

IS PITCHFORD RIGHT ?
CURRENT ACCOUNT ADJUSTMENT,
EXCHANGE RATE DYNAMICS
AND MACROECONOMIC POLICY

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Research Discussion Paper

9001

May 1990

Research Department

Reserve Bank of Australia

I am grateful to Justin Myatt for excellent research assistance, and for helpful comments from Malcolm Edey, David Gruen and Glenn Stevens. Any errors are mine alone. The views expressed herein are those of the author and do not necessarily reflect the views of the Reserve Bank of Australia.

ABSTRACT

The recent debate on Australia's current account imbalance has focused on two issues: whether the dynamics of current account deficits and debt accumulation are leading to a "debt trap", and what role (if any) should public policy play in altering the current account outcome. In this paper, I develop a simple theoretical model of current account and exchange rate determination to examine these issues. I find that a debt trap, meaning a situation where the income available for repayment of the debt is lower than the interest on the debt, can exist in only the most implausible of circumstances. Therefore, a current account deficit can be expected to eventually correct itself without policy intervention. However, the conclusion that non-intervention is the optimal policy depends on the assumption that the real exchange rate adjusts continuously to equate actual and desired savings. When the real exchange rate is slow to adjust to its equilibrium value, social welfare will be increased by a fiscal policy that alters the dynamic path of the current account.

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1. INTRODUCTION

As Australia enters the 1990's, the current account deficit stands at near record levels. According to many commentators, this deficit - and especially the high levels of foreign debt that previous deficits have generated - is the most important economic issue facing the nation. Australia is said to be facing a "debt crisis". Of particular concern is the fear that the country is falling into an "unsustainable debt trap".¹

The response of economic policy to this external imbalance has been to attempt to diminish the current account deficit via reductions in aggregate demand, principally through contractionary fiscal policies. Accordingly, the net public sector borrowing requirement has been turned around from a deficit of 6.7 per cent of GDP in 1983/4 to a surplus of one per cent in 1988/89.

The normative basis for these policies is grounded in the belief that large current account deficits are undesirable, *per se*. Consequently, policy has been set to achieve a reduction in the

¹ An unsustainable debt trap eventuates when the income available to meet repayments on the debt falls short of the interest on that debt. In such a case, the level of debt eventually becomes infinite.

current account deficit consistent with a stable, and suitably low, ratio of foreign debt to GDP (although few commentators are prepared to articulate precisely how low this ratio needs to go before the "crisis" has abated).

Recently, these views and policies have been the subject of some criticism, most notably by Professor John Pitchford of the Australian National University.² The Pitchford critique may be stated in two parts:

(i) Contrary to the conventional wisdom, abnormally large current account deficits are inherently temporary events. Concerns about "unsustainable debt traps" are therefore without solid foundation. The reasoning behind this argument is that since the fiscal accounts are now in balance, Australia's current account deficit is the result of borrowing by private individuals and firms. This borrowing must be financing either private investment or a desire for present over future consumption.

Consider the case of investment. If this investment turns out to be profitable, it will yield a return sufficiently high to pay back the debt so incurred. *Ex-ante*, this must be the case, or the investment would not have been made in the first place. *Ex-post*, due to either bad luck or bad management, the returns from the investment might indeed be insufficient to pay back the debt. In this case, however, the borrower has the option of bankruptcy, and the debt is simply written off by the creditor.

In the case of borrowing for present consumption, no income is generated with which the debt can be repaid in the

² See e.g. Pitchford (1988, 1989a, 1989b, 1989c)

future. It is unclear, however, why this should be a problem for public policy, if this borrowing only reflects individual preferences for intertemporal consumption. The individuals concerned will need to reduce their consumption in the future to pay back their debts, but this is a problem only for those particular borrowers (and their creditors).

(ii) Macroeconomic policies ought not to be employed to reduce the current account deficit, since that deficit merely reflects the savings and investment patterns of private economic agents. The possible existence of distortions and externalities implies that the current account balance, perhaps, does not reflect optimal private borrowing. However, the correct policy response in this event is to attack the problems at their source, via microeconomic policy. The blunt instruments of macroeconomic policy will, at best, be unhelpful, and may in fact worsen economic welfare.

The Pitchford view represents one end of the spectrum in the debate on Australia's current account. By contrast, one or two academic economists and some private sector analysts believe that a debt crisis is almost upon us, and that remedial action needs to be taken forthwith.³ These "debt pessimists" not only explicitly reject the idea that the current account reflects anything like optimal savings and investment decisions, but also implicitly adopt the view that the private sector is neither willing nor able to change its spending and saving propensities (even sub-optimally) when faced with debt.

The issue of whether the private sector can be expected to adjust

³ See e.g. Arndt (1989), Macquarie Bank (1989) and Access Economics (1990).

its behaviour as foreign debt begins to accumulate is what is pivotal to the contemporary debate on Australia's current account. The important questions are whether the current account and exchange rate dynamics can be expected to lead to an equilibrium in the balance of payments, whether that equilibrium is efficient, and if not, whether government policy can improve social welfare.

In this paper, I employ a simple macroeconomic model to examine these issues. I find that Pitchford is correct about (i), but incorrect about (ii). A debt trap is shown to exist in only the most implausible of circumstances; the beliefs of the debt pessimists are therefore inconsistent with any reasonable view of economic behaviour by the private sector. However, when the real exchange rate is slow to adjust to real shocks that change its equilibrium value, fiscal policy can lead to a welfare improvement by altering the dynamic path of domestic consumption, and hence the current account. Thus a beneficial role can be found for macroeconomic policy in relation to the external debt.

The rest of the paper is organized as follows. Section 2 presents a model of debt and exchange rate dynamics in which all markets are assumed to clear instantaneously. A sticky real exchange rate is introduced into the model in section 3. Welfare and policy issues are examined in section 4. Section 5 contains some concluding remarks.

2. THE MARKET-CLEARING MODEL

Models which incorporate the dynamic interaction between the price of foreign assets (the exchange rate) and the rate of accumulation of those assets (the current account) date back to

Kouri (1976).⁴ These models integrate the notion that the exchange rate is an asset price with the insight that changes in net asset holdings can only come about through current account imbalances. They also highlight the intertemporal nature of the relationship between the current and capital accounts, and the effects of this connection on exchange rate determination.

The model in this paper draws heavily on Mussa (1984). The model consists of a home country which trades two goods (domestically produced goods and foreign goods) with a foreign country. Also traded is a real asset, which pays a fixed rate of return in terms of foreign goods equal to r , the foreign real interest rate. The stock of this asset held by domestic residents, denoted a , may be positive or negative.

Foreign residents are willing to exchange foreign goods for real assets at the prevailing rate of return r ; however, their demand for domestic goods in exchange for foreign goods is less than perfectly elastic with respect to the relative price of those goods (the real exchange rate). Consider equations (1) - (3).

$$d = \sigma(\psi - x - z) - \beta q + x, \quad 0 < \sigma < 1, \quad (1)$$

$$d^* = -\beta^* q + y, \quad (2)$$

$$f = (1-\sigma)(\psi - x - z) + \beta q + z. \quad (3)$$

⁴ Other prominent contributions include Dornbusch and Fischer (1980), Rodriguez (1980), Greenwood (1983) and Helpman and Razin (1984). More recently, the literature has emphasized the dynamic relationships between fiscal policy, the current account and the real exchange rate. See Frenkel and Razin (1987) for a synthesis of this literature.

d is the value of domestic excess demand for domestic goods, d^* is foreign excess demand for domestic goods (the home country's real exports), f is domestic excess demand for foreign goods (the home country's real imports) and ψ is the excess of domestic spending over the value of domestic product. All of the above are measured in units of the foreign good. σ is the marginal share of domestic goods in domestic spending. q is the logarithm of the price of domestic goods in terms of foreign goods, so an increase in q represents an appreciation of the home country's real exchange rate. β and β^* are semi-elasticities. x , y and z are exogenous shocks to d , d^* and f respectively. Note that equations (1) and (3) are constrained so that $d + f = \psi$.

Equilibrium in the market for domestic goods occurs when

$$d + d^* = 0. \quad (4)$$

Assume, for simplicity, that $\beta + \beta^* = 1$.⁵ From (4), we can then derive

$$-\psi = [(v-1)x - z + vy - vq] \quad (5)$$

where $v = 1/\sigma$.

By definition, the real trade surplus $T = d^* - f$. It is easy to show that $T = -\psi$ i.e. T is equal (as it should be) to the excess of domestic production over domestic spending.

From (5), we can see that an increase in q (a real appreciation)

⁵ None of the qualitative results from the model is affected by this assumption.

reduces the trade surplus, as does an exogenous increase in imports, z . An increase in x , the exogenous component of domestic spending on domestic goods, appears to increase the trade surplus. However, this is not the case. An increase in x must be offset by decreased demand for domestic goods to maintain equilibrium in that market. This occurs via an appreciation of the real exchange rate, which leads to a decrease in real exports and an increase in real imports, hence leading to a trade deficit.

Finally, it appears that an exogenous increase in the foreign excess demand for domestic goods, y , leads to an improvement in the trade balance, but this is also not the case. The apparent effects of the increase in y are eliminated by an increase in q , which results in offsetting changes in imports and exports. There is no effect on the trade balance. The intuition behind this result lies in the fact that the trade balance identically equals the difference between domestic savings and investment. Changes in foreign spending propensities, as given by y , have no effect on domestic savings or investment behaviour, and so must therefore have no effect on the balance of trade.^{6,7}

⁶ Savings is defined, in this context, to exclude income on net foreign assets. If this income is included in the definition of savings, then it is the current account that is identically equal to the difference between domestic savings and investment. None of these semantic points affects the argument above.

⁷ Similarly, consider the effects of a policy which persuades consumers to switch their expenditures from imports to locally produced goods, an idea sometimes canvassed as a means of reducing the current account deficit (see e.g. Stilwell (1989) p83). In terms of this model, this would entail a reduction in z and a corresponding increase in x . Can this policy have any effect on the current account balance? The answer of course is no, since a

The current account balance in year t is given by the sum of the trade balance and the foreign income account:

$$C_t = T_t + ra_t = [(v-1)x - z + vy - vq_t] + ra_t \quad (6)$$

(The values of x , y , and z are assumed to be constant and so the time subscript on these variables is suppressed).

As a matter of accounting, the accumulation of net foreign assets by domestic residents in year t is equal to the current account balance in year t .⁸ Thus,

$$a_t = (v-1)x - z + vy - vq_{t-1} + (1+r)a_{t-1} \quad (7)$$

where a_t denotes net foreign assets held at the beginning of t . In equilibrium, savings is equal to desired savings. The latter is assumed to be given by

$$\check{S}_t = (R_t - r_t) + u(A - a_t) - x - z, \quad 0 < u < 1, \quad (8)$$

where R_t is the domestic real interest rate, A is a target level of foreign assets, and u is a parameter. Desired savings in period t

switch in expenditures leaves total savings unchanged. The reduction in imports leads to an appreciation of the real exchange rate, which leads to a corresponding reduction in exports. This reduction is necessary to maintain equilibrium in the market for domestic goods, given the increase in x . The trade balance and current account are completely unaffected.

⁸ This is savings net of investment. Since investment is not explicitly modelled here, the current account balance is referred to hereafter simply as savings.

is a fraction u of the difference between the targeted and realized level of foreign assets, and an increasing function of the real interest differential between the home and foreign country.⁹ Exogenous domestic spending on domestic and foreign goods is assumed to reduce desired savings one for one.

R_t is determined by the interest parity condition

$$R_t = r_t - \sigma E_t(q_{t+1} - q_t) \quad (9)$$

where $E_t(q_{t+1} - q_t)$ is the expected appreciation of the real exchange rate between periods t and $t+1$. According to equation (9) an asset that yields a rate of return r_t in terms of foreign goods will yield a rate of return in terms of a domestic consumption basket equal to r_t less the expected rate of increase of the relative price of domestic goods, weighted by the share of domestic goods in the consumption basket.

The expected change in the real exchange rate is determined by

$$E_t(q_{t+1} - q_t) = u(\hat{q} - q_t) \quad (10)$$

where \hat{q} is the steady state value of q . Equation (10) says that the expectation, held at time t , of the change in the real exchange rate between t and $t+1$ is equal to a proportion of the difference between its steady state value and its realized value at t . As savings become more responsive to a discrepancy between realized and targeted assets (an increase in u), the faster will the real

⁹ r_t is assumed to be equal to the Wicksellian natural rate of interest i.e. the interest rate at which domestic residents wish to spend all of their income, provided that foreign assets are at their targeted level and exogenous spending is equal to zero.

exchange rate be expected to converge to its steady state value.

Substituting (9) and (10) into (8), and equating with (6), yields

$$q_t = [1/(v+u\sigma)][-u(A - \sigma\hat{q}) + (u + r)a_t + vx + vy] \quad (11)$$

From equation (11), we can see that an increase in the target level of real foreign assets, A , leads to a depreciation of the real exchange rate. This occurs because larger trade surpluses are needed in order to accumulate these assets. An increase in the actual level of such assets, on the other hand, leads to a real appreciation. An increase in the foreign interest rate, r , results in a depreciation if the level of foreign assets is negative, since larger trade surpluses are needed to meet the new, higher, interest payments on the debt. The converse occurs if the country is a net creditor.

The exogenous component of domestic spending on domestic goods, x , affects q directly and indirectly through its effects on a . On the other hand, y , exogenous foreign spending on domestic goods, has no such indirect effect, since it doesn't affect the current account balance. Finally, z , the exogenous component of real imports, has no direct effect on q , but it has an indirect effect through a .

Equations (7) and (11) jointly determine the time paths of the stock of real foreign assets, a , and the real exchange rate q . The steady state is reached when asset accumulation (or decumulation) is zero, i.e. the current account balance is zero. In the steady state the trade balance exactly offsets the interest receipts (or payments) on the stock of net foreign assets. A bit of algebra reveals that the steady state values of a , q and T (respectively \hat{a} , \hat{q} and \hat{T}), are

given by:

$$\hat{a} = A - (1/u)(x + z) \quad (12)$$

$$\hat{q} = \sigma r A + x(1 - \sigma - r\sigma/u) - z\sigma(1 + r/u) + y \quad (13)$$

$$\hat{T} = -r\hat{a} \quad (14)$$

x , y and z can be thought of as permanent spending shocks, each with an initial value of zero. From (12), we can see that permanent increases in x and z lead to a permanent fall in the steady state value of domestically held foreign assets. The extent of the fall varies inversely with u , the savings adjustment parameter. The more sensitive are savings to shortfalls in the level of foreign assets, the smaller will be the eventual decline in foreign asset holdings following (positive) shocks to domestic spending. (Of course, there will be no fall in the steady state value of a if these shocks are temporary.)

From (12), it is clear that permanent increases in y have no permanent effects on a , in fact, they don't even have temporary effects. Substitution of (13) into (11) reveals that following a change in y the real exchange rate immediately jumps to its steady state value, with asset accumulation unaffected.

Abstracting from the effects of exogenous spending, we can see from (13) that if A is positive (negative), q takes on a positive (negative) value in the steady state. From equation (14), a positive (negative) value of A implies that income from foreign assets is positive (negative); this must be offset by a trade deficit (surplus) to yield a zero current account balance.

From (13), a permanent increase in exogenous real imports unambiguously depreciates the real exchange rate in the long run. It is interesting to note, however, that x shocks have an ambiguous effect on the steady state value of the real exchange rate.¹⁰ While the impact effect of positive x will be to increase q , q will be smaller (than its initial value) in the steady state if the following condition holds:

$$u < r/(v-1). \quad (15)$$

The intuition behind this result is that, on the one hand, following a positive x shock, the real exchange rate needs to appreciate to maintain equilibrium in the market for domestic goods. On the other hand, the initial current account deficits lead to an accumulation of foreign debt; trade surpluses are needed to cover the interest on this debt, and the real exchange rate will need to depreciate to generate these surpluses. These effects tend to offset each other, with the final outcome depending on the parameter values.

If u is relatively small, savings will adjust slowly to the initial debt and the final build-up in debt will be relatively large. This implies a large incomes deficit on the current account, and so, on balance, the real exchange rate will depreciate relative to its initial value.

The stability condition for this model is easily determined. For non-zero u , it is

$$r < v^2. \quad (16)$$

¹⁰ This result was first derived by Campbell and Clarida (1987).

This is an extremely weak condition. A plausible value of v is about 1.7, (assuming that σ is about equal to 0.6). This implies that r need only be less than 2.8 for the model to be stable i.e. for the level of debt to reach a permanent maximum. Since one very rarely observes annual real interest rates of around 280 per cent, it seems safe to conclude that unsustainable debt traps are extremely unlikely to occur.

However, if $u = 0$, the model is unstable at any real interest rate, and the level of debt does indeed become infinite. This is what most commentators have in mind when asserting the existence of a debt trap. With a trade balance of zero, the level of debt must go to infinity, as a matter of arithmetic, if the real interest rate on that debt exceeds the real growth rate of output. Since output in this model does not grow, any positive real interest rate will yield an infinite amount of debt, *provided that $u = 0$* .

The problem with this scenario is that $u = 0$ implies that economic agents make absolutely no adjustments to their spending and savings patterns when confronted with debt. In other words, it implies that people and firms will voluntarily send themselves into bankruptcy. As a theory of economic behaviour for individuals, this reasoning is, at best, dubious; applied to the nation as a whole, it becomes preposterous. One can only conclude that popular commentators who assert the existence of an unsustainable debt trap need, at the very least, to explain more precisely how such a predicament can arise.

Some Illustrative Simulations

For simulation purposes, values have to be assigned to five parameters: A , r , u , β and σ . Without loss of generality, A can be

set at zero; r is assumed equal to 0.05; u is assumed to be equal to 0.25; β is set at 0.5 and σ is set at 0.6.¹¹ Figures 1 to 8 illustrate the effects of a 0.20 permanent upward shock to x and z on the trade and current account balances, level of debt, real exchange rates, imports and exports. The initial values of all the variables is zero, and the shocks occur in year zero. Consider the shock to x , exogenous domestic spending on domestic goods.

Figure 1 shows the effect on net foreign assets. Following the initial trade deficit, debt accumulates for about fifteen years, before reaching its steady state value of x/u . The time taken to reach this steady state depends crucially on the value of the parameter u . If u were larger, indicating that desired savings were more responsive to discrepancies between targeted and realized net foreign assets, then the level of debt would stabilize much more quickly, and at a lower level. For example, if $u = 0.75$, the steady state would be reached in about five years, and with debt one-third the level shown in figure 1.

Figure 2 shows the effects of the shock on the trade balance and the current account. Following the spending shock, both the trade balance and current account are in a deficit position. Over time, this deficit gradually becomes smaller. The trade balance becomes positive after seven years, but, because of the interest payments on the debt, the current account is still in a deficit position. A further eight years of trade surpluses are required before the current account becomes balanced.

¹¹ $1-\sigma$ = the income elasticity of imports times the share of imports in GDP. For Australia, this share is about 18 per cent. Using Australian data, Horton and Wilkinson (1989) find an elasticity of about 1.9; hence $\sigma = 0.6$.

REAL DOMESTIC
EXPENDITURE SHOCK (x)

REAL
IMPORT SHOCK (z)

$u = 0.25$

Fig. 1:
NET FOREIGN ASSETS

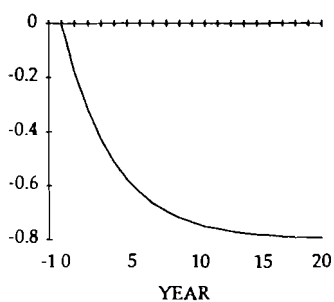


Fig. 5:
NET FOREIGN ASSETS

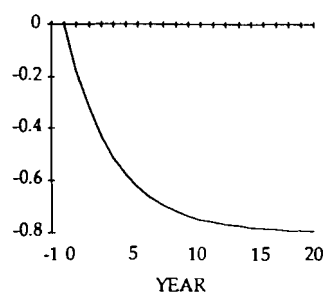


Fig. 2:
— TRADE BAL. ···· CURR. ACC.

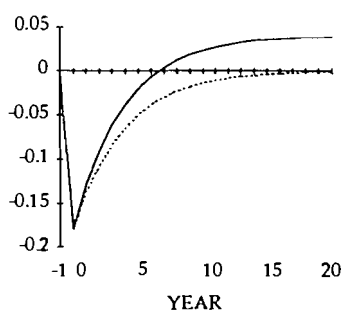


Fig. 6:
— TRADE BAL. ···· CURR. ACC.

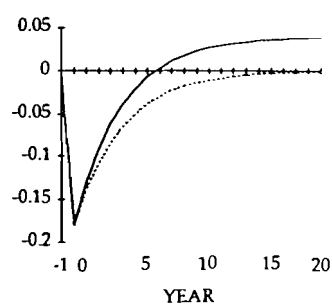


Fig. 3:
REAL EXCHANGE RATE

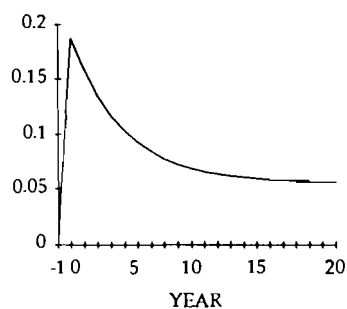


Fig. 7:
REAL EXCHANGE RATE

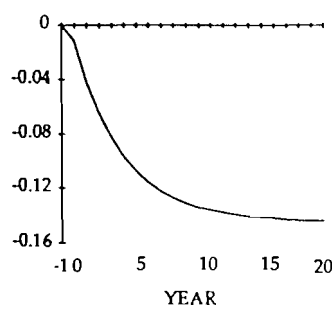


Fig. 4:
— REAL EXPORTS ···· REAL IMPORTS

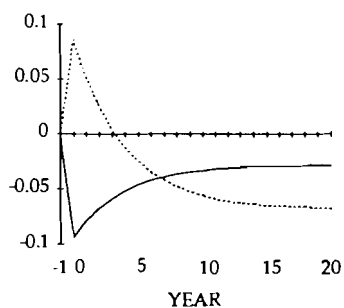
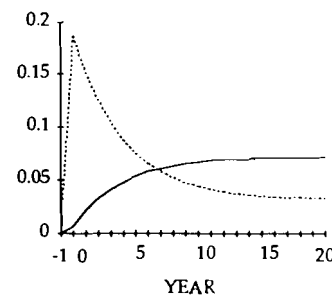


Fig. 8:
— REAL EXPORTS ···· REAL IMPORTS



NOTE :The vertical axis denotes deviations from the initial state.

Figure 3 plots the effects on the real exchange rate. After an initial jump, it gradually falls back to its steady state value.

Figure 4 displays the paths of exports and imports. The initial real appreciation leads to a fall in exports and a rise in imports. In the new steady state, exports have fallen somewhat below their initial value of zero, and imports have fallen considerably below this level. This large fall in imports is necessary to create the trade surplus necessary to maintain a balanced current account, given the steady state level of foreign debt.

Figures 5-8 show the effects of a z shock.

A comparison of figures 2 and 6 shows that the dynamic paths of the trade balance and current account are identical under each type of domestic spending shock; thus, so are the paths for debt. This is as expected since the x and z shocks reflect identical reductions in desired savings. However, the paths for exports and imports and the real exchange rate are different.

A z shock leads to an initial jump in imports, which gradually falls (as the real exchange rate depreciates) but is still positive in the new steady state. Exports, on the other hand, gradually rise throughout the adjustment process. Thus, under the two kinds of spending shocks, the difference between exports and imports - the trade balance - is identical in every period, but the components of the trade balance follow very different adjustment processes. These differences can be traced to a different adjustment path for the real exchange rate.

The results of this section show that, even following permanent adverse shocks, a current account deficit will, eventually, correct

itself, and the level of foreign debt will stabilize.¹² Can any role be found for policy here? The answer, I would suggest, is no. There are no distortions, no externalities, no market failures of any kind in this model, and so a strong presumption exists that the dynamic sequence of competitive equilibria are Pareto efficient. It seems difficult to justify any policy intervention which alters the current account outcome.

3. THE STICKY REAL EXCHANGE RATE MODEL

The model of section 2 assumes that the real exchange rate, and hence the current account, adjust smoothly to all shocks. To what extent are the above results dependent on this assumption? This is an important question since substantial evidence suggests that real exchange rates do not, in fact, adjust steadily and quickly to eliminate current account imbalances. (See e.g. Dornbusch 1989.)

In this section I relax the market-clearing assumptions of section 2. As it turns out, with one significant exception, the results of that section are essentially unchanged. The exception is that the *laissez-faire* outcome is now inefficient and so a welfare-enhancing role can be found for government policy.

The market-clearing assumption is relaxed by no longer requiring savings to be equal to desired savings in each period; rather,

¹² One possibility not considered in this section is adjustment forced upon the domestic country by its foreign creditors. This would be brought about in this model by an increase in r after the level of debt had reached some threshold level. Nothing of substance would be changed by inclusion of this effect.

savings adjusts to desired savings by an error-correction mechanism:

$$S_t = S_{t-1} + \gamma(\check{S}_t - S_{t-1}), \quad 0 < \gamma < 1. \quad (17)$$

Equation (17) introduces inertia to current account adjustment. Savings in period t is equal to savings in the previous period plus a proportion, γ , of the difference between desired savings in period t and the previous period's savings. \check{S}_t is given by equation (8), above. The source of this inertia is an assumed stickiness in the real exchange rate.¹³ The market-clearing model ($S_t = \check{S}_t$) is a special case of this model; it occurs when $\gamma = 1$.

Making all the appropriate substitutions, the expression for the real exchange rate can be derived:¹⁴

$$q_t = [1/(v+u\sigma\gamma)][-u\gamma(A - \sigma\hat{q}) + (u\gamma + r)a_t + (1-\gamma)vq_{t-1} + (1-\gamma)ra_{t-1} + v\gamma x + v\gamma y] \quad (18)$$

¹³ Stickiness in the real exchange rate is an example of a real rigidity which can occur due to a variety of imperfections in product and labour markets. These imperfections need not be due to institutionalized rigidities and may reflect more subtle influences, e.g. asymmetries in the information available to participants in a bargaining process. See Blanchard and Fischer (1989), Ch 9, for an analysis of the sources and effects of real rigidities.

¹⁴ Note that the market-clearing condition $d + d^* = 0$ is retained in deriving equation (18). This is consistent with a sticky real exchange rate model provided that d is now interpreted as the *effective* domestic excess demand for domestic goods. The market for domestic goods will therefore still "clear", but only in the sense that purchases are identically equal to sales. See Benassy (1982) for an analysis of models of this type.

Equation (18) differs from its market-clearing counterpart (11) in that lagged values of q and a are present, along with the parameter γ . Note that (18) collapses to (11) when $\gamma = 1$. The asset accumulation equation (7) is unchanged, since it is an accounting identity. The steady state expressions, (12) - (14), are also unchanged, since $S = \check{S}$ in the steady state.

Figures 9 - 26 compare the effects of y shock of -0.20 and x and z shocks of 0.20, for the market-clearing and sticky real exchange rate models. The latter are simulated under the assumption that $\gamma = 0.25$, implying that one quarter of disequilibrium savings is eliminated each year.

Turning first to the y shock i.e. an exogenous falls in exports, we can see that, unlike the market-clearing case, the trade and current accounts (figures 18 and 19) will be affected when the real exchange rate is slow to adjust (figure 15). The initial fall in exports (figure 17) is almost as large as the exogenous shock; furthermore, imports (figure 16) do not fall sufficiently to offset the fall in exports. In fact they initially increase, for reasons explained below. Consequently, the trade balance becomes negative.¹⁵

Figure 16 shows the effects on real imports of the y shock. Notice that in years 0 and 1, imports actually rise, despite the depreciation of the real exchange rate. Because the real exchange

¹⁵ Recall that, when the real exchange rate is sticky, realized and desired savings are no longer equal, except in the steady state. Desired savings are unaffected by the y shock, but given the above inequality, realized savings are changed by the shock to export demand; thus, so is the current account.

REAL DOMESTIC EXPENDITURE SHOCK (x)

$$u = 0.25$$

— MARKET CLEARING

.... STICKY PRICES ($\gamma = 0.25$)

Fig. 9:
REAL EXCHANGE RATE

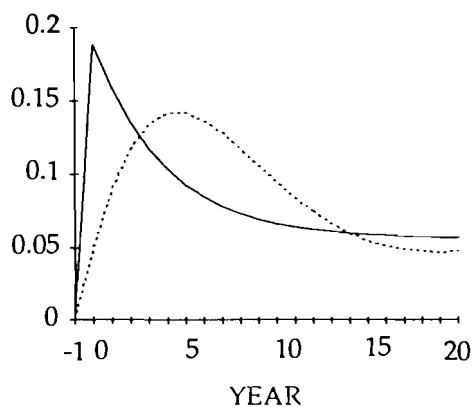


Fig. 12:
TRADE BALANCE

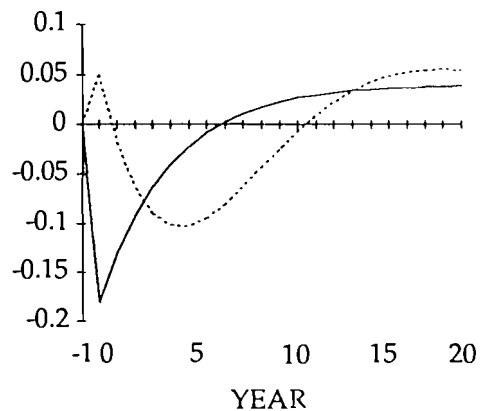


Fig. 10:
REAL IMPORTS

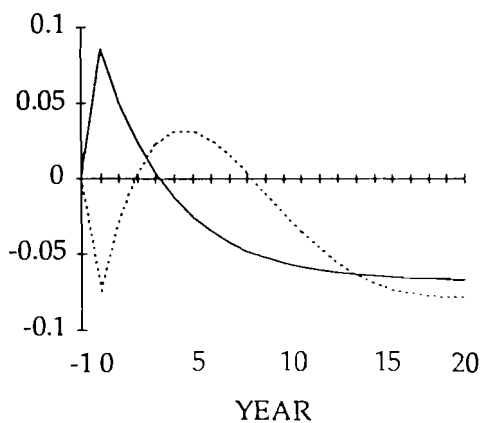


Fig. 13:
CURRENT ACCOUNT

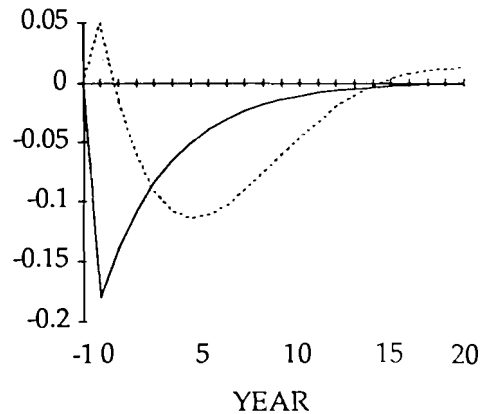


Fig. 11:
REAL EXPORTS

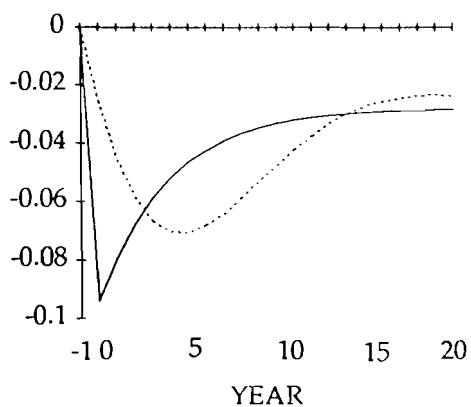
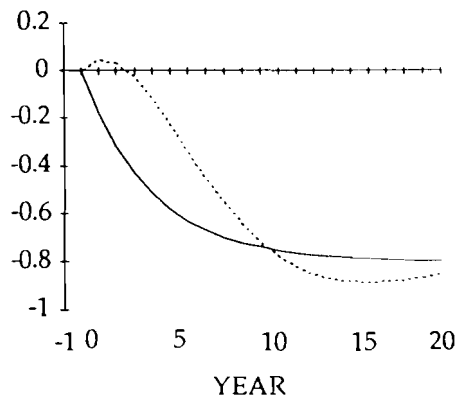


Fig. 14:
NET FOREIGN ASSETS



NOTE : The vertical axis denotes deviations from the initial state.

REAL EXPORT SHOCK (y)

$u = 0.25$

— MARKET CLEARING

.... STICKY PRICES ($\gamma = 0.25$)

Fig. 15:
REAL EXCHANGE RATE

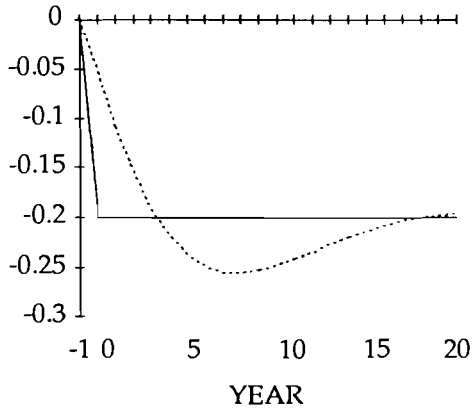


Fig. 18:
TRADE BALANCE

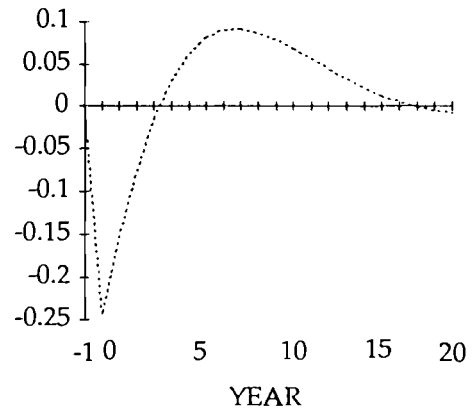


Fig. 16:
REAL IMPORTS

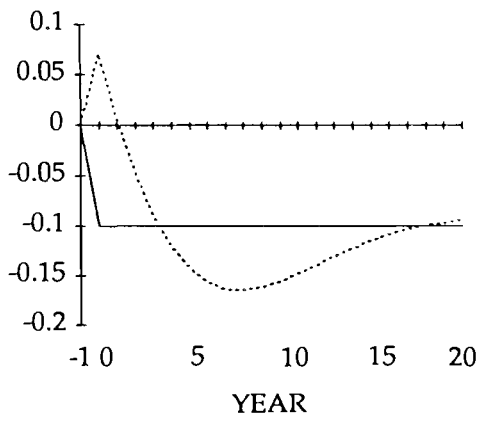


Fig. 19:
CURRENT ACCOUNT

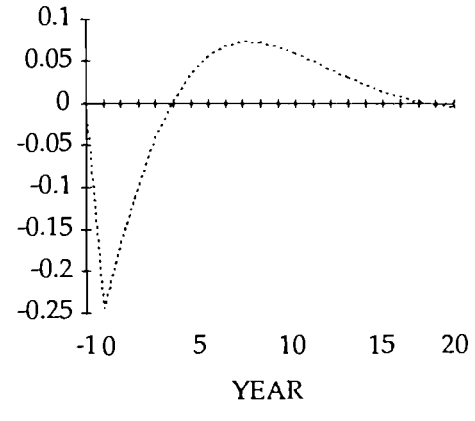


Fig. 17:
REAL EXPORTS

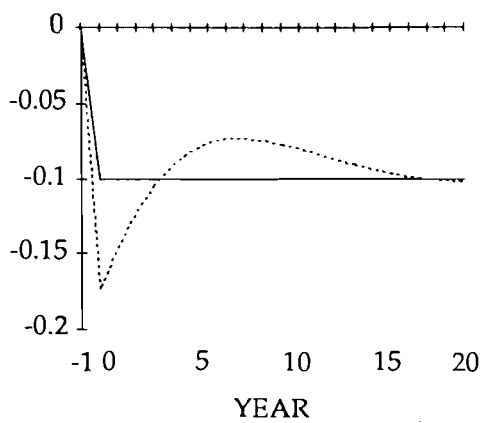
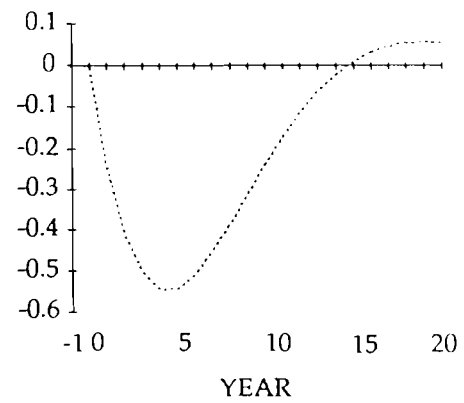


Fig. 20:
NET FOREIGN ASSETS



NOTE : The vertical axis denotes deviations from the initial state.

REAL IMPORT SHOCK (z)

$$u = 0.25$$

— MARKET CLEARING

.... STICKY PRICES ($\gamma = 0.25$)

Fig. 21:
REAL EXCHANGE RATE

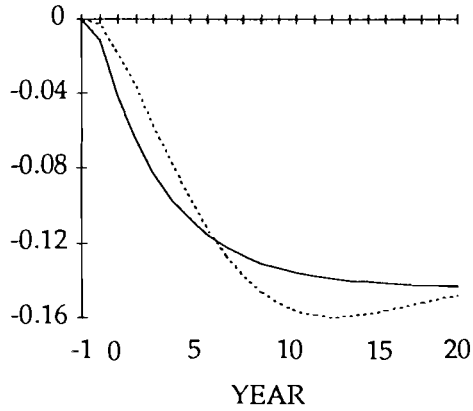


Fig. 24:
TRADE BALANCE

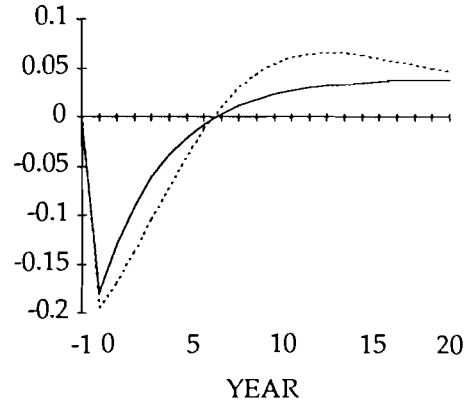


Fig. 22:
REAL IMPORTS

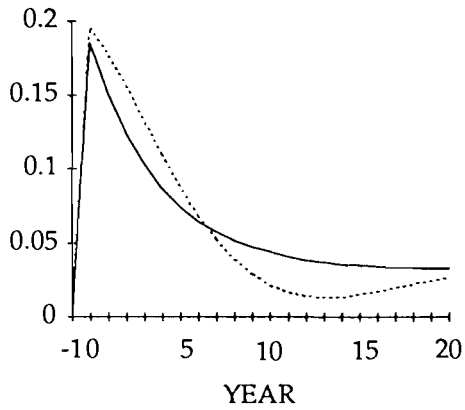


Fig. 25:
CURRENT ACCOUNT

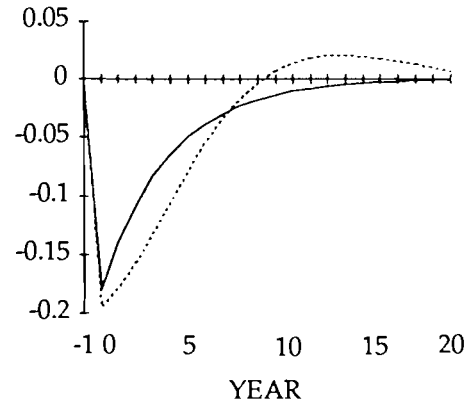


Fig. 23:
REAL EXPORTS

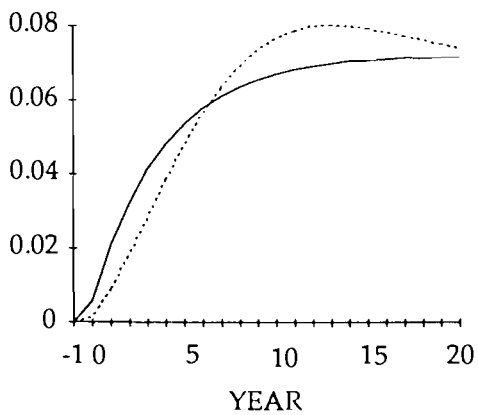
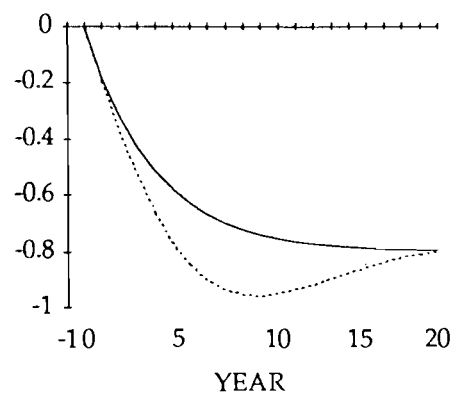


Fig. 26:
NET FOREIGN ASSETS



NOTE : The vertical axis denotes deviations from the initial state.

rate is slow to depreciate, the net reduction in exports following the negative shock to y is relatively large. The result is a deficit on the balance of trade. The counterpart to a trade deficit is an excess of domestic spending over domestic production. Part of that excess spending will fall on imports; the net result is an increase in imports in years in 0 and 1.

By year 2, the real depreciation is large enough for imports to have fallen (relative to their initial position). The trade account is still in a deficit position, however, until year 4, when it becomes a surplus. This surplus lasts for several years, and is due to overshooting of the real exchange rate i.e. in years 4 through 17, the value of the real exchange rate falls below its steady state value.

The initial, large, current account deficits lead to the build up of a considerable stock of foreign debt (figure 20). Despite the existence of current account surpluses from year 4, this debt is not eliminated until a further 11 years have elapsed. Eventually, the steady state is reached, characterized by equal reductions in imports and exports, and a trade balance and debt level of zero. However, as figures 15-20 show, stickiness in the real exchange rate can generate long cycles in the trade and current accounts, the real exchange rate, and the stock of net foreign assets.

The effects of the x shocks are shown in figures 9-14. The real exchange rate is slower to rise than in the market-clearing case; it is also slower to fall (figure 9). As a result, it is overvalued (relative to its market-clearing path) from years 3 through 14. Correspondingly, the trade and current account deficits are also larger during that time (figures 12 and 13).

Figure 10 shows that, when the real exchange rate is sluggish, the initial effect of the x shock is to decrease imports. Because of the slow initial rise in the real exchange rate, the crowding out of exports is relatively small (figure 11); consequently, so is the increase in domestic spending on domestic goods. Total domestic expenditure in fact falls relative to production, implying a fall in spending on imports.¹⁶

Consistent with this result, the trade balance is in a surplus position, with the fall in imports exceeding the fall in exports. The trade and current account balances become negative in year 1, but for that year and the next the deficits are smaller than for the corresponding years in the market-clearing case. As a result of the initial surplus and the relatively small deficits which follow, the stock of debt takes longer to accumulate when the real exchange rate is sticky than when it is not (figure 14).

The effects of the z shocks are shown in figures 21-26. Qualitatively, the adjustment paths in both of the models are similar. The real exchange rate falls, the current account balance gradually adjusts and the level of debt is eventually eliminated. The quantitative differences are due to the slow response of the real exchange rate, resulting in a slower adjustment process.

The results of this section show that a current account deficit will be self-correcting even if the real exchange rate exhibits some inflexibility. All that is needed to achieve this result is a

¹⁶ This result is not a necessary consequence of the sticky real exchange rate assumption. For a sufficiently large value of σ (so that nearly all excess domestic spending falls on domestic goods) imports will rise (due to the real appreciation) and a trade deficit will result, just as in the market-clearing case.

reasonable institutional assumption, $\gamma \neq 0$ i.e. that the real exchange rate, while sluggish, adjusts eventually to its equilibrium value.

4. WELFARE AND POLICY

The general result that emerges from section 3 is that the dynamic path for all variables is different when the real exchange rate is slow to adjust, but why should we care about that? After all, the current account becomes balanced eventually, and isn't that the focus of our concerns? The answer to these questions is that the distorted adjustment path for the real exchange rate leads to a problem of resource misallocation that ought to be of concern to policy makers.

This is a matter of elementary welfare economics. Domestic consumption of the two goods in this model is a function of their relative price, q . Distorted values of q must therefore lead to distorted consumption levels, in each period, of domestic and foreign goods. The result is a lower level of welfare than would be the case if the economy were free of such distortions. Since the current account is a function of the consumption levels of the two goods, it also follows a distorted sub-optimal path.

To gain an idea of the quantitative effects of this distortion, consider the following loss function:

$$L = \sum_{n=0}^N \delta^n \{ [\sigma(d_n^c - d_n^s)^2] + [(1-\sigma)(f_n^c - f_n^s)^2] \}. \quad (19)$$

$\delta = 1/(1+r)$ is a discount factor and the *c* and *s* superscripts, respectively, refer to the market-clearing and sticky real exchange rate values of *d* and *f*. The deviations of *d* and *f* from their optimal values are weighted by their shares in total consumption. *L* is the discounted sum of welfare losses that arise when the consumption of each good deviates from its Pareto-efficient level in each period.

Table 1 gives outcomes for *L*, over a twenty-year horizon, for different values of γ and *u*. Not surprisingly, the largest losses occur when $\gamma = 0.25$, i.e. when the real exchange rate is slowest to adjust. There is no general tendency, however, for welfare losses to be significantly smaller as *u* increases for a given value of γ . For given values of *u* and γ welfare losses are significantly greater when the shocks occur to the demand for domestic goods (*x* and *y*) than when they occur to the demand for foreign goods (*z*).¹⁷

Since the sticky real exchange rate outcomes are inefficient, policy has the potential to enhance social welfare. The purpose of this government intervention should be to restore consumption of each good to its Pareto-efficient level. While the current account, as such, ought not to be the object of government policy (since the current account does not enter anybody's utility function) the effect of government intervention will be to alter the current account outcome.

¹⁷ One of the major costs of a distorted real exchange rate that is not considered here is the likelihood that it results in irreversible investment in the wrong parts of the economy. (See Alesina et al (1990)). This failure of the price mechanism to impart the correct signals could well lead to large dynamic inefficiencies and so Table 1 almost certainly underestimates the welfare costs of a sticky real exchange rate.

Table 1

Welfare Loss From Real Exchange Rate Stickiness

		γ		
		0.25	0.50	0.75
$x=0.2$				
	0.25	2.36	0.76	0.17
u	0.50	1.90	0.66	0.15
	0.75	1.59	0.59	0.14
$y=-0.2$				
	0.25	3.07	0.86	0.18
u	0.50	2.87	0.81	0.17
	0.75	2.69	0.76	0.16
$z=0.2$				
	0.25	0.28	0.04	0.01
u	0.50	0.43	0.07	0.01
	0.75	0.50	0.09	0.01

* x 100

One obvious role for policy would be to try to reduce the degree of real exchange rate inflexibility; this might be achieved by various pieces of "microeconomic reform". However, since there are good reasons to believe that even markets with no institutional rigidities will exhibit a certain degree of price inflexibility (see n.13) there is a limit to the extent to which microeconomic policy will alleviate the problem.

What about macroeconomic policy, specifically, fiscal policy ? When the real exchange rate is sticky an optimal fiscal policy leads to a replication of the market-clearing outcome, in each period, for private spending on domestic and foreign goods. Fiscal policy in this model is effected by exogenous changes in public spending on domestic goods and/or foreign goods. This leads to changes in the real exchange rate and hence to changes in the level of private consumption of each good.

Suppose that the only fiscal instrument that the government can use is exogenous spending on domestic goods; let this spending be denoted x_g . Using (1) and (5), it turns out that $d^c = d^s(x_g)$, for all three kinds of spending shocks, if

$$x_g = (1-\beta)[q^s(x_g) - q^c] \quad (20)$$

where d^s and q^s are both functions of x_g . A closed-form solution for x_g can be found in terms of the parameters β , σ , r and u . (Of course, both q^s and q^c will be different under each of the shocks and so the solutions for x_g will also be different).

Using (3) and (5), the spending rule that equates $f^c = f^s(x_g)$ can also be found:

$$x_g = (1-(\beta/(1-\nu)))[q^s(x_g) - q^c]. \quad (21)$$

Obviously, (20) \neq (21), and so it is not possible for variations in public spending on domestic goods to lead to optimal levels of private consumption of both domestic and foreign goods.

Suppose, however, that public spending on foreign goods (denoted z_g), is also available as a fiscal instrument. Equality of d^c and d^s is implied by the fiscal rule

$$x_g = (1-\beta)[q^s(x_g, z_g) - q^c] \quad (22)$$

while equality of f^c and f^s is implied by

$$q^s(x_g, z_g) = q^c. \quad (23)$$

Equations (22) and (23) indicate that, under an optimal fiscal policy, $x_g = 0$. Appropriate amounts of public expenditure on foreign goods alone will lead to a replication of the market-clearing real exchange rate. This leads to optimal (welfare-maximizing) amounts of private expenditure on both domestic and foreign goods.¹⁸ The market-clearing current account will not be replicated, but this in itself has no welfare implications.

Although a current account imbalance is self-correcting, an appropriate macroeconomic policy will improve social welfare.

¹⁸ From standard duality methods, we know that when utility is maximized, $U(d, f) = V(q, y)$, where $U(\cdot)$ is the direct utility function, $V(\cdot)$ is the indirect utility function, and y is income. Thus, with income constant in this model, the welfare-optimizing levels of d and f are obtained at the market-clearing real exchange rate q^c .

This policy leads to changes in private consumption levels, and as a result, alters the current account outcome. Commensurate changes in the real exchange rate lead to the new current account balance being validated by appropriate variations in exports and imports.

5. CONCLUSIONS

This paper has used a simple model of current account and exchange rate determination to ask two questions:

(i) Following a permanent adverse shock, will a current account deficit eventually correct itself, even when the real exchange rate is slow to adjust ?

(ii) In the event of this slow adjustment, can macroeconomic policy improve allocative efficiency and hence social welfare ?

The answer to both of these questions is an unequivocal yes. The results of this paper should not, however, be interpreted as offering precise predictions on either how long the process of current account adjustment will take, or the costs of inefficient adjustment. Rather, the paper offers qualitative results that seem to be both realistic and robust to changes in both behavioural and institutional assumptions.

Of course, more research needs to be done on this important subject, and the analysis of this paper can be usefully extended in a number of ways. One way would be to add a monetary sector to the model, and to examine how any inefficiencies in the

determination of nominal exchange rates affect the adjustment path for the real exchange rate, and hence the current account. This could be of major consequence, since there is ample evidence to suggest that these inefficiencies have played a significant part in hindering the adjustment mechanism (Krugman 1989).

A current account deficit is fundamentally a consequence of aggregate demand exceeding aggregate supply. This paper has highlighted the means by which demand can be reduced to meet a given supply, but this is only half the story. One might just as well examine the means by which supply can be increased to meet a given demand. The introduction of a supply side would enable an analysis of the effects on the current account of different kinds of price rigidities e.g. in the product and labour markets.

A third extension worthy of consideration would be to introduce a non-traded good into the model. The ease with which resources can be transferred between sectors of an economy may well turn out to be the most important factor of all in determining the pace and cost of the current account adjustment process.

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