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Commercial Policy and the Current Account: A Mussa-Neary Approach

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Abstract: The paper examines the effect of commercial policies on the current account for the case of a small open economy, in which capital is sector-specific in the short run but mobile in the long run. In the context of a two period model, trade liberalisation increases income by more in the long run than in the short run; consumption smoothing thus implies that the economy runs an external deficit in the short run. The analysis considers both tariff and quota liberalisation, and looks at the implications of wage rigidity.

I INTRODUCTION

Policy makers have traditionally been interested in tariffs and quotas, not just for their impact on resource allocation, but for their supposed effects on the current account. Interest in the relationship between commercial policy and the current account in small open economies was heightened as a result of the experiences of the countries of the "Southern Cone" in the 1970s. Argentina, Chile and Uruguay all embarked on extensive liberalisation programmes during this period. (For a discussion see, for example, Corbo, de Melo and Tybout, 1986.) While many policy changes were involved (the elimination of controls on commodity prices, interest rates and capital flows, the loosening up of labour markets and the reduction of Government deficits), a crucial

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part of each liberalisation package was a move towards free trade. The fact that all three countries eventually experienced a large increase in their external indebtedness leads one to suspect that tariff liberalisation may have had current account effects in these countries.

Many modern theories of current account determination (as exemplified by Sachs (1981)) stress the identity between the current account and the excess of savings over investment in an economy. In this tradition current account determination is inextricably linked with the intertemporal choices of agents. In such a framework it is difficult to see why a permanent reduction in tariffs, say, would affect the current account in any particular direction: why should such a change influence net savings one way or the other?

One answer was provided by Gavin (1991) and O'Rourke (1989), both of whom assume in the tradition of Mussa (1978) and Neary (1978) that capital is sector-specific in the short run but mobile in the long run. This has immediate implications for the current account response to a permanent reduction in tariffs. In the short run, only labour can move from the import-competing sector to the export sector. In the long run, both labour and capital can move to the export sector. Thus income is increasing over time as resources are reallocated to the "right" sector. If consumers like to smooth consumption, they will borrow in order to be able to consume in excess of production in the short run. The economy will thus run a current account deficit in the short run in response to the permanent reduction in tariffs. (At some point in the future it will then run a current account surplus so that it can pay back its debts to the rest of the world.)

O'Rourke (1989) made this point within the context of a simple two-sector two-factor two-period trade model. The argument can be put in the context of Figure 1, which shows the effects of *increasing* tariffs from an initially positive level. LL is the long-run production possibility frontier (PPF) facing the economy, when all factors are mobile between sectors. Good H is the export good, and good F the import good. World prices are given by the slope of LL at Q. Initially, the tariff on the import good is such that domestic relative prices are given by the slope of LL at P. Production will naturally be at P. Then, at the start of the period with which we are concerned, tariffs are increased. SS represents the first period PPF. During the first period only labour is mobile between sectors. Thus SS lies inside LL everywhere except at P. The new, higher tariff is such that domestic relative prices are given by the slope of SS at T, which equals the slope of LL at T'. First period production is at T. In the second period both labour and capital are mobile, and production is at T'. In terms of world prices, first period income (measured in units of the export good) is equal to OA. Second period income is equal to OA' and is clearly lower than first period income. Thus, consumption

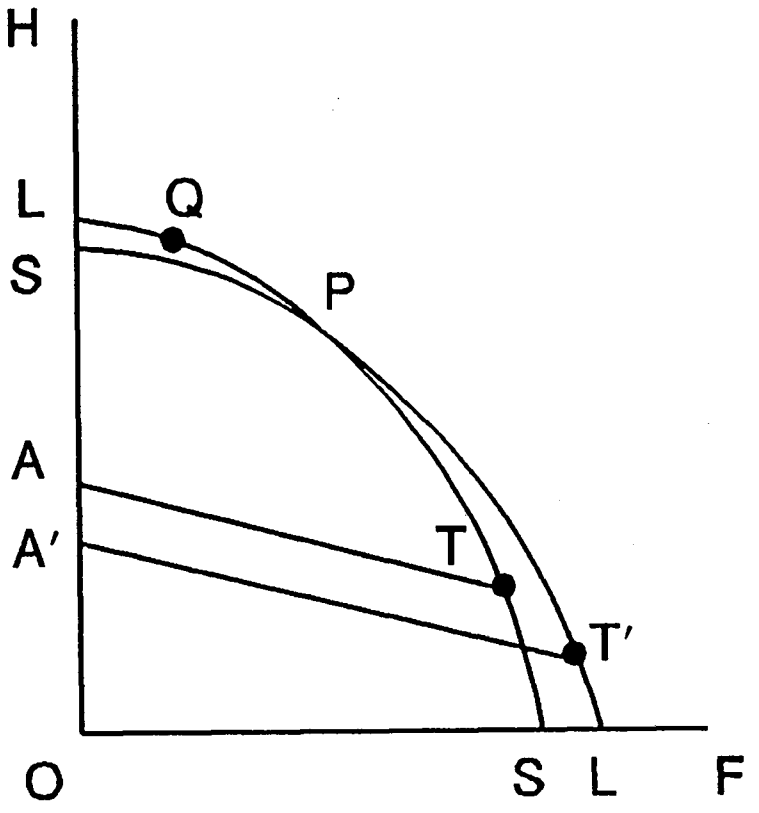

FIGURE 1

smoothing will lead to a first period surplus. In the same way, a permanent reduction in tariffs would lead to a first period deficit.

The present paper extends the model in two ways. First, tariff policy has often been discussed in the literature (e.g., by Eichengreen (1981)) in the context of reducing unemployment. Wage rigidities are therefore introduced into the model and some of their implications derived. Second, the analysis is extended to the case where quotas rather than tariffs are used by policy makers. The expectations of capital owners regarding the price of the importable are important for the path of adjustment in all versions of the model: in this case

domestic prices change over time, which complicates the analysis considerably. A meaningful distinction between static and rational expectations over prices arises in this case and is shown to matter for the current account.

In Section II the basic model is introduced. It is identical to that employed in O'Rourke (1989), with one small difference which will be explained later. Section III examines the effects of permanent tariff reductions on the current account when wages are fully flexible. (It thus reproduces the analysis of O'Rourke (1989). The reason for doing so is that this provides a benchmark against which the more complex exercises of the latter sections can be compared.) Section IV explores the implications of wage rigidity, while Section IV looks at the effects of permanent quota changes on the current account. Section VI concludes.

II THE MODEL

We are considering a small open economy facing given world prices and a given world interest rate r. The economy is able to borrow and lend at an exogenous price: financial capital is thus perfectly mobile internationally. Physical capital (K) is, however, in fixed supply. In addition to physical capital, the economy is also endowed with fixed amounts of labour (L) and sector specific factors of production (X).

There are two goods, H and F, produced in each of two periods according to the equations:

$$H = H(K_H, L_H, X_H) \qquad F = F(K_F, L_F, X_F) \tag{1}$$

where $H_K, H_L, H_X > 0$, $H_{KK}, H_{LL}, H_{XX} < 0$, $H_{ij} > 0$ $(i=j)$,

$$\det \begin{bmatrix} H_{XX} & H_{KX} & H_{LX} \\ H_{KX} & H_{KK} & H_{KL} \\ H_{LX} & H_{KL} & H_{LL} \end{bmatrix} = 0 \tag{2}$$

(with similar conditions applying to the function F).

The sole difference between this model and that specified in O'Rourke (1989) is the inclusion in the production functions of sector-specific factors of production X_H and X_F. (In O'Rourke (1989) both goods were produced with capital and labour alone.) The inclusion of these fixed factors is necessary since in Section IV an exogenous constraint is placed on wages. As is well known such constraints cannot be imposed in nxn small open economy models without driving the economy to complete specialisation. Including sector-specific factors in the model seems the obvious way to avoid such a problem.

(Throughout the paper primes will be used to refer to second period variables; thus H′ refers to second period production of good H.) Good H is the numeraire good, and the country's export good. The world price of good F, the country's import good, is equal to p^* in both periods. A specific tariff t is levied on imports in both periods. The domestic price of the importable is thus equal to $p^* + t$, and is denoted by p. We will be interested in the economy's initial response to changing t. The Government redistributes tariff revenues to consumers in a lump sum fashion.

Consumers choose first period consumption (C_H, C_F) and second period consumption (C_H', C_F') to maximise their intertemporal utility function

$$\alpha \ln C_H + (1 - \alpha)\ln C_F + [\alpha \ln C_H' + (1 - \alpha)\ln C_F'] / (1 + \delta) \qquad (3)$$

where δ is the consumers' rate of time discount, subject to the intertemporal budget constraint

$$[C_H + pC_F] + [C_H' + pC_F'] / (1 + r) = [H + pF + tM] + [H' + pF' + tM'] / (1 + r) \qquad (4)^1$$

M and M′ are first and second period imports respectively. It is of course the case that

$$M = C_F - F; \quad M' = C_F' - F' \qquad (5)$$

The net current account surplus in the first period is defined as

$$B = H - C_H + p^*(F - C_F) \qquad (6)$$

III TARIFFS AND THE CURRENT ACCOUNT

The current account in this model is derived from the optimal savings decisions of consumers. Maximising (3) subject to (4) yields the familiar conditions

1. It can be easily proved that the results of the paper go through for the utility function

$$U = (C_H^{\alpha} C_F^{1-\alpha})^{1-\beta} / (1 - \beta) + (C_H'^{\alpha} C_F'^{1-\beta} / (1 - \beta) (1 + \delta) (1 + \delta)$$

of which the utility function in the text is just a special case.

$$C_H = \alpha C_F p / (1 - \alpha) \tag{7}$$

$$C_H' = C_H (1 + r) / (1 + \delta) \tag{8}$$

$$C_F' = C_F (1 + r) / (1 + \delta). \tag{9}$$

Substituting (7) to (9) into (4) gives us the following solutions for C_H and C_F:

$$C_H = \alpha p(1 + \delta)W / (2 + \delta)(p^* + \alpha t) \tag{10}$$

$$C_F = (1 - \alpha)(1 + \delta)W / (2 + \delta)(p^* + \alpha t) \tag{11}$$

where

$$W = H + p^*F + [H' + p^*F'] / (1 + r). \tag{12}$$

Substituting (10) to (12) into (6) yields the following simple expression for the current account:

$$B = [(Y - Y') + Y'(r - \delta) / (1 + r)] / (2 + \delta) \tag{13}$$

where

$$Y = H + p^*F; \; Y' = H' + p^*F'. \tag{14}^2$$

We will consider the effects of a permanent change in tariffs on the current account for the benchmark case where $r = \delta$. Under these circumstances, the economy would in the absence of shocks be in current account balance in both periods (we are assuming constant tastes, technology and endowments through time). The effect of changing tariffs on B is given by

$$\frac{dB}{dt} = \frac{1}{2 + \delta} \left(\frac{dY}{dt} - \frac{dY'}{dt}\right). \tag{15}$$

This is a key result, which is moreover independent of the assumptions made about the structure of production. It shows that the current account improves as tariffs are increased if and only if production at world prices falls by more in the long run than in the short run. Conversely, if tariffs are reduced ($dt < 0$) the current account will worsen if and only if income rises by more in the long run than in the short run.

2. Note that B and W depend on first and second period incomes measured at world rather than domestic prices.

Moreover,

$$\frac{dY}{dt} = \frac{dH}{dt} + p^* \frac{dF}{dt} \tag{16}$$

and

$$\frac{dY'}{dt} = \frac{dH'}{dt} + p^* \frac{dF'}{dt}. \tag{17}$$

It remains to be seen how production adjusts to the permanent change in tariffs.

We assume that prior to the change in Government policy, production was efficient in the sense that wages and rents were equalised between sectors. Thus at the start of period 1

$$H_L(K_H, L_H) = pF_L(K_F, L_F) \tag{18}$$

$$H_K(K_H, L_H) = pF_K(K_F, L_F). \tag{19}$$

We assume that in the first period capital is fixed where it was, but that when the tariff is changed labour will move between sectors so as to eliminate any incipient wage differential. Taking the total derivative of (18), and remembering that $dL_H = -dL_F$, we obtain the following expression relating the labour employed in the first sector in the first period to the tariff on good 2:

$$dL_H/dt = F_L / (H_{LL} + pF_{LL}) < 0. \tag{20}$$

Since both X_H and X_F are assumed to be in fixed supply, we ignore all terms involving dX_H or dX_F. The algebra is thus identical to that in O'Rourke (1989). The only difference arises in proving that the term "D" in Equation (21) below is positive. This follows from the conditions (2) above, which are of course different from the equivalent conditions in the earlier two-factor model.

By the start of the second period, capital has had time to move between sectors. To relate changes in capital and labour employed in the first sector in the second period to changes in t, it is necessary to totally differentiate (18) and (19), again remembering that $dL_H' = -dL_F'$ and $dK_H' = -dK_F'$, and to solve the two resulting simultaneous equations in dL_H' and dK_H'. After simple manipulation we obtain

$$\begin{bmatrix} dK_H' \\ dL_H' \end{bmatrix} = \frac{1}{D} \begin{bmatrix} H_{LL} + pF_{LL} & -(H_{KL} + pF_{KL}) \\ -(H_{KL} + pF_{KL}) & H_{KK} + pF_{KK} \end{bmatrix} \begin{bmatrix} F_K\, dt \\ F_L\, dt \end{bmatrix} \tag{21}$$

where

$$D = (H_{KK} + pF_{KK})\ (H_{LL} + pF_{LL}) - (H_{KL} + pF_{KL})^2$$

and $D > 0$ from (2). Clearly both dK_H' and dL_H' are negative.

It is now easy to calculate dY/dt and dY'/dt. The former is given by

$$dY/dt = (H_L - p^*F_L)\, dL_H/dt$$

and since $H_L = w$, $F_L = w/p$ (from profit maximisation), we obtain

$$dY/dt = (tw\, dL_H/dt) / p. \qquad (22)$$

Similarly,

$$dY'/dt = (tw\, dL_H'/dt) / p + (tr\, dK_H'/dt) / p. \qquad (23)$$

Thus

$$(2 + \delta)dB/dt = tw\,(dL_H/dt - dL_H'/dt) / p - (tr\, dK_H'/dt) / p. \qquad (24)$$

From (21) and (2) $dK_H'/dt < 0$. To sign dB/dt unambiguously we need only determine the sign of $(dL_H/dt - dL_H'/dt)$. From (20) and (21) we obtain, after some manipulation:

$$dL_H/dt - dL_H'/dt =$$

$$[F_K\ (H_{LL} + pF_{LL}) - (H_{KK} + pF_{KK})^2]$$

$$^*(H_{KL} + pF_{KL}) / D(H_{LL} + pF_{LL})$$

which from (2) is positive. Thus we have proved that dB/dt is unambiguously positive, for a positive initial t. A permanent reduction in tariffs (starting from a tariff-riden equilibrium) with short-run capital immobility will always worsen the current account in the period immediately following the change.[3]

Q.E.D.

3. Note that dB/dt is zero if the initial t is zero. To this extent the effects discussed in the paper are second order. This is not however of great concern, since the motivation for the paper is the experience of countries reducing tariffs from initially high levels.

IV TARIFFS AND THE CURRENT ACCOUNT WITH WAGE STICKINESS

In this section nominal wage rigidity is introduced, implying that commercial policy can influence total employment. In particular, let the wage be set in terms of the export good at some level $\underline{w}$ above the market clearing rate, such that unemployment would result in the absence of policy intervention. First let us assume that the wage is sticky in the first period, but fully flexible in the second. If one makes this assumption, the current account and employment effects of a permanent tariff are unambiguous.

Take the employment effects first. In period 2 full employment prevails; however, in period 1 total employment, assumed less than total labour supply, is defined by the two equations

$$\underline{w} = pF_L(K_F, L_F, X_F) \tag{25}$$

$$\underline{w} = H_L(K_H, L_H, X_H). \tag{26}$$

Remembering that K_H and K_F are fixed in the first period, and that it is no longer the case that $dL_H = -dL_F$ (since there is unemployment), one can see from (26) that L_H is unaffected by t. To get the effect of t on L_F, totally differentiate (25) and rearrange to get

$$dL_F/dt = -F_L/pF_{LL} > 0. \tag{27}$$

From the definition of Y, it is easy to see that $dY/dt = -p^*F_L^2/pF_{LL} > 0$.

Given our assumption of perfectly flexible wages in the second period, second period production would have been at full employment even in the absence of a tariff. Thus dY'/dt is given by the expression in (23), and is negative (raising the tariff sucks resources into the wrong sector, without there being a compensating gain in employment).

The effect on the current account of raising a tariff permanently, given by $dB/dt = (dY/dt - dY'/dt) / (2 + \delta)$, is thus unambiguously positive. Likewise the effect on first period employment is unambiguously positive. However, the effects on welfare are ambiguous, depending on the world interest rate (since a gain in first period income has to be balanced against a loss in second period income).

The above case is rather trivial. More interesting conceptually is the case when wages adjust more slowly than, or as slowly as, the capital stock; in this case, the process of capital reallocation can produce counter-intuitive

movements in income.[4] To dramatise this possibility it is useful to regard wages as being fixed in both periods, while capital adjusts in the second period. (This seems rather unsatisfactory; however, the resulting experiment can be regarded as providing the intuition for the results of continuous time models, such as Neary (1982), in which wage adjustment is not necessarily absolutely slower than capital adjustment. All that is required in such models is that wage adjustment occur alongside, rather than antecedent to, capital adjustment.)

In such a model, the effect of raising a tariff on first period income is the same as in the model above where wages clear in the second period. Thus

$$dY/dt = -p^*F_L^2/pF_{LL} > 0. \tag{28}$$

(25) and (26) continue to govern employment in both periods; to determine second period factor flows, we totally differentiate them to get

$$p[F_{LK}\,dK_F' + F_{LL}\,dL_F'] + F_L\,dt = 0 \tag{29}$$

$$-H_{LK}\,dK_F' + H_{LL}\,dL_H' = 0. \tag{30}$$

Since dL_F' is not equal to $-dL_H'$ in the unemployment case, we need a third equation to determine the three unknowns in (29) and (30) in terms of dt; this is provided by totally differentiating the equation requiring second period returns to capital to be equal in the two sectors $[pF_K = H_K]$.

Rather than using these equations to solve directly for dY'/dt, it is useful to rewrite Y as

$$Y = p^*F(K_F, L_F(t,K_F)) + H(K - K_F, L_H(K_F)) \tag{31}$$

where K is the total capital stock. Solving for dY'/dt yields:

$$dY'/dt = [p^*F_K - H_K]\,dK_F/dt + [H_L\,dL_H/dK_F +$$

$$p^*F_L\,\partial L_F/\partial K_F]\,dK_F/dt + pF_L\,\partial L_F/\partial t. \tag{32}$$

4. Neary (1982) analyses the effects of capital reallocation under conditions of wage stickiness in a continuous time context; my derivation is based on that of Rodriguez (1982) in his comment on the Neary paper. Neary examines the adjustment to a new equilibrium when the terms of trade change exogenously and finds the possibility of "immiserizing reallocation"; that is, income evaluated at the new world prices may actually fall along the adjustment path. In the present paper adjustment is to a new domestic price (p + t + dt), but income is still evaluated at (constant) world prices. Thus in my model the counter-intuitive effect possible is that of income increasing along the adjustment path (enriching reallocation).

The first term represents the direct effect of capital reallocation, and is negative (since $p^*F_K < H_K$ for $t > 0$); the second effect captures the net effect on output of changing employment levels in the two sectors, and is ambiguous since employment rises in one sector and falls in the other; the third term represents the effect on output of increased employment in the import-competing sector due to the direct effect of the increased tariff, and is positive (it is equal to dY/dt).

We thus see that the difference between second and first period income reduces to

$$dY'/dt - dY/dt =$$

$$[p^*F_K - H_K]\,dK_F/dt + [H_L\,dL_H/dK_F + p^*F_L\,\partial L_F/\partial K_F]\,dK_F/dt \qquad (33)$$

which is impossible to sign *a priori*. It is thus possible that income could expand along the adjustment path. In this case, imposing a permanent tariff will lead to a first period current account deficit. This result is possible since the direct negative effect of reallocating capital to a less productive sector may be outweighed by an indirect employment effect; as Rodriguez points out, the social and private marginal returns to capital may differ with sticky wages. The result is possible only if the import-competing sector is labour-intensive (in which case shifting capital to that sector increases total employment). If the import-competing sector is capital-intensive, increasing the tariff leads to second period unemployment being worse than first period unemployment, and the current account must improve. Again the net welfare effect is ambiguous, since first period income improves, and second period income can either increase or decrease.

V QUOTAS AND THE CURRENT ACCOUNT

While permanent quotas have similar effects on the current account to those of permanent tariffs, their analysis is far more complicated. With a permanent tariff, the domestic price of the import good is exogenously determined at $p^* + t$, and is the same for both periods. Factor flows can be determined from this exogenous price. With quotas, the domestic price of the import good is endogenously determined by supply and demand; moreover, it is changing over time, as factor flows affect supplies. Since factor flows also depend on domestic prices, factor flows and domestic prices have to be simultaneously determined. (Only the barest bones of the analysis are contained in the text; some details can be found in an appendix available on request.)

For the case of an increased quota, it can be shown that the domestic price of the import good falls over time, as capital relocates to the import-competing

sector, and supplies of the import good increase. One implication of this is that it is impossible to find a quota equivalent to any given tariff in its effects on domestic price. Moreover, the form of capital owners' expectations now becomes important. Less capital will move to the import-competing sector if expectations are rational, and the depressing effects of capital movement on the domestic price of the import good are taken into account, than if expectations are static; thus the current account effects of permanent quotas are greater with static than with rational expectations. (The form of expectations were irrelevant in the tariff case.)

The consumer's problem when binding quotas are imposed is as follows:

$$\max \alpha \ln C_H + (1 - \alpha)\ln C_F + [\alpha \ln C_H' + (1 - \alpha)\ln C_F'] \; / \; (1 + \delta) \text{ s.t.}$$

$$C_H + pC_F + [C_H' + p'C_F'] \; / \; (1 + r) =$$

$$[H + pF + RM] + [H' + p'F' + R'M'] \; / \; (1 + r)$$

$$M = M' = Q$$

$$C_F = F + Q$$

$$C_F' = F' + Q \qquad (34)$$

where Q is the permanent quota, and p and p′ are the domestic prices of the imported good in periods 1 and 2 respectively. These prices are given by $p = p^* + R$ and $p' = p^* + R'$, where R and R′ are the excess of the domestic price of the import good over its world price in the first and second periods respectively (i.e., the quota rents per unit of output), and all other variables are as defined before. Solving the problem for C_H we obtain

$$C_H = [(1 + r) / (2 + r)] \; [H + H'/(1 + r)] - p^*Q \qquad (35)$$

while the current account is now given by

$$B = (H - H') / (2 + \delta). \qquad (36)$$

We are interested in determining

$$\frac{dB}{dt} = \frac{1}{2 + \delta} \left(\frac{dH}{dt} - \frac{dH'}{dt}\right).$$

There are essentially six variables involved in the problem: K_F, K_F', L_F, L_F', R and R′. To solve we need six equations: two giving goods market equilibrium

in the first and second periods (i.e., $C_F = F + Q$, $C_F' = F' + Q$), and four giving factor market equilibrium in the first and second periods. The goods market equations can be expressed as:

$$\alpha p(F + Q)/(1 - \alpha) = [(1 + r)/2 + r)]\ [H + H'/(1 + r)] - p^*Q \tag{37}$$

$$\alpha p'(F' + Q)/(1 - \alpha) = [(1 + r)/(2 + r)]\ [H + H'/(1 + r)] - p^*Q \tag{38}$$

while the two equations expressing first period factor market equilibrium are given by

$$H_L(K_H, L_H, X_H) = pF_L(K_F, L_F, X_F) \tag{39}$$

$$dK_F = 0. \tag{40}$$

In the case of rational expectations, the equations giving second period factor market equilibrium are

$$H_L(K_H', L_H', X_H) = p'F_L(K_F', L_F', X_F) \tag{41}$$

$$H_K(K_H', L_H', X_H) = p'F_K(K_F', L_F', X_F) \tag{42}$$

while under static expectations we have

$$H_L(K_H', L_H', X_H) = pF_L(K_F', L_F', X_F) \tag{43}$$

$$H_K(K_H', L_H', X_H) = pF_K(K_F', L_F', X_F). \tag{44}$$

In the case of rational expectations, totally differentiating (37),[5] (38), (39), (41) and (42) we obtain five equations in dK_F, dK_F', dL_F, dL_F', dR and dR'; together with (40), this is sufficient to solve for all of these variables in terms of dQ. In the case of static expectations, (43) and (44) are substituted for (41) and (42). From this one can calculate dH/dQ, dH'/dQ and dB/dQ. These expressions are extremely messy, and are given in the appendix; the results are all as expected. dB/dQ is negative (i.e., imposing a tighter quota improves the current account) for both rational and static expectations, with the effect being greater for static expectations. Both dR/dQ and dR'/dQ are negative, with $dR/dR' > 1$; i.e., imposing a quota increases the domestic price of the import good in both periods, but the price does decline over time.

These results can be made more intuitive as follows.[6] Imposing a quota

5. Remembering that dH and dF can be expressed in terms of dK_F, dL_F, and similarly for dH' and dF'.

6. I am grateful to a referee for suggesting the following argument.

will raise the domestic price of the importable. The price will obviously rise by more the less responsive is supply: this is the standard Marshallian short-run/long-run distinction. It thus follows that in the second period the price will be lower than in the first period. Moreover, we know from Mussa (1978) that rational expectations tends to produce smoother output responses to shocks than static expectations. From Equation (36) it follows straight away that the current account response to a quota shock will be less under rational than under static expectations; the difference between domestic prices in the two periods will also be less.

VI CONCLUSIONS

This paper has argued that permanent trade liberalisation in small open economies can lead to short-run current account deficits. This may provide a rationale for giving short-term credits to developing countries switching to free trade. (Of course, in this model international capital markets are perfect and current account imbalances are of no concern to policy makers.) The results of the paper do not justify using tariffs or quotas to improve the current account (since tariffs only improve the current account in this model by reducing income in the long run by more than in the short run). Free trade is still the optimal policy for a small open economy; this paper has merely pointed out one possible consequence of moving towards free trade.

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