have also tended to (implicitly or explicitly) ignore the presence of nontradable goods.[6] However, once nontradable goods are allowed into the picture the effect of tariff changes on the real exchange rate can be very different from those obtained from simpler partial equilibrium models. It has been shown that in the context of a three-goods model···exportables, importables and nontradables···the reduction in the tariff levels can result in a *real appreciation*, rather than real depreciation, even in the absence of intermediate goods [see, for example, Ethier (1972), Jones (1974), Dornbusch (1974, 1980) and Edwards (1984)].

However, a problem with this type of analysis is that when there are tariff (or terms of trade) changes, it is not possible to talk about "the" price of tradables. Indeed, once the relative price between importables and exportables changes, it is not licit to lump these goods together in a Hicksian composite good. In some sense, it is possible to think that, in this case, there are two "real exchange" rates, given by the relative prices of importables to nontradables (P_M/P_N) and exportables to nontradables (P_X/P_N). Alternatively it is possible to construct an index for the price of nontradables formed

5. On modern criticisms of the concept of effective rate of protcetion see, for example, Bhagwati and Srinivasan (1983), Jones and Neary (1984), and Corden (1984).

6. There are, of course, some exceptions to this case. See for example Corden (1971, Ch. 5).

by the prices of both importable and exportable goods. In the rest of this paper, and in order to simplify the exposition, the latter definition of the real exchange rate will be used.

From a formal point of view there are several possible ways to show that in this three-goods world a tariff change could result either in an equilibrium real appreciation or real depreciation. In this paper a traditional trade model that assumes price flexibility and full factor mobility will be used to investigate this problem.[7] In order to simplify the discussion no capital movements will be allowed. In fact, it will be assumed that, as is the case in a number of developing countries, the capital account is closed. The discussion will first (Section Ⅰ.1) deal with the long-run case. Next, in Section Ⅰ.2 the short-run case will be investigated; In Section Ⅰ.3 the dynamics will be briefly discussed. In that section some issues related to expectations, and to the effects of temporary and permanent changes in tariffs will also be addressed.

Long-Run Effects

Consider the case of a small economy that produces exportables (X), importables (M) and nontradables (N), using two factors of production, capital (K) and labor (L). Assume also that technology is characterized by constant returns to scale, that there is perfect competition, that there is a fixed unitary nominal exchange rate and that there is an initial tariff on the importation of M. Also, assume that both factors of production can move freely across sectors. Under these circumstances, and ruling out specialization, the world prices of exportables (P_X^*) and importables (P_M^*) plus the tariff (t) determine unequivocally the rewards of both factors (W and r). These factors rewards, and under the assumption of competition, determine the nominal price of nontradables (P_N). Demand conditions for nontradables, in turn, determine total production of nontradables and total factors used in their production. This leaves a certain amount of factors (K and L) that are used in the production of exportables and importables in a traditional Heckscher-Ohlin fashion. The analysis presented in this section focuses both on the effect of tariff change on goods prices and factor rewards, and on its effect on quantities produced. For a discussion of the effects of changes in tradable goods prices on production in the context of similar models see Corden and Neary (1982), Edwards (1983), Edwards

7. For an alternative model treatments of the problem see Dornbusch (n.d.), Edwards (1983).

and van Wijnbergen (1987).

The model is given by equations (1) through (8), where the price of X is taken as the numeraire, Note that, as discussed above, since in this long-run case we are first dealing only with effects on prices and factor rewards there is no need to specify the demand side of the model. Later, in Section Ⅰ.2, in order to determine the effect of tariff changes on output, the demand side will be introduced.

$$a_{LM}w + a_{KM}r = P_M \tag{1}$$
$$a_{LX}w + a_{KX}r = P_X \tag{2}$$
$$a_{LN}w + a_{KN}r = P_N \tag{3}$$
$$P_X = P_X^* \ E = 1 \tag{4}$$
$$P_M = P_M^* \ M(1+t)E \tag{5}$$
$$P_T = P_M{}^{\alpha} P_X{}^{1-\alpha} \tag{6}$$
$$e = P_T / P_N \tag{7}$$
$$E = 1 \tag{8}$$

where a_{ij}'s are input-output coefficients; W and r are the wage rate and the rental of capital; P_M, P_X and P_N refer to the domestic price of importables, exportables and nontradables; P_X^* and P_M^* are the world prices of X and M; t is the tariff rate, P_T is the domestic price of tradables; α and $(1-\alpha)$ are weights used in the construction of P_T; and e is the real exchange rate.[8]

Equations (1) and (2) can be used to determine the effects of a tariff change on factor rewards. In Jones's (1965) familiar notation (where $\hat{x} = dx/dt \cdot 1/x$):

$$\hat{W} = \left(\frac{\theta_{KX}}{\theta_{KX} - \theta_{KM}}\right)(1 \hat{+} t) \tag{9}$$
$$\hat{r} = -\left(\frac{\theta_{LX}}{\theta_{KX} - \theta_{KM}}\right)(1 \hat{+} t) \tag{10}$$

where $\theta_{KX} = \dfrac{a_{KX}r}{P_X}$; $\theta_{LX} = 1 - \theta_{KX}$

$\theta_{KM} = \dfrac{a_{KM}r}{P_M}$; $\theta_{LX} = 1 - \theta_{KM}$

If it is assumed, as is the most plausible case for developing countries, that importables

8. Notice that, given the simple nature of this model, the external sector is always in equilibrium. On this, see Dornbusch (1980) and Jones (1965).

have the highest capital-labor ratio, then $(\theta_{KX}-\theta_{KM})<0$ and :

$$[\hat{W}/(1\hat{+}t)]<0, \text{ and, } [\hat{r}/(1\hat{+}t)]>0$$

This, of course, is Stolper-Samuelson's theorem and indicates that in a developing country, under the assumptions of this model, i.e., imports are capital-intensive, the tariff reduction (i.e., $(1\hat{+}t)<0$) will generate an increase in W and a reduction in r. The effect of the tariff change on the relative price of nontradables is obtained using (9), (10) and (3) :

$$\hat{P}_N=[\frac{\theta_{KX}-\theta_{KN}}{\theta_{KX}-\theta_{KM}}](1\hat{+}t) \tag{11}$$

It is possible to see from this expression that effect of a change in t on the price of nontradables will depend on the difference in capital intensity between exportables and nontradables. If it is assumed that exportables have the lowest capital-labor ratio. $(\theta_{KX}-\theta_{KN})<0$ and consequently,[9]

$$[\hat{P}_N/(1\hat{+}t)]>0 \tag{12}$$

This means that, under these assumptions, a reduction in the level of tariffs will result in an increase in the price of exportables relative to nontradables (i.e., $\hat{P}_X-\hat{P}_N<0$). As a consequence, of course, the production of exportables will increase. If, however, $(\theta_{KX}-\theta_{KN})>0$, that is, nontradables have the lowest capital-labor ratio, the liberalization of international trade could result in a reduction in the production of exportable goods. Note also that it $\theta_{KM}>\theta_{KN}>\theta_{KX}$, in (11) $0<[(\theta_{KX}-\theta_{KN})/(\theta_{KX}-\theta_{KM})]<1$. This means that when there is a tariff reduction, P_N goes down by less than P_M, so that P_M/P_N increases.

From equations (10), (7), (4) and (5) it is now possible to find a general expression for the long-run effect of a tariff change and the real exchange rate :

$$[\hat{e}/(1\hat{+}t)]=[\alpha-(\theta_{KX}-\theta_{KN})/(\theta_{KX}-\theta_{KM})] \gtrless 0 \tag{13}$$

This confirms, then, that in the general case, where no particular capital intensity ranking is imposed, a tariff reduction can result either in a real appreciation or in a real depreciation. If, however, specific assumptions regarding factor intensities are made, more definitive results can be found. For example, if it is assumed that $\theta_{KM}<\theta_{KX}$

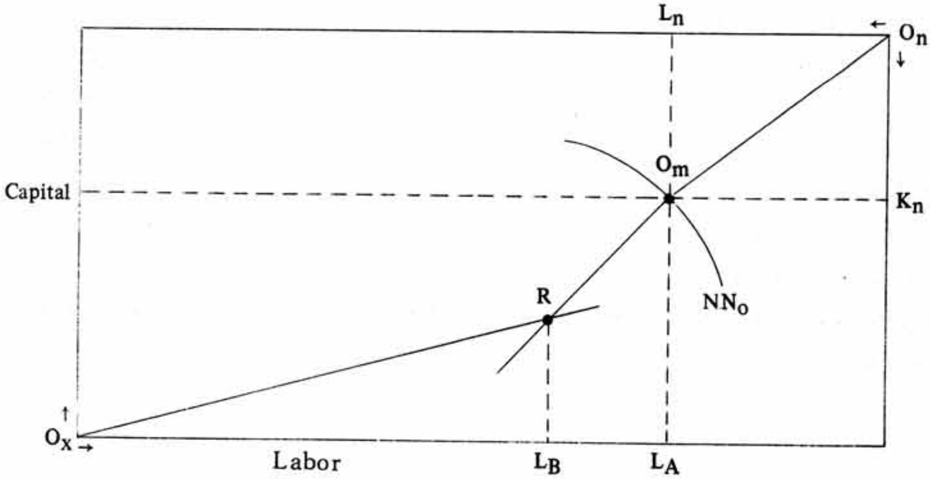
9. Of course, if $(\theta_{KX}-\theta_{KN})>0$, $[\hat{P}_N/(1\hat{+}t)]<0$.

$<\theta_{KN}$ (i.e., imports are the most labor-intensive, with nontradables being the more capital-intensive), then $\hat{e}/(1\hat{+}t)>0$; in this case liberalization of trade will result, contrary to the conventional wisdom, in a real appreciation. This, however, is not very plausible in the developing countries. Indeed, in these countries it is more likely that M will be the most capital intensive, with exports being the most labor-intensive. In this case. $\theta_{KX} < \theta_{KN} < \theta_{KM}$ and if α is not too small, it is likely that the liberalization will require a real depreci ation in order for this economy to remain in equilibrium.

While, in the present setting, the long-run relative price of nontradables is completely determined by technological considerations, foreign prices and the extent of protection, the amount produced of this type of good will also depend on the demand side. In particular, production of N will be such that, at the prevailling prices, the nontradables market clears.

The production side of the model can be analyzed using a three-goods Edgeworth-Bowley box as developed by Melvin (1968). Figure 1 illustrates the case where exportables are the most labor-intensive good, and importables are the most capital-intensive good.

Figure 1. Initial Equilibrium in Production



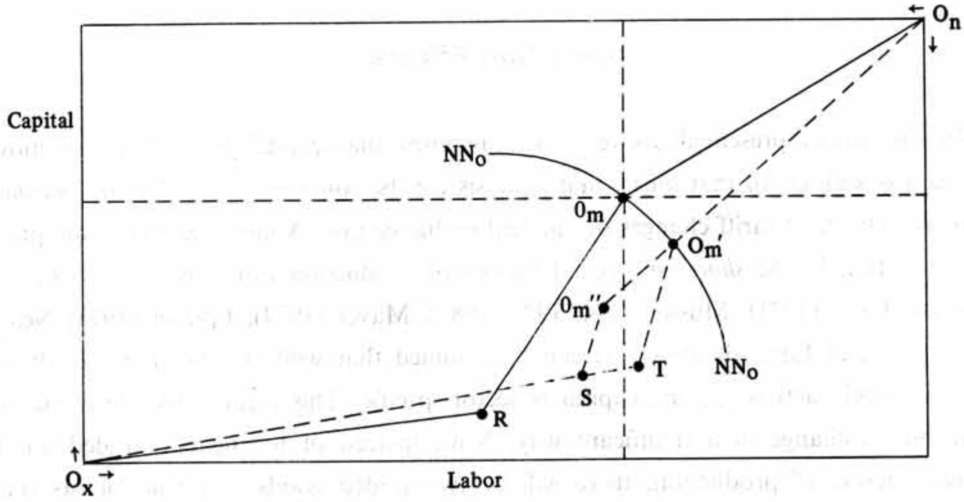
In this diagram nontradables isoquants are drawn from origin O_N. At the initial prices the nontradable goods market clears at a level of production given by isoquant NN_O. The capital-labor ratio in nontradables production is given by the slope of

10. See Corden and Neary (1982) and Edward (1984) for alternative uses of this type of diagram.

O_NO_M. Production of exportables is measured from O_X, and that of importables by distance O_MR. In equilibrium the slope of NN_O isoquant at O_M equals the slopes of the corresponding isoquants for exportables and importables, which are tangent at R.

The discussion above showed that if importables are more capital-intensive than exportables, a reduction of the import tariff will generate, in the long run, an increase in the wage rate relative to the rental rate. That means that all three sectors will now become more capital-intensive. This is shown in Figure 2, where dashed rays depict the new (after tariff reduction) capital-labor ratios. However, in order to determine the new equilibrium it is necessary to know what will happen to the demand of nontradables as a consequence of the tariff reduction. In order to make the exposition clearer we will proceed under the assumption that the tariff reduction will result in a real depreciation.

Figure 2. Long-Run Equilibrium after Tariff Liberalization



Assume first, in order to organize the discussion, that the quantity demanded for nontradables does change after the import tariff is reduced. This assumption will be relaxed later. In this case, since by assumption production of nontradables remains constant, the new equilibrium point in production of nontradables will be obtained at the intersection of the new (higher) capital-labor ratio and the initial NN_O isoquant, at point O'_M. Then, as can be seen from Figure 2, production of importables will be reduced to O^1_MT, and production of exportables will increase to M_XT. However, this result was obtained under the fairly implausible assumption that the quantity demanded of nontradables was not affected by the reduction of tariffs. In general this will not be the case. Moreover, given the assumptions regarding capital-labor intensity it is expected that the demand for nontradables will tend to *increase* as a result of the liberalization. There are two reasons for this ; (a) Under the assumption that the liberalization results in a real depreciation, the (relative) price of nontradables will decline, producing a substitution effect in demand towards nontradables ; and (b) the trade liberalization will generate a positive income effect, as national income at international prices increases, which will also have a positive effect on the quantity demanded of N. If the demand for nontradables increases, long-run equilibrium in Figure 2 will be on the new capital-labor ratio ray to the left of the NN_0 isocost. In terms of Figure 2 this new equilibrium is obtained at Q''_M, with production of exportables being equal to OS, production of importables having been reduced to $Q''_M S$ and production of nontradables being equal to $O_N Q''_M$.

Short-Run Effects

In the model presented above it was assumed that capital and labor can move freely across sectors. In that sense, that analysis can be considered to reflect the *medium* or *long-run* effects of tariff changes on the real exchange rate. A more realistic assumption however is that in the *short-run* not all factors of production can move across sectors. Following Jones (1971), Mussa (1974, 1978, 1983), Mayer (1974), Leamer (1978) Neary (1978 a, b), and Edwards (1984), it can be assumed that while in the short run labor can move freely across sectors, capital is sector-specific. This means that the structure of the model change in a significant way. Now, instead of having two traded goods and two factors of production, there will be two traded goods and *four* factors (i.e., capital in each of the three sectors and mobile labor). Under these circumstances the nominal price of nontradables will be affected by the demand conditions for these goods.

It is easy to show that in this short-run case it is also theoretically possible that a tariff reduction could generate a real appreciation rather than a real depreciation (Edwards, 1984). The reason for this is simple. Consider the case of a small tariff···so that income effects can be assumed away for the time being···where all three goods are gross substitutes in consumption. The initial effect of a tariff reduction will be to generate a lower domestic price of importables relative to exportables (assuming away Metzler's paradox), and of importables relative to nontradables. However the latter effect···the decline of the importables relative to nontradables···will generate an incipient excess supply for nontradable goods, which under the assumptions of gross substitutability will require an increase in the price of exportables relative to nontradables to restore equilibrium in the nontradable goods market and in the external sector. (See also Dornbusch, 1980.) Under these assumptions, then, the elimination of a small tariff will generate a *decline* in the price of importable relative to nontradables (P_M/P_N), and an *increase* in the price of exportables relative to nontradables (P_X/P_N). Since change in the real exchange rate are equal to a weighted average of change in the prices of importables and exportables relative to nontradables, the tariff reduction can either generate a real appreciation *or* a real depreciation. Although a real appreciation is indeed a theoretical possibility, it is not a very likely outcome as is discussed above.

There are several ways to formally analyze the short-run effects of tariff changes on the real exchange rate. In all cases, of course, the demand side of the nontradables sector has to be explicitly brought into the picture. In this section one of the simplest ways of analyzing this short-run case is pursued. (See Edwards 1986c and Edwards and van Wijnbergen 1987 for alternative more complicated approaches.) Consider our three-goods economy, where in the *short run* only labor can move between sectors. Assume, as before, that the nominal exchange rate is equal to one. In equilibrium, the nontraded goods market clears and income equals expenditure. Taking the price of exportables to be the numeraire, equilibrium in this economy is given by:

$$N^d\left(\frac{P_N}{P_X}, \frac{P_M}{P_X}, y\right)=N^s\left(\frac{P_N}{P_X}, \frac{P_M}{P_X}\right) \tag{14}$$

$$y=z \tag{15}$$

$$e=(P_M/P_N)^a(P_X/P_M)^{1-a} \tag{16}$$

$$P_M=P_M^*(1+t) \tag{17}$$

where N^d and N^s are the demand and supply functions for nontradables; y is real income in terms of exportables; Z is real expenditures in terms of exportables; and, as before, e is the real exchange rate, as defined in equation (7). When equations (14) and (15) hold, the balance of trade is also in equilibrium:

$$(X^s-X^d)+\left(\frac{P_M}{P_X}\right)(M^s-M^d)=\left(\frac{P_N}{P_X}\right)(N^d-N^s). \tag{18}$$

Equations (14)−(18) imply that in this economy there is a simultaneous equilibrium of the internal (i.e., nontradables) sector and external (i.e., trade balance) sector. The equilibrium real exchange rate is defined as that value of e for which this simultaneous equilibrium holds, for given long run derived values of other forcing variables such as tariffs (Edwards, forthcoming, uses an intertemporal model.)

Assume now that the small tariff is changed; this results in a change in P_M (with P_X constant). Then

$$\hat{P}_N/(1\hat{+}t)=(\varepsilon_{NM}-\eta_{NM})/(\eta_{NN}-\varepsilon_{NN})-[\eta_y/(\eta_{NN}-\varepsilon_{NN})]\ [\hat{y}/(1\hat{+}t)], \tag{19}$$

where η_{NN} and η_{NM} are elasticities of demand (own and crossed); η_y is the income elasticity of demand for nontradables; and the ε's are elasticities of supply.[11] As may be seen from equation (19), the sign of $[\hat{P}_N/(1\hat{+}t)]$ is ambiguous. Even in the more usual case of substitutability (i.e., $\eta_{NM}>0$, $\varepsilon_{NM}<0$) the sign of $[\hat{P}_N/(1\hat{+}t)]$ is not determined.

If it is assumed, however, that the subsuitution effect dominates the income effect $[\hat{P}_N/(1\hat{+}t)]$ will be positive, with the reduction of the import tariff resulting in a decline in the price of nontradables relative to importables. From this discussion, it also follows that it is not possible to sign *a priori* the change in the price of exportables to nontradables $(\hat{P}_X/\hat{P}_N)$.

Using (19) and (16) we can now find the effect of a change in the import tariff on the real exchange rate.

$$[\hat{e}/(1\hat{+}t)]=\{\alpha+[\eta_y/(\eta_{NN}-\varepsilon_{NN})]\ [\hat{y}/(1\hat{+}t)]-(\varepsilon_{NM}-\eta_{NM})/(\eta_{NN}-\varepsilon_{NN})\}. \tag{20}$$

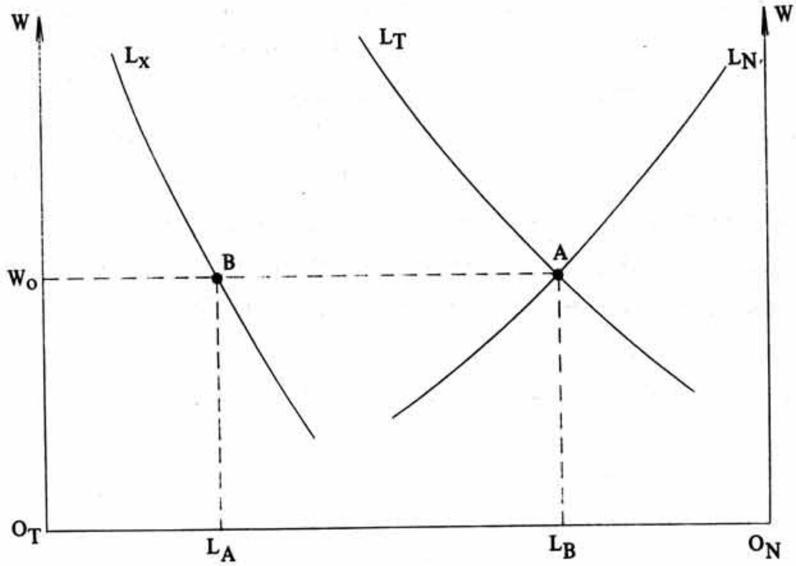
This expression can be positive or negative. According to this equation, if the income effect dominates the substitution effect, a tariff reduction will result in a real *appreciation* [i.e., $\hat{e}/(1\hat{+}t)>0$]. However, under the most plausible case where the substitution effect is strong enough and α is small, the more traditional result that suggests that trade liberalization will generate a real depreciation will be obtained. The formal condition for a tariff reduction to result in a real depreciation in the short run is that $(\varepsilon_{NM}-\eta_{NM})/(\eta_{NM}-\varepsilon_{NN})>\alpha+[\eta_y/\eta_{NN}-\varepsilon_{NN})]\ [\hat{y}/(1\hat{+}t)]$. In order to simplify the discussion that

11. In order to simplify the exposition the income effect has been deliberately left as $\hat{y}/(1\hat{+}t)$ without writing a more explicit expression. Throughout, however, it is assumed that tariff revenues are always returned to the public in a nondistorting way.

follows it will assume that this is the case and that $\hat{e}/(1\hat{+}t)<0$.

What will happen to production in the short run?[12] Since in the short run capital is sector-specific, production in each sector will depend only on how labor is allocated across them. The short-run effect of the tariff liberalization on production can then be analyzed using Figure 3, which is adapted from Mussa (1974) and depicts labor market equilibrium. In this figure the horizontal axis measures total labor available in the economy, while the vertical axis depicts the wage rate in terms of exportables.

Figure 3. Labor Market Equilibrium



L_T is the demand for labor by the tradable goods sectors and is equal to the horizontal sum of the demand for labor by the exportable sector (which is given by L_X in this figure) and demand for labor of the importables sector. L_N on the other hand is the demand for labor of the nontradable goods sector. The initial equilibrium is characterized, then, by a wage rate equal to W_J with $O_T L_A$ labor used in the production of exportables, $L_A L_B$ labor used in the production of importables and OL_B used in the production of nontradables. As was shown above, assuming that the three goods are gross substitutes in consumption and production, and that the income effect does not exceed the substitution

12. As stated above, this will be the case if all goods are assumed to be gross substitutes, the income effect does not dominate the substitution effect, and is α "small". See equation (21).

effect, as a result of the tariff reduction the price of nontradables will fall relative to that of exportables and increase relative to that of importables.

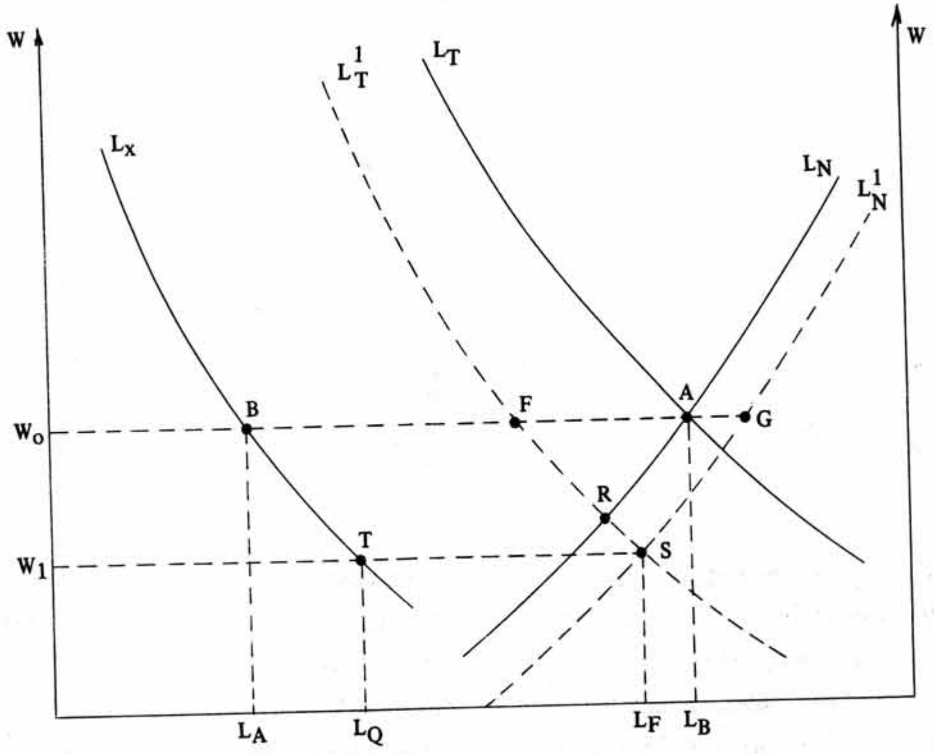
The reduction in the level of the tariff will reduce the domestic price of importables, generating a downward shift of the L_T curve (with the L_X curve constant). In Figure 4 the new L_T curve will intersect the L_N curve at R. However, this is not a final equilibrium situation, since, as already discussed, the tariff reduction will also result in a *decline* in the price of nontradables (relative to exports). As a consequence, L_N will shift downward (by less than L_T) and final *short-run* equilibrium will be achieved at S. In this new equilibrium, production of exportables has increased···with labor used by this sector increasing by $L_A L_Q$. The production of nontradables may either increase or decrease, and production of improtables will fall. In this case depicted in Figure 4 labor has moved out of the importable goods sector, into the exportables and nontradables sectors. Consequently production in these two sectors increases as a result of the tariff reduction.

What has happened to factors rewards in the short run? Wages have decline in terms of the exportable good (from W_0 to W_1 in Figure 4). Also, wages decline in terms of the nontradable good, since the vertical distance between the L_N and L_N^1 curves is smaller than the reduction of W from W_0 to W_1 (see Mussa 1974). However, wages increase relative to the importable good, since the domestic price of importables has fallen by more than wages. In the exportable sector, the rental rate of capital will increase in terms of all three goods, while the rental rates of the capital-specific to the importables and nontradable sector could either increase or decrease.[13]

The above discussion has assumed that all prices (of good and factors) are fully flexible. However, this need not be the case. In a number of developing countries the labor market is usually characterized by the existence of (real) minimum wages. It is easy to see from Figure 4 that if wages, expressed in terms of exportables are inflexibly downward, short-run unemployment will result as a consequence of the reduction of tariffs. In terms of Figure 4, the magnitude of this unemployment will be equal to distance FG. This unemployment will only be a short-run phenomenon, which will tend to disappear as capital moves between sectors in the medium and long run. In general, in the presence of sector-specific capital and wage rigidity in the short run, there will be a second-best argument for slow trade liberalization and adjustment assistance. The

13. Formally, the rental rate of capital specific to the importable sector will decrease in terms of importables, and could either increase or decrease in terms of the other two goods. With respect to capital specific to the nontradable sector, its rental rate will in terms of nontradables, and could either increase or decrease in terms of the other two goods.

Figure 4. Tariff Reductions and the Labor Market

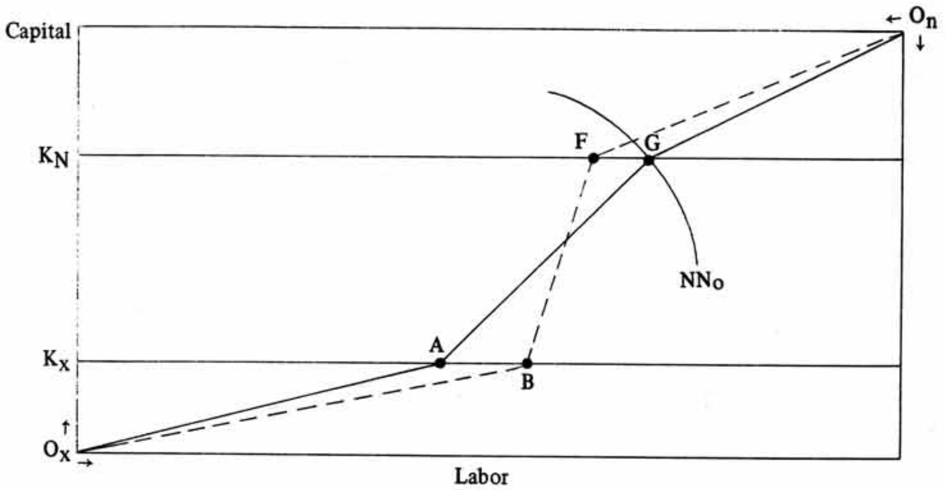


first-best policy, of course, is to act directly on the labor market, removing the sources of wage rigidity (Edwards, 1986).

Under the assumption of wage flexibility, the short-run effect of trade liberalization on the levels of production can be depicted in Figure 5. The initial (pre-reform) equilibrium is given by points A and G, with production of exportables proportional to distance O_XA, production of nontradables given by isocost NN_0, and production of importables proportion to distance GA. Notice that initially the nontradable goods sector uses O_NK_N capital, the exportables sector uses O_XK_X capital, and the importables will use the rest (K_NK_X). Since in the short run capital is sector-specific these amounts of capital will also be used by each sector after the tariff reform. This means that the new short run equilibrium points will necessarily lie on the K_NK_N and K_XK_X lines.

The tariff reduction will result in an increase in the use of labor (and thus in production, for given amounts of capital) in the exportables and importables sectors. This is shown in Figure 5 by the movement of the equilibrium points to B and F.

Figure 5. Trade Liberalization Effects in the Short Run



The new capital-labor ratios are now given by the dashed lines, and as may be seen both the exportable and nontradable sectors become relatively more labor-intensive, while the importables sector has become more capital-intensive. A comparison of Figure 2 and 5 provides some indication of how transition period will look, with factors moving from their post-reform short-run allocation towards their long-run post-reform allocation.

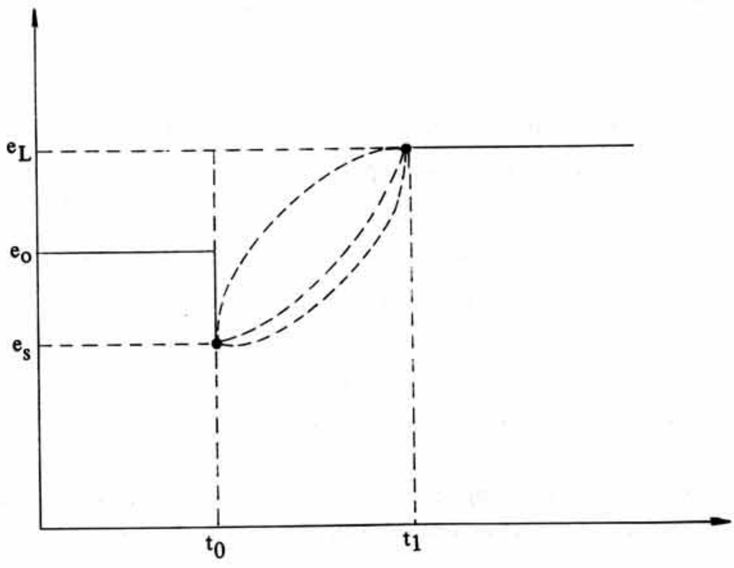
In the present case, with short-run capital specificity the conditions required to generate a real appreciation are different from those of the long-run case with fully mobile factors: in the *long-run* model the capital-labor ordering of the three sectors was critical to generate the possibility of a real appreciation as a result of the tariff reduction. In the sector-specific short-run model, however, the capital intensities are of *no* importance to determine this result. In this case the crucial conditions···which by the way are inconsequential in the long-run model···are related to the degrees of substitutability in demand among the three sectors and the intensity of the income effect [Dornbusch (1974, 1980); Edwards (1986)].

Transition

Since the way in which changes in the tariffs affect the real exchange rate in the long and short run depend on different sets of conditions···the long-run effects depend on relative capital-labor intensities, while the short-run reaction depends on the degree of substitutability and magnitude of the income effect···the dynamic effects of terms of trade changes on the real exchange rate can get quite involved. It is possible to find a case where the real exchange rate will first appreciate and then depreciate as a result of the permanent imposition of a tariff. For example, this will happen if, in equation (20), $(\varepsilon_{NM}-\eta_{NM})(\eta_{NN}-\varepsilon_{NN})<(\alpha+[\eta_{NM}-\varepsilon_{NN})](\hat{y}/\hat{P}_M))$ and if $\theta_{KM}>\theta_{KN}>\theta_K$. In this case, a tariff reduction will generate in the short run a real appreciation. However, as time goes by and capital begins to move across sectors e will increase, with the total long-run effect being a real depreciation. The dynamics of the real exchange rate, then, will be (approximately) captured by Figure 6, where it is assumed that at time t_0 there is a (permanent) reduction in tariffs, e_0 is the initial equilibrium real exchange rate, e_S is the new short-run equilibrium real exchange rate after the tariff reduction and e_L is the new (i.e., post-tariff liberalization) equilibrium real exchange rate. It is assumed that the new long-run equilibrium (e_L) is attained at t_1.

The analysis presented here does not allow us to fully specify the dynamic path of e between e_s and e_L. In order to establish such a path, the way in which the capital stock will move following the exogenous shock should be clearly specified (see, for example, Mussa 1978). The main message of Figure 6, however, is that it clearly points

Figure 6.



out the difference between short- and long-run equilibrium real exchange rate. The fact that after the trade liberalization e declines, from e_0 to e_s, and that e_s is well below the new long-run equilibrium real exchange rate does not mean that during periods t_0 and t_1 the domestic currency is *overvalued* as the traditional approach would suggest.

This discussion, as well as that in the previous section, does not make a distinction between changes in tariff perceived to be temporary from those perceived to be permanent. This is, however, an important distinction, since in many cases tariffs change only temporarily. If the changes in tariffs are perceived to be permanent, the results discussed above will hold. (See Edwards, forthcoming, for an exhaustive analysis of temporary vs. permanent disturbances and the real exchange rate.)

However, in the case of temporary tariff changes, some modifications to the model should be made (see Edwards, forthcoming). Frist, actual real income in equation (14) can be replaced by permanent real income (y^P). In this case temporary change in tariffs will have a smaller impact on y^P than permanent changes. A second direction in which the model can be modified is by allowing a smaller supply response to temporary than to permanent relative price changes. Of course, one way of doing that is by assuming that whenever changes in the tariffs are perceived to be temporary, the specific factor (i.e., capital in our model), will not move across sectors.[14] Only labor···the mobile factor···will be reallocated. Under these circumstances, the effects of temporary and permanent tariff changes on the real exchange rate will be different : if the changes are temporary, we would only observe what we have called short-run effects above. If the tariff changes are permanent, then both the short- and long-run effects will be experienced.

In this section, following the real trade literature tradition, it has been assumed that resource movement and demand shift respond to actual relative price movements. In reality, however, agents try to anticipate relative price changes and many decisions actually depend on *expected price* movements. It is easy, however, to expand the above analysis to this case. Under these assumptions, the real exchange rate will respond not only to actual terms of trade changes, but also to anticipated or expected change.

14. This will be the case, for example, if it is costly to move capital across sectors as in Mussa (1978). In this case, it may not pay for firms to incur such an expense if the movement of capital has soon to be reversed.

15. In fact, the relative price change will occur at the time the expected change in the terms of trade change is perceived. If the actual terms of trade change differ from its expected value, a correction will take place.

It should be noted that the fact that theoretically a tariff reduction (increase) *can* result in an equilibrium real appreciation (depreciation), does not necessarily mean that this is empirically an important case. The actual effect will depend on the particular case being considered and on the values of the parameters involved. The main policy implication of the above discussion is that in the real world···where there are, among other things, tariffs and nontradable goods···a tariff reduction will possibly "require" a smaller real depreciation to restore external equilibrium than what is implied by simple partial equilibrium estimations that ignore the existence of nontradables.

Ⅱ. Terms of Trade and the Equilibrium Real Exchange Rate

In a small country exogenous changes of the external terms of trade···or "world" relative price of exportables to importables···will affect the equilibrium real exchange rate. The traditional wisdom is that if the terms of trade deteriorate an equilibrium real depreciation will result. For example, Carlos Diaz-Alejandro (1983, p.33) stated that :

> [S]tandard models···predict that the following variables···influence its real exchange rates··· : an improvement [in terms of trade] will lead to appreciation.

On the other hand Dornbusch(1980, p.111) has indicated that : "The adjustment process to a terms-of-trade impovement involves a real appreciation."

Most traditional analyses of the effect of terms of trade changes on the equilibrium real exchange rate have emphasized the role of the income effect generated by the change in the external terms of trade. The argument usually goes in the following way : a deterioration of the terms of trade reduced real income and results in a decline in the demand for nontradable goods. In order to restore equilibrium the relative price of nontradables has to decline (i.e., there has to be an equilibrium real depreciation). However, as will be emphasized below, the income effect is only part of the story···and under some circumstances, not a very important one. In order to understand the way in which terms of trade affect the equilibrium real exchange rate both income and substitution effects should be analyzed.

Basically, in the case of a small country, the interaction between exogenous terms of trade changes and the equilibrium real exchange rate can by analyzed using the same apparatus used to investigate the case of tariff changes. The reason for this, of course, is that in a small country the domestic price of imports P_M can change either because their world price change or balance tariffs were altered.

In the long-run case where factors can move freely across sectors the effect of an exogenous change in the terms of trade ($\hat{P}_M^*$) on the real exchange rate is given by:

$$(\hat{e}/\hat{P}_M^*)=[\alpha-(\theta_{KX}-\theta_{KN})/\theta_{KX}-\theta_{KM})] \tag{21}$$

which is equivalent to (13). Again it is clear that $(\hat{e}/\hat{P}_M^*)$ cannot be signed *a priori*. Then, in a small country case with nontradables a deterioration in the terms of trade can result, in the long run, in either an equilibrium real appreciation or deprection. The traditional result···a worsening of the terms of trade will generate a depreciation ···will be obtained if:

$$\alpha>(\theta_{KX}-\theta_{KN})/(\theta_{KX}-\theta_{KM}) \tag{22}$$

Surprisingly, this condition is exactly the opposite of that required for a tariff liberalization to generate a real depreciation! Indeed, from equation (13) it is possible to see that for a tariff reduction to reult in a real depreciation it is required that $\alpha<(\theta_{KX}-\theta_{KN})/(\theta_{KX}-\theta_{KM})$. This means that these two popular propositions in international economics···lower tariffs result in a real depreciation and terms of trade improvements result in a real appreciation···cannot hold simultaneously in the standard class of models considered here. Within the framework of this model, if one of these propositions holds, the other necessarily will not be true (see Edwards and van Wijnbergen, 1987).

However, in the short-run model where capital cannot move across sectors, these two popular propositions can hold simultaneously. In order for this to be case a fairly special condition has to hold. Consider the short-run model given in equations (14) through (17). The effect of a terms of trade worsening ($\hat{P}_M^*>0$) on the equilibrium real exchange rate is given by

$$\hat{e}/\hat{P}_M^*=\alpha+[\eta_y/(\eta_{NN}-\varepsilon_{NN})][\hat{y}/\hat{P}_M^*]-(\varepsilon_{NM}-\eta_{NN})/(\eta_{NN}/e_{NN}) \tag{23}$$

The right-hand side of this equation differs from the right-hand side in (21) by the income effect term. Now we have $[\hat{y}/\hat{P}_M^*]$ whereas in the tariff case we had $[\hat{y}/(1\hat{+}t)]$. These terms are negative, since both a deterioration of the terms of trade and an increase in tariff protection generate a decline in real income at world prices. It is easy to show that, as long as tariff proceeds are handed back to the public in an undistorted fashion, $[\hat{y}/(1\hat{+}t)]<[\hat{y}/\hat{P}^*_M]$. This means that for a given relative price effect (i.e., $\hat{P}^*_M=(1\hat{+}t)$), the negative income effect of a terms of trade deterioration exceeds the negative income effect of a tariff increase. Then if $[\hat{y}/\hat{P}^*_M]$ is sufficiently smaller than $|\hat{y}/(1\hat{+}t)|$ it is possible that both popular propositions will hold simultaneously. In this context "sufficiently smaller" means that $(\hat{y}/\hat{P}^*_M)<\hat{y}/(1\hat{+}t)+k/[\eta_y/\eta_{NN}-\varepsilon_{NN})]$ where k is equal to $(\varepsilon_{NN}\eta_{NM})/(\eta_{NN}-\varepsilon_{NN})-\alpha-[\eta_y/(\eta_{NN}-\varepsilon_{NN})](\hat{y}/(1\hat{+}t))$.

The Dutch Disease Case

During the last few years, there has been renewed interest in investigating the effects of the terms of trade improvement generated by a resource-based export boom on the equilibrium exchange rate, resource allocation and employment. This problem has come to be known in the professional literature as the *Dutch Disease*.[16] In this section, the Dutch Disease case and its implications for real exchange rate behavior is briefly analyzed.

In recent years export booms generated by increases in the price (or quantity) of a resource-based export (i.e., oil, coffee) have resulted in significant real appreciations. This has been the case, for example, in Colombia (1975–79), Indonesia (1973–80), Nigeria (1979–80), and the United Kingdom after the discovery of the North Sea oil. As a consequence of these real appreciations, the rest of the tradables (i.e., non-resource-based) sectors have experienced a loss competitiveness, production and employment. This phenomenon has been labeled the *Dutch Disease*, as a reference to the effects of natural gas discoveries in the NeRherlands during the 1960s. Since the real appreciation that followed these gas discoveries especially hurt the manufacturing sector in the Netherlands, the phenomenon has also been known as the *deindustrialization* process.

Most studies on the Dutch Disease have concentrated on the real effects of a resource-based export boom, investigating how production, wages, employment and profitability are affected.[17] In his survey, Corden (1984) divided the real consequences of a resource-based export boom in a developing economy into two distinct effects: a *spending effect* and a *resource movement effect*.

16. See, for example, the survey by Corden (1984), van Wijnbergen (1983) and Edwards and Aoki (1983).

17. See Corden (1981), Corden and Neary (1982), Neary and Purvis (1983) and van Wijnbergen (1984a, b).

The *spending effect* is a direct result of the higher real income that the export boom generates. The higher price of the resource-based export···which will be called oil for convenience···will generate a positive real income effect in the country in question. If all goods···oil, other tradables (or lagging sector in Corden's terminology), and nontradables ···are normal in demand, the real income effect will be translated into a higher demand for all these goods. In the case of nontradables this higher demand will result in a higher nominal price, for a given nominal exchange rate.[18] This higher relative price of nontradables will provoke a real appreciation and a movement of resources out of the other tradable good sectors and into the nontradable goods sector. Profitability is squeezed out of the traditional tradable goods or lagging sector (i.e., manufacturing or traditional exports sector) with production and unemployment declining. In Corden's (1984, pp.6–7) words :

> Assuming that at least some part of the extra income···is spent, ··· there is likely to be extra spending on N··· [S]o the price of N relative to the prices of tradables must rise. This is a *real appreciation*. It will draw resources out of [the tradable good sectors] into N···

However, this is not the only way in which the export boom will affect profitability and production in the rest of the economy. The *resource movement effect* is related to the way factor markets are affected. In his analysis, Corden assumes that labor is the only mobile factor. The increase in the price of oil will initially result in a higher wage rate in that sector, with labor moving out of nontradables and other tradables into oil. This, however, is not the end of the story as far as the adjustment of the labor market is concerned. Since the spending effect will result in a higher nominal price of nontradables, there will also a tendency for the wage rate to increase in that sector, with labor now moving out of the rest of the economy into the nontradables sector. Profitability, in the other tradables sectors is further squeezed, with its employment and production declining even more. [For an elegant detailed discussion of this and other cases, see Corden and Neary (1982).]

Most studies on the Dutch Disease have focused exclusively on the long-run real effects of the export boom. A few authors, however, have also investigated the short-run monetary consequences of an export boom [Harberger (1983), Edwards and Aoki (1983), Neary and Purvis (1983), Neary and van Wijnbergen (1984), Edwards (1986).]

18. Note that in order for this demand to affect the price of nontradables, it is necessary to assume that the number of factors exceeds the number of tradable goods.

Harberger (1983), for example, does this by introducing a slowly clearing monetary sector into a three-goods simple simulation model. He includes the lagged excess supply for money as a determinant of the demands for nontradables and other tradables. In this setting, an increase in the world price of the resource-based export generates an overshooting in the relative price of nontradables. That is, in the short run, the real appreciation is higher than the long-run real appreciation generated by real factors only. Harberger (1983) calculates that for plausible parameter values, in the short run the relative price of nontradables will overshoot its final equilibrium by approximately 50 percent.

Although resource export booms will generally result in an improved balance of payments, the accumulation of international reserves and in an increase in high-powered money, this does not mean that a monetary disequilibrium will necessarily result. In fact, as emphasized by Neary and van Wijnbergen (1984) and Edwards (1984b), in addition to the increase in the supply of money as resource-based export boom will also result in an increase in the quantity of money demanded. The final effect can be either an excess supply or demand for money. The evidence available indicates that in some cases···Colombia in 1975–79, for example···the money supply effect can be very important, generating very substantial increases in the supply for money and short-run money disequilibria (see Edwards 1986).

Ⅲ. Empirical Evidence

There have been very few econometric studies that have empirically investigated the relationship between commercial policies and the real exchange rate. The main reason for this in the lack of adequate data. First it is not easy to find appropriate time series for import tariffs and/or export subsidies. Moreover, even if these data were available, there is a serious problem with the definition of the average rate of protection.[19] Second, in a number of developing countries tariffs are only one of the tools in commercial policy, with quotas being the most important instrument. This fact makes the measurement of the level and degree of protection even more difficult.[20]

In their empirical investigation on PPP for a group of Latin American countries, Clague and Tanzi (1972) included import duties as a proportion of imports and export

19. See, for example, Corden (1967).

20. See Bhagwati (1978) and Krueger (1978).

taxes as a proportion of exports as explanatory variables in their regression analysis. In this study the dependent variable was the inverse of the PPP-defined real exchange rate, and income per capita was also included as an explanatory variable. The results obtained were marginally satisfactory , showing that, in accordance with the traditional view, for the countries under consideration a higher level of trade restrictions had resulted on average in a real appreciation.

More recently Barro (1983) used annual data for 1952–82 for seven OECD countries to investigate the behavior of the real exchange rate. Barro uses the change of the bilateral real exchange rate relative to the U.S. as the dependent variable. When a pooled regression for all seven countries was run the coefficient for the trade restrictions variable indicated that, with other things given, higher tariffs will tend to generate a real appreciation (the regression coefficient is almost 0.5).

Carlos Diaz-Alejandro (1983) analyzed in detail the determinants of the real exchange rate in Argentina during 1918 and 1976. After showing that the PPP view of real exchange rate behavior was strongly rejected by the data he analyzed whether real exchange rate changes had been affected by taxes to trade, terms of trade change and productivity gains. As a proxy for taxes on trade he used an index of protection. The results obtained indicate that the change in trade taxes had affected the real exchange rate according to the traditional view : higer tariffs generate a real appreciation. Using a double log specification he obtained a coefficient of -0.15 for the tariff variable. More recently, Musalem (1985) also analyzed the real exchange rate behavior in Argentina for the period 1962–82. He found that higher taxes on trade have resulted in a real appreciation. Using a specification on logs first differences that included real money balances, the importance of the public sector and the capital labor as the other independent variables, he obtained a coefficient of -0.3 for the tariff variable.

While there have been relatively few econometric studies relating commercial policies to the real exchange rate, a number of investigations have computed, using some kind of partial equilibrium formula, the effects of the a trade liberalization (i.e., complete removal of existing tariffs and other trade restrictions) on the equilibrium real exchange rate [Basevi (1968), Balassa (1971, 1982).] Most of these studies have been done within the context of computations of "net" effective rates of protection, defined as the rate of effective protection corrected by exchange rate overvaluation [see, for example, Balassa (1982), Appendix X]. The simple partial equilibrium nature of these computations have generated some concern even among the authors that have used them. For example, in their study on Argentina, Berlinsky and Schydlowsky (1982) state that the computation of the free trade exchange rate using Balassa's formula should only be viewed as a "benchmark figure for the purposes of comparison" (p.96). After having cautioned the reader about these problems, they calculate that in 1969 the Argentinian peso was overvalued by 40 percent in relation to its free trade value. [See also the papers in Balassa (1971) and (1982) for further case studies where the free trade real exchange rate is computed.]

Free trade real exchange rates have also been empirically computed within the context of calculations of the shadow price of foreign exchange [Bacha and Taylor (1971)]. Again, most empirical studies on the subject have used simple partial equilibrium models with no nontradables. For example, Chile is one of the countries where equilibrium free trade exchange rates have been computed several times. Bacha and Taylor (1973), for example, calculated that the complete elimination of trade impediments in Chile in 1969 would result in a real devaluation of approximately 30 percent. This calculation was later updated by Ossa (1974) using a similar methodology. Ossa's computation suggested an overvaluation of Chile's currency of approximately 25 percent in 1974. Selowsky (1970) performed a similar exercise within the context of the computation of the welfare cost of protection. He concluded that a full elimination of trade impediments in Chile would result in a real depreciation of 35 percent. Jeanerett (1971) used Balassa's formula for computing the degree of overvaluation relative to free trade and found that in 1961 there was a real overvaluation of 68 percent in Chile. Later, Coeymans (1978) used a general equilibrium simulation model to conclude that in 1977 the real exchange rate in Chile was overvalued by 20 percent.

Computable general equilibrium (CGE) models have also been used to simulate the relationship between tariffs and the real exchange rate in developing countries. de Melo (1978), for example, used a model with tradable and nontradable goods to analyze the Colombia economy. He concluded that elimination of all trade resrictions …except those applicable to the coffee sector…would require a real devaluation ranging from 4.1 to 11.2 percent to restore external equilibrium. Feltestein (1980) used a general equilibrium model to investigate the effects of trade liberalization in Argentina. He found that if tariffs are reduced by 50 percent and the exchange rate is not adjusted a serious deterioration of the balance of trade would result. If, however, the tariff reduction is implemented at the same time as a devaluation, it is possible to generate an improvement in the balance of payments. Cavallo and Mundlak (1982) also analyze the Argentinian case, reaching conclusions similar to those obtained by Feltestein. They also found that a trade liberalization cum devaluation will result in a significant increase in output.

Khan and Zahler (1985) used a general equilibrum mode to analyze the effect of the liberalization of the current and capital accounts on various variables. Using parameter values reflecting the economic structure of a "typical" developing country they conclude that liberalization experience would result in an *appreciation* of the real exchange rate. Unfortunately, however, due to the nature of their simulation experiment, it is not possible to know if this appreciation is the result of opening the capital account or of reducing tariffs. Actually Dornbusch (1983) has recently suggested that a real appreciation resulting as a consequence of tariff reduction could indeed have empirical importable in the case of the Southern Cone countries.

A few studies have recently analyzed the effects of terms of trade changes on the real exchange rate. Diaz-Alejandro (1983), for example, included contemporaneous and lagged terms of trade in his study of Argentina's real exchange rate between 1918 and 1976. He found that the coefficient for the contemporaneous and up to four years lagged terms of trade index was negative as indicated by the traditional view. The sum of the five terms of trade coefficients was significantly negative and had a coefficient of -0.85. In a more recent study Calvo (1986) used quarterly data for Argentina for the period 1976 through 1980 and found that whereas the terms of trade coefficients (contemporaneous and once lagged) had the expected negative sign they were insignificant.

Edwards (1986b) has analyzed the behavior of the real exchange rate in Chile during the 1973–83 period. Using quarterly data he estimated regressions that included lagged terms of trade, lagged net capital inflows and a productivity growth proxy (also lagged) as explanatory variables. He found that, according to the popular view, terms of trade improvements have results in a real appreciation in Chile. However, his results also imply that when terms of trade changes take place the real exchange rate will move slowly towards its new equilibrium.

Barro (1983) has provided one of the few multicountry studies of real exchange rate behavior. Using annual data and a simple of seven OECD countires he found that in his pooled regression case the terms of trade coefficient was significant; its sign also supported the conventional view that terms of trade improvements result in real appreciations, When the regessions were run for each individual country the coefficients remained significant and still supported the traditional view. Edwards (1985b) used a sample of seven developing countries and annual data to analyze real exchange rate behavior. In six out of the seven cases the coefficients of the (change of the) terms of trade were negative which suggested that an improvement in the terms of trade has resulted in real appreciations; the exception, where the coefficient turned out to be positive, was Israel. However, in only three of the seven cases the coefficient was significant.

The results obtained in the empirical work reviewed here indicate that in spite of the theoretical ambiguity of the effects of terms of trade on the real exchange rate, in most instances the evidence shows that the more traditional result holds. Terms of trade improvements (worsenings) tend to generate a real appreciation (depreciation. However, where regression results from a large number of countries, in some cases there is evidence that terms of trade improvements have indeed led to real exchange rate depreciations.

Only a handful of studies have analyzed empirically the real exchange rate consequences of the Dutch Disease case. Gelb (1986), for example, provides a useful survey of the actual behavior of the oil exporting countries in the 1970s and early 1980s. After analyzing the cases of Algeria, Ecuador, Indonesia, Iran, Nigeria, Trinidad and Tobago and Venezuela he found out that, on average, the trade-weighted real effective exchange rate appreciated by almost 40 percent between 1970–72 and 1982–83. The real appreciation was particularly severe in the cases of Nigeria and Iran. Pinto (1985) compared the experiences of Nigeria and Indonesia concluded that the degree of real appreciation was much more severe in Nigeria. He further argued that Indonesia's management of the nominal exchange rate and fiscal policy are the main elements behind this difference in behavior.

Edwards (1984) developed a model to investigate the relationship between fluctuations in the price of coffee and the real exchange rate in Colombia. The model allowed both for the real and monetary channels to affect the degree of real appreciation or depreciation. He found that in the Colombian case increases in the world price of coffee have traditionally resulted in higher money growth, higher inflation, slower devaluation of the crawling peg and a real appreciation.

IV. Summary

In this paper the effects of terms of trade and tariff changes on the equilibrium real exchange rate has been analyzed in some detail. It was indicated that the traditional view is that in small countries : (a) a tariff reduction leads to an equilibrium real appreciation, and that (b) a terms of trade improvement will provoke an equilibrium real appreciation. It was then shown that these propositions are not generally correct. More specifically, within the context of two simple models of a small open economy with no capital movements developed in this paper, the effects of terms of trade and tariff changes on the equilibrium real exchange rate will depend on (1) relative capital intensities among importables and exportables, (2) sign and magnitudes of cross-elasticities of demand and supply and (3) relative importance of income effects. Moreover, it was shown that in a popular model···the three-goods two-factors model of trade···both popular propositions are inconsistent; they cannot hold at the same time.

An important implication of this discussion is that actual nature of the relationship between terms of trade, tariffs and the real exchange rate is an empirical issue. Most of the studies reviewed in this paper have obtained results that are in accordance with the traditional views.

In this paper the Dutch Disease was also briefly discussed. It was pointed out that most theoretical studies have investigted the effect of commodity export booms on the real exchange rate, profits, wages and prôduction. Most of the theoretical studies have ignored the potential monetary effects of commodity export booms. Only a few studies have recognized that export booms will result in the accumulation of international reserves, an increase in the quantity of money and inflation. Only a handful of papers have empirically analyzed the Dutch Disease case.

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