

## 19 Protection and the Real Exchange Rate\*

This essay presents a geometric exposition of the relationship between protection and the real exchange rate in the 'orthodox' model, and then it compares this orthodox approach with exchange rate protection. Thus, it expounds in more detail themes already touched upon in the previous two essays. Finally, it outlines two other ways in which the exchange rate, protection and the current account may be related. Right through this essay the small country assumption (given terms of trade) will be maintained.

### I The Orthodox Approach: Protection and the Exchange-rate Adjustment

Let us begin then with an exposition of the orthodox approach.<sup>1</sup> The macroeconomic assumptions underlying it will be discussed more fully later. Here they can be put briefly as follows. (1) Macroeconomic policy keeps income consistently equal to expenditure. (2) The nominal price of non-tradables is fixed. This means that a nominal exchange rate alteration leads to an equivalent real exchange rate change, where the real exchange rate refers to the relative price of tradables to non-tradables, the price of tradables for this purpose being the price *excluding* any tariff. It will be shown later that assumption (2) is not crucial: a real exchange rate change can also be brought about when the nominal exchange rate is fixed and the nominal price of non-tradables changes appropriately.

There are three goods in the model, exportables  $X$ , importables  $M$  and non-tradables  $N$ , and both domestic consumption and production of all three are positive. To start with, consumption exceeds production of  $M$  (the excess demand being imported), production exceeds consumption of  $X$  (the excess supply being exported), and consumption equals production

\* This essay was specially written for this book.

1. The principal references on the 'orthodox approach' are Corden (1971, pp. 105-14) and Dornbusch (1974).

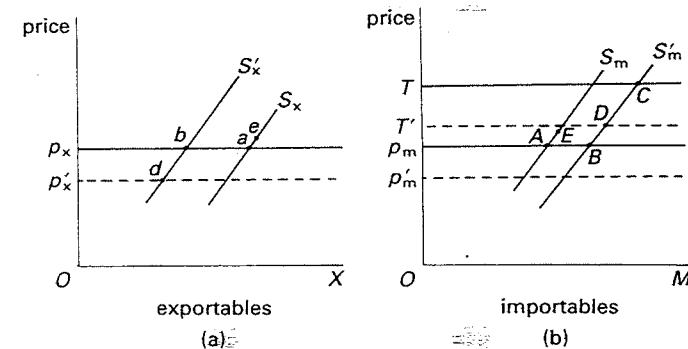


Figure 19.1

of  $N$ . Since income equals expenditure and there is zero excess demand for  $N$ , imports must be equal to exports. We describe this as current account balance, since exports and imports can refer to invisibles as well as visibles.

In figure 19.1(a)  $Op_x$  is the initial domestic price of  $X$  and in figure 19.1(b)  $Op_m$  is the initial domestic price of  $M$ , there being initially no tariff. Units of  $X$  and  $M$  are chosen so that  $Op_m = Op_x$ . Initial domestic production of  $X$  is  $p_x a$  and of  $M$  is  $p_m A$ . A tariff is then imposed which raises the domestic tariff-inclusive price of  $M$  to  $OT$ , the tariff rate being  $p_m T / Op_m$ . This has two effects on resource allocation and hence production.

1) It shifts resources out of  $X$  into  $M$ , this being the direct protection effect. It represents a resource reallocation within the tradables sector. Hence output of  $X$  falls by  $ab$  (with the new output point at  $b$ ) and output of  $M$  rises by  $AB$ . If there is a production cost of protection as a result of this reallocation, the value of output at world prices must fall, so that  $AB < ab$ .

2) With the exchange rate still constant, the tariff shifts resources out of  $N$  into  $M$ , the reason being that the price of  $N$  is constant while the tariff-inclusive price of  $M$  has risen. Hence output of  $M$  rises further, namely to  $C$ .

In addition to the production effects shown in the diagrams, the pattern of demand will have been affected. Demand will have shifted (or tried to shift) from  $M$  to both  $X$  and  $N$ . The net result is that, at this stage, there is excess demand for  $N$ , which is equal to a current account surplus. This is really an intermediate stage, excess demand for  $N$  being *ex-ante*, and equilibrium has yet to be re-established.<sup>2</sup>

Equilibrium is re-established with an appreciation of the exchange rate that lowers the domestic currency prices of  $X$  and  $M$  to  $Op'_x$  and  $Op'_m$

2. We can assume that the excess demand is saved involuntarily, so that expenditure falls temporarily below income. Corden (1971, p. 105) assumes that expenditure is reduced by policy, for example a budget surplus.

respectively. The tariff-inclusive price of  $M$  falls to  $OT'$ , where  $p_m^T/Op_m' = p_m^T/Op_m$  (the tariff being *ad valorem*). Thus the exchange-rate adjustment does not affect the price of  $X$  relative to  $M$ , and therefore does not lead to resource reallocation or consumption shifts between them. But it does lower the prices of both  $M$  and  $X$  relative to the given price of  $N$ , and hence leads to reductions of output of both  $X$  and  $M$ . It is these output shifts towards  $N$  combined with demand shifts away from  $N$ , all resulting from the real appreciation, that eliminate the *ex-ante* excess demand for  $N$ . Hence, as a result of the appreciation, output of  $X$  falls from  $b$  to  $d$  and output of  $M$  falls from  $C$  to  $D$ . Comparing this final outcome with the initial situation, there has been a fall in the price of  $X$  from  $Op_x$  to  $Op_x'$  and a rise in the tariff-inclusive price of  $M$  from  $Op_m$  to  $OT'$ . Relative to the price of  $N$ , one of the other prices has thus fallen and the other risen, so that the market for  $N$  stays in equilibrium.

The rise in output of  $M$  and the fall in output of  $X$  have each two elements, first the *direct* protection effect, and then the *indirect* effect, which operates through the real exchange rate. In the case of  $M$ , the direct effect has raised output from  $A$  to  $B$  and the indirect effect has raised it from  $B$  to  $D$ . One can also distinguish two protection rates.

- 1) The ordinary rate is the tariff rate, namely  $p_m^T/Op_m$  (which is equal to  $p_m^T/Op_m'$ ); it indicates the proportional rise in the price of  $M$  relative to the price of  $X$ .
- 2) The *net* protective rate takes into account the exchange rate adjustment, and is  $p_m^T/Op_m'$ ; it is the rise in the price of  $M$  relative to the price of  $N$ . Both rates are relevant. It would be wrong to focus on just one or the other, as some models have done.<sup>3</sup>

Something must also be said about the four supply curves in the diagram. Each curve is drawn on the assumption that the cross elasticity of supply between  $X$  and  $M$  is zero (i.e. that there is no direct resource movement between  $X$  and  $M$  whatever the relative price ratio). This, of course, is not the assumption of the model. Hence a change in the relative price owing to the tariff will shift the two supply curves. The tariff shifts the supply curve of  $X$  to the left, from  $S_x$  to  $S_x'$ , and the supply curve of  $M$  to the right, from  $S_m$  to  $S_m'$ . The shifts in the supply curves thus represent the direct protection effect, and the movements along  $S_x'$  and  $S_m'$  the indirect effects.

3. The concept of the net protective rate was first introduced by Corden (1966). Corden (1971, pp. 105-9) takes into account both rates and both effects, but the explicitly partial-equilibrium analysis on pp. 110-14 suppresses the first (direct) effect in order to focus on the exchange-rate adjustment. It has to be stressed that finally  $N$  may not lose any resources, since it gains resources from  $X$ . Taking this into account, the protection of  $M$  is thus primarily, and possibly wholly, relative to  $X$ .

### Exchange-rate Protection

Exchange-rate protection can be represented quite simply. A devaluation raises the prices of  $X$  and  $M$  uniformly, say to  $e$  (exportables) and  $E$  (importables). The movement is along the two initial supply curves  $S_x$  and  $S_m$ . There are two differences from ordinary protection, namely (a) exportables are positively protected, instead of being anti-protected, the protection being at the expense of non-tradables, and (b) if a new equilibrium is to result for more than a very short time (it is *not* suggested that it can be forever), macroeconomic policy must reduce expenditure below income so that a current-account surplus can be sustained. This has already been stressed in essay 17.

### II The Dornbusch Diagram

The two diagrams show both price and output effects of the various measures and adjustments. Furthermore, they show how the partial equilibrium approach that has been used in the past is a special case. These are the advantages. The disadvantage is that they do not explicitly show demand effects, even though these are implicit in the exchange-rate adjustment, and a different, but more complicated pair of diagrams could be drawn, showing both demand and supply effects. In any case, an alternative diagram has been devised by Dornbusch (1974), which does not show output effects, but which neatly highlights the price effects, and brings out more clearly the situation in the non-tradables market.

Figure 19.2 is drawn in  $p_m, p_x$  space, initial free-trade equilibrium being at  $A$ .  $NN$  shows all the combinations of  $p_x$  and  $p_m$  that maintain equilibrium in the market for  $N$  when income is equal to expenditure. The initial domestic price ratio is represented by the ray  $OR$ , so that initial equilibrium is at  $A$ . A tariff raises the ratio facing domestic producers and consumers to  $OR'$ . At a constant real exchange rate, temporary equilibrium would move to  $C$ . Points to the right of  $NN$  represent excess demand for  $N$  and current account surplus. The real appreciation required to eliminate the surplus brings equilibrium from  $C$  to  $D$ . The proportional rise in the price of  $M$  resulting from the movement from  $A$  to  $D$  has been  $p_m^T/Op_m$ , which is the net protective rate, and is less than the tariff rate  $p_m^T/Op_m'$ . Exchange-rate protection would be represented by a movement from  $A$  to, say,  $E$ .

### III The Macroeconomic Assumptions: The Price of Non-tradables

The macroeconomic assumptions implied in both the orthodox story and the exchange-rate protection story are very special, though not unreasonable, at least as starting points for analysis.

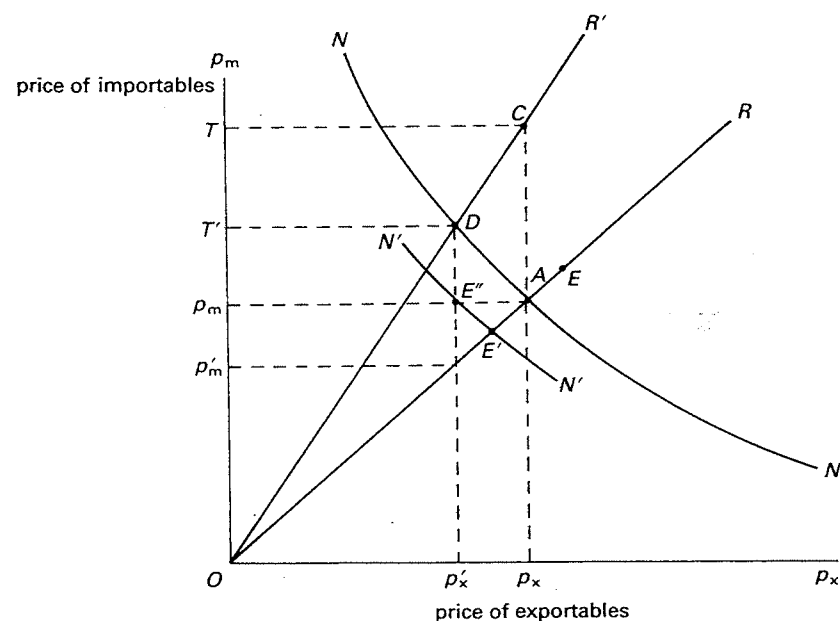


Figure 19.2

There is, first of all, the assumption that the nominal price of tradables is rigid. This is an extreme assumption that allows direct translation of a nominal exchange-rate change into a real exchange-rate change. As stressed in essay 17 with respect to exchange-rate protection, it is the real exchange rate that matters, and a real appreciation could be brought about by a rise in the price of  $N$  resulting from excess demand for  $N$ , combined with a fixed nominal exchange-rate policy. This point also needs stressing for the orthodox story.

Suppose that monetary policy keeps the nominal exchange rate fixed and a tariff is imposed. Before the price of  $N$  rises, excess demand for  $N$  results, as highlighted in our exposition. This might then lead to a rise in the price of  $N$  until equilibrium has been restored. With the price of  $N$  rising relative to the price of  $X$ , which is fixed, there has then been a real appreciation. The *real* story – that is the quantity changes and the *relative* price changes – will be identical to those presented above.

There are also various intermediate assumptions one might make. For example, one might hold the nominal wage constant and suppose that the price of non-tradables is market determined, subject to the fixed nominal wage, which is the principal element in the cost of production of non-tradables. There may then be *some* rise in the price of  $N$ , but not sufficient to restore equilibrium in the labour market. Another possibility is to

assume sluggish adjustment of the price of  $N$ , so that it rises somewhat in response to excess demand for  $N$ , but a supplementary appreciation is still needed to restore market equilibrium.

#### IV The Macroeconomic Assumptions: The Current Account

Consider now the macroeconomic policy implications of the current account outcomes of our two stories. In the orthodox model, current account balance is maintained, except in a temporary intermediate stage, before the exchange rate appreciates, when there is a surplus. Let us now focus on the initial and final equilibria. We must start with national savings equal to national investment. The implication is that this equality is maintained in the final equilibrium.

One can think of various reasons why private savings or investment might alter. For example, the redistribution of income towards producers of importables might lead to more (or less) savings. The higher expected profitability of import-competing industries might lead to increased investment and the lower expected profitability of export industries to lower investment. On balance, investment might rise or fall. Consumers who lose from the tariff might save less if they expect the tariff to be temporary. On the other hand, some consumers will gain from the appreciation. Here we are assuming that the budget stays in balance, so that the extra tariff revenue is disbursed. But there may be endogenous budgetary effects, with all the extra revenue not being spent or compensated by tax reductions. A budget surplus might then lead to a current account surplus.

In addition, there may be a real balance effect. The average price level may rise or fall (since the price of exportables falls but the tariff-inclusive price of importables rises), and so the real money supply may fall, leading possibly to temporary savings to restore real balances, or may rise, leading possibly to dissaving. Incidentally it should be noted that the refunding of the tariff revenue, if it takes place, may reduce the price level if the refunding takes place through reduction of indirect taxes.

The implication of the model has been that monetary or fiscal policy, or both, offset the net effects of the various factors just discussed on the current account. If the 'natural' tendency, taking account of all these considerations, is for a current account surplus to emerge, monetary expansion can raise investment as required, or fiscal expansion (budget deficit) can reduce national savings. In this way monetary and fiscal policies maintain current-account balance ('external balance') while it is assumed that the exchange rate, or alternatively flexibility of the price of non-tradables, maintains equilibrium in the market for non-tradables ('internal balance'). But it should be noted that the same results would ensue – more traditionally – if monetary and fiscal policies were targeted on internal balance while the exchange rate was targeted on external balance.<sup>4</sup>

4. This was assumed in the discussion of protection and the exchange rate by Corden (1971, pp. 105–19).

Very little need be added on the macroeconomic assumptions behind the exchange-rate protection story, since they have already been discussed in essay 17. If the country starts in 'internal balance', so that employment is not to change, then a depreciation has to be associated with a reduction in real expenditure. This could be brought about with either fiscal or monetary contraction, or with some combination of both. Of course expenditure reduction might not be necessary if employment and income could increase owing to initial Keynesian unemployment: savings may then rise, with income rising more than expenditure.

#### *V Alternative Links between Protection, the Exchange Rate and the Current Account*

There are numerous other ways in which protection, the exchange rate and the current account can be related. Here two other cases will be noted.

##### *Fixed Exchange Rate: Tariff Leads to Surplus*

In a model with three potential variables, namely the tariff level  $T$ , the real exchange rate  $RE$  and the current account  $CA$  we have considered the orthodox model, where  $CA$  is held constant, with  $T$  and  $RE$  varying, and the exchange rate protection model, where  $T$  is held constant, with  $RE$  and  $CA$  varying. Logically there is a third case, where  $RE$  is constant, while  $T$  and  $CA$  vary. When specified in a particular way, this third case becomes very familiar.

The imposition of a tariff improves the current account, which is what many people would expect. It is described by the 'temporary' stage in the orthodox model: the tariff is imposed, the nominal exchange rate has not yet appreciated, and there is potential excess demand for non-tradables, reflected in temporary savings, yielding a current-account surplus. If this is to be more than temporary one can suppose that monetary contraction reduces investment, or a budget surplus raises public sector savings, so that equilibrium in the market for non-tradables is restored. It has to be stressed that if absorption had not been reduced below output a current account surplus could not have come about. It is the combination of expenditure reduction and 'switching' through the tariff that yields a current-account surplus combined with the maintenance of 'internal balance'.

##### *Endogenous Protection in Response to Real Appreciation*

The following case describes the situation and prospects of the United States, as seen in 1983 and 1984. A combination of fiscal expansion and monetary contraction causes the real interest rate to rise, capital to flow in, a current-account deficit to develop and the real exchange rate to appreci-

ate. The real appreciation is part of the mechanism by which a current-account deficit is generated. In a sense it is a by-product of the particular macroeconomic policy mix.

We have here the mirror image of the exchange-rate protection story. Instead of the primary objective being to depreciate the real exchange rate so as to achieve favourable effects for tradable producers, the appropriate fiscal and monetary policies come first, the real exchange-rate appreciation being a by-product. In both cases one would expect policymakers to take 'by-products' into account, so that these cases come to much the same thing, exchange rate protection being defined by motive. If the United States budget deficit is moderated, for example, because of the adverse effect that the consequent real appreciation would have on tradables producers, then there is an exchange-rate-protection element in the fiscal policy.

Here we are concerned with an additional complication. Protectionist pressures tend to increase when a real exchange rate appreciates. The reason is that a rise in ordinary protection can moderate, or even prevent completely, the adverse effects of real appreciation on particular tradables producers. But it will do so by bringing about even greater real appreciation for a given current account surplus to be generated. Hence the effect on other tradable producers, for whom protection has not increased, will be even more adverse. Nevertheless, such protectionist pressures do take place and tend to have some success.<sup>5</sup>

This case can be simply represented in figure 19.2. Initially the real appreciation moves equilibrium from  $A$  to  $E'$ , with both  $p_x$  and  $p_m$  falling.  $E'$  is on  $N'N'$ , which represents the current-account deficit that results from the macroeconomic policy. Then a tariff is imposed, yielding a domestic price ratio represented by a ray through  $E'$  (not drawn). Thus the new equilibrium becomes  $E''$ , where this ray intersects  $N'N'$ . The net result is to lower  $p_x$  further, hence intensifying the adverse effect on export producers (because of the further real appreciation which a reduction in  $p_x$  represents), and restoring  $p_m$  to its original level. In this particular example the tariff fully offsets the adverse domestic price effects on import-competing producers of both the initial appreciation and the further appreciation that goes with the rise in the tariff. Of course import restrictions, voluntary export restraints imposed on suppliers, and so on, would have similar effects.

5. See Bergsten and Williamson (1983) and Corden (1984).

## References

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## Real Wage Rigidity, Devaluation and Import Restrictions\*

In 1975, in the depth of a recession, a group of Cambridge economists known as the Cambridge Economic Policy Group proposed that Britain should impose wide-ranging restrictions on imports of manufactured goods to accompany a demand expansion that would increase employment. The basic idea was that a demand expansion on its own would worsen the balance of payments, so that import restrictions were needed to divert the whole of the extra demand on to British goods. If expenditure rises then some imports, notably of raw materials, are bound to rise. To keep the total import bill stable, some other imports must fall, presumably of manufactures, where UK goods are substitutes for imports. They argued that total imports would not decline so that other countries would have no reason to retaliate. They were not concerned with the implications for Britain's membership of the European Community. The obvious alternative measure to accompany demand expansion would be devaluation of sterling. But they ruled this out on the grounds that it would raise import prices, hence lead to a rise in nominal wages to compensate, and so would increase inflation as well as finally negating the effects of the initial devaluation. A tendency to *real* wage rigidity was an essential element in their implicit model.<sup>1</sup>

\* This essay was written especially for this book. It is based on work begun in 1975, and carried on intermittently since, in an effort to analyse rigorously the protectionist arguments that have come out of Cambridge.

1. The Cambridge Economic Policy Group (CEPG) first put its case for wide-ranging import controls in Britain in 'Review of Britain's Economic Prospects 1975-78', *Economic Policy Review*, Cambridge, No. 1, February 1975. This attracted great attention. The CEPG repeated its arguments in *Economic Policy Review*, No. 2, March 1976, and in many other places in various forms, shifting at some stage from advocacy of quantitative import restrictions to advocacy of tariffs. Particularly relevant for the broader framework and for the search for their assumptions is the paper by Cripps and Godley (1976).

A critical analysis was produced by Corden, Little and Scott (1975), later reprinted in Scott *et al.* (1980). This latter volume also contained a detailed further analysis of the CEPG case by Maurice Scott. In addition the CEPG case and the general issues were analysed in detail by Brian Hindley, Hugh Corbet and others (Corbet *et al.*,