Savings, Investment and the Current Account: An Empirical Study of Seven Major Countries 1965-84*

PHILIP P. TURNER**

I. Introduction

Perhaps one of the most intriguing facets of experience with floating exchange rates over the last decade or so has been the lack of any obvious tendency for persistent current account imbalances to disappear. Indeed, major macroeconomic divergences among the largest economies in the 1980s have led to record current account imbalances despite (because of?) floating exchange rates. And the configuration that has emerged among the three biggest economies – very large deficits in the United States and big surpluses in Germany and Japan – is hardly new. Indeed, this pattern, evident now for about twenty years, has been interrupted only by two, severe oil price shocks and the associated international recessions.

Macroeconomic analyses of the durability of the trade patterns observed typically start from the observation that current account surpluses (or deficits) have two counterparts: one, capital outflow (inflow) and, two, an excess (or shortage) of

* This paper was written while the author was a Visiting Scholar at the Institute for Monetary and Economic Studies, Bank of Japan. The author would like to express his gratitude to Dr. Yoshio Suzuki, Director of the Institute and the staffs, and elsewhere in the Bank for their hospitality and for providing a congenial research environment. He is most grateful to Professor Carl F. Christ for many helpful comments on an earlier draft. Comments and suggestions at seminars at the Bank and at Keio University helped to improve this paper; in particular, Hiroshi Yomo, Mitsuaki Okabe, Yoshiharu Oritani, Mahito Uchida, Yuichi Abiko, Hiromichi Shirakawa, Suzu Ishihara and Misako Kimura, all of Research Division I; and to Kazumi Asako (Yokohama National University), Kyoji Fukao (Hitotsubashi University), Kunio Okina (University of Tsukuba), Yusuke Onitsuka (Yokohama National University), Kazuo Ueda (Osaka University, now at Ministry of Finance) and Kanji Yoshioka (Keio University). All opinions are of the author's and do not necessarily reflect official OECD views.

** Chief Economist, Country Studies and Prospects Branch, Economics and Statistics Department, OECD.

domestic savings over domestic investment.[1] An items are measured in domestic currency unless otherwise stated:

$$X - \frac{M}{e} = [S - I] + [T - G] = - F \quad (1)$$

where S = Gross private savings;
T = Total taxation;
I = Gross private investment;
G = Government expenditure;
X = Exports of goods and services (plus net factor income from abroad if GNP is used);
M = Imports of goods and services (measured in foreign currency);
F = Inflow of capital from abroad (outflow, if negative);
e = Exchange rate (units of foreign currency per unit of domestic currency).

Approaches to the theory of the determination of the current account can be classified according to the three elements of these identities. There is of course no theoretical reason for preferring explanations couched in terms of any particular element: correctly specified models of any one element can be identically applied to the other two. Assertions that this or that element is somehow exogenous with the other two adjusting endogenously have little support in even the simplest economic theory. Rather, the issue is pragmatic; focusing on a particular element of the identity may highlight key features that alternative approaches would obscure.

The traditional approach has perhaps been to explain (X − M) directly: most reduced-from estimates of current account developments have relied on trade equations explaining X and M, where income and relative prices have played central roles. Many explanations of persistent external disequilibria have turned on details of trade structure. The persistent surplus of the United States in the 1950s was frequently attributed to her superior ability to innovate which stimulated exports and reduced imports; almost identical explanations are now put forward to explain Japan's persistent surplus.[2]

1. The first identity follows from the national accounting identity:

$$Y = C + I + G + X - \frac{M}{e}$$

and from the definition of gross private savings:

$$S = Y - T - C.$$

2. Kindleberger (1976) summarises the key elements of earlier United States performance. For accounts of how rapid technical progress and the adoption of new products can explain the changes in trade structure that underlie recent Japanese current balance performance, see OECD (1985) pp. 64-77 and Bank of Japan (1985).

Secondly, explanations that start from the capital account of the balance of payments (that is, F in the identity) have a long history. The interwar debate on the "transfer problem" implied by the payment of German war reparations was in part a debate of how once F (reparations) was fixed, (X − M) could adjust and what costs such adjustment might entail. More recent work has focused on shifts in F that arise from changes in the portfolio preferences of international investors. Persistent downward pressure on sterling in the early and mid-1970s; the rapid appreciation of the DM, the yen and the Swiss franc in the late 1970s; and the just-as-rapid appreciation of the dollar after 1981 have all been attributed to shifting portfolio preferences – the current account being left to adjust accordingly.

Thirdly, many recent discussions have focused on the middle element of the identity, according to which a current account surplus is the sum of excess private sector savings [S − I] plus the government budget surplus [T − G].[3] This is the savings-investment approach to the current account which is based on the view that the so-called 'savings-investment balances' (hereinafter SI balances) reflect certain crucial macroeconomic differences between countries. According to this view, it makes analytical and empirical sense to start from the determinants of savings and investment in understanding current balance developments.

A special case of the savings-investment approach is the monetary approach to the balance of payments where savings essentially depend on the real value of cash balances. An exchange rate change is a price level change; with nominal money supply fixed, changes in real cash balances that result determine domestic savings. A devaluation thus works by reducing real cash balances and hence increasing domestic savings.

A number of more recent theories of the balance of payments have been more concrete than this and have examined the various elements of aggregate domestic savings and investment. Many have focused on a single element of excess domestic savings as being the key determinant of the current account. In the United Kingdom, the self-styled "New Cambridge" school argued in the early 1970s that, because the private sector's net saving propensity (that is, S – I in the above equation) was more or less stable, the current account was determined by changes in the public sector deficit.[4] Sachs (1981), on the other hand, argued that variation in aggregate investment (I) was the main determinant of current account developments in many countries. More recently, Ueda (1985) has argued that the United States current account

3. The expression 'excess savings' in this paper refers to savings minus investment. Although the expression 'net' savings would perhaps be more natural, it has been avoided because of the danger of confusion with saving net of depreciation.

4. For a review of this theory, see Brunner-Meltzer (1978).

deficit and the Japanese current account surplus largely reflect divergent fiscal policies in the two countries (that is, variation in T – G dominates). In his model, Ueda allows the endogenously-determined real interest rate (depending on gross private and excess government savings) to influence private investment – a distinct improvement on the New Cambridge school where all expenditure is interest rate inelastic. McKinnon (1980, 1981) combines elements of Ueda and Sachs, by assuming that gross private savings (S) is constant so that changes in the current account reflect changes in both (T – G) and I.[5]

These theories seek to divert attention from more superficial, but more immediate, causes of balance of payments patterns to more fundamental factors. For instance, Sachs wanted to challenge the common view that cross-country differences in dependence on imported oil constituted a key factor behind divergent current account performance in the 1970s. Similarly, much of the discussion of Japan-US trade imbalances has focused on supposed differences in international openness. Ueda correctly puts the emphasis on more basic macroeconomic factors: commercial policy measures will have an effect only in so far as they impinge on these basic factors. Nevertheless, focusing on only one element of the overall SI balance as the prime determinant of the current account is probably misleading. Theoretically, of course, no one element can claim precedence. Certainly some empirical regularities can be found by regressing the current account on the various SI components; but this may merely reflect the relative stability of the components over the period of observation. Those variables that exhibited the greatest variability are likely to 'explain' current balance movements; the more stable variables will not. But such empirical 'facts' are hardly likely to be robust – as indeed witnessed by the fact that different researchers have used different variables. A second consideration is that SI balances are themselves endogenous. Any discussion of underlying or structural savings or investment behaviour therefore requires some attempt to adjust actual savings-investment ratios for changes in their important determinants.[6]

5. McKinnon cited David-Scadding (1974) who found a remarkable stability in gross private savings in the United States over the period 1898-1969. However, this stability only holds once savings are defined to include consumer durables expenditure.

6. Probably the most telling empirical criticism of the usefulness of the SI approach is Feldstein-Horioka's well-known assertion that over the long-run domestic savings equal domestic investment. If this is so, the usefulness of approaching the current account via SI balances is clearly seriously compromised. However, further examination of this point in Appendix I concludes that the evidence is in fact that substantial differences between savings and investment have persisted across countries for a considerable period of time. Simple cross-country regressions of all OECD countries suggest that an extra dollar of saving implies only 0.58 dollars of additional investment in the short-run (equation 6 of Table A1 in Appendix I) and 0.72 dollars in the long-run (equation 4 in Table A1), the rest going to increase the current account surplus.

This paper attempts a simple empirical analysis of current balance trends in the seven major OECD countries from the perspective of savings-investment balances, but allowing for the fact that savings and investment are themselves endogenous. Although the same approach is applied to all countries, the implications for Japan are stressed. The basic framework for the paper starts from the proposition the savings and investment depend principally on income, interest rates and exchange rates. A simple Mundell-Fleming model is outlined in Chapter II to examine the importance of the sensitivity of SI balances to these factors in the determination of current balances. Subsequent sections decompose aggregate excess domestic savings into its various components: corporate, household and government. The relative importance of major determinants of each are then assessed, first impressionistically, looking at broad trends over the last twenty years in each country (Chapter III); and then econometrically (Chapter IV). Specifically, the equations developed relate corporate and household savings and investment to the rate of interest and to the exchange rate (both defined in real terms) as well as to cyclical developments. The main novelty of the results obtained is that excess domestic savings are negatively related to the real exchange rate, and that direct exchange rate effects are often quantitively more important than interest rate effects. The penultimate section uses the equations thus developed to provide 'fitted' savings and investment variables, and examines how far these variables explain observed current account trends. The general conclusion is that medium-term movements in SI balances provide a good explanation of underlying balance of payments developments.

Such developoments can thus be explicitly related to income, interest and exchange rate movements; divergent trends in government budget deficits also play an important part. The most important policy implication of these estimates is that relying on the exchange rate alone to reduce excessive imbalances is likely to involve changes in the exchange rate so large as to be disruptive. Other policy adjustments will also be necessary.

II. SI Balances in a Mundell-Fleming Model

The Mundell-Fleming framework provides a convenient tool for analysing the interaction between SI balances, the level of income, interest rates and exchange rates. This framework suggests — see below — that the sensitivity of SI balances to income, interest and exchange rates has an important bearing on the international consequences of domestic economic policies. The empirical estimates of savings and investment functions for seven major countries suggest that there are major cross-country differences in the impact of interest and exchange rate changes on domestic SI balances.

The model presented below is subject to two main simplifications. First —

equilibrium conditions are purely conditions for *flow* equilibrium. These are not full equilibrium conditions because their stock counterparts are changing; and because such changes are likely to affect flows. For instance, a current account deficit implies lower net foreign assets, which in turn implies reduced foreign investment income receipts. If such stock-counterparts change only slowly, they can perhaps be ignored in analysing short-run developments. A second simplification is that inflation is ignored, with the domestic expenditure deflator held constant. Nevertheless, presenting the model in its starkest form does highlight the importance of the domestic determinants of SI balances, and of capital mobility. In the standard Mundell-Fleming model, equilibrium must be maintained in three markets: the domestic money market, the goods market, and in the foreign exchange market. To simplify the inspection of signs, all partial derivatives, written in small letters, are positive: negative effects are simply indicated by a minus sign (all variables used are listed in Appendix II).

Denoting the money demand function by L and the money supply by MS, the condition for money market equilibrium may be written:

$$MS = L(y,r) \tag{2}$$

where $L_y = 1$ (that is, income elasticity of money demand of unity)
$L_r = -h$.

Hence $dMS = dy - h \cdot dr$. (2a)

The condition for equilibrium in the goods market is that excess domestic savings equal the excess of exports over imports:

$$S-I+T-G=X-\frac{M}{e} \quad \text{[domestic expenditure deflator is held constant].} \tag{3}$$

It is assumed that:

$X - \frac{M}{e} = B(y,e)$ where $B_y = -m$ the marginal propensity to import,
$B_e = -q$ defining e as units of foreign currency per unit of domestic currency.

$I = I(r)$ where $I_r = -i$,

$T = ty$ where t is the marginal propensity to pay tax,

$S = S(y-T,e)$ where $S_{y-T} = s_p$, the private marginal propensity to save
so that $S_y = s = s_p(1-t)$
$S_e = -u$ (where $u < q$).

By differentiation of (3)

$$(s+m)dy + i \cdot dr + (q-u)de = dG. \tag{3a}$$

The above specification of domestic savings and investment functions is quite standard, with the exception of the assumption that (holding income constant) domestic savings are inversely related to the real exchange rate. This relationship is complicated and controversial.[7] In this paper, there are two main channels whereby a higher exchange rate is likely to reduce aggregate domestic savings. One factor is the existence of possible wealth effects on consumption: by increasing the real value of domestic financial assets, an appreciation of the exchange rate may stimulate consumption. A second factor is that exchange rate appreciation reduces corporate sector savings (that is, profits). The estimates reported below suggest that the second effect is more powerful empirically for most of the countries studied.[8] It is, however, assumed that the direct effect of a higher exchange rate on domestic savings is less than that on net exports ($u < q$).

7. The issue of how aggregate household savings respond to exchange rate changes is complicated, and the debate has a rather long history. The classic Laursen-Metzler effect is that an exchange rate appreciation raises real income and thus real savings (both measured in terms of the domestic goods). However, this result depends on a rather special specification of the consumption function and does not necessarily hold once wealth effects are included. In particular, Obstfeld (1982) has shown that a permanent appreciation increases real wealth and so reduces real savings, the reverse of the Laursen-Metzler effect. Others have pointed out that, while a permanent appreciation raises both current and expected future income (and thus no obvious reason to increase savings in a life-cycle model), a temporary appreciation raises only current income and, by intertemporal consumption smoothing, savings (see Sachs (1981), Persson-Svensson (1985)).

8. McKinnon (1981) has argued that an exchange rate appreciation may actually increase excess domestic savings (and thus the current account surplus). He discussed this in the context of a simple Keynesian model in which a higher exchange rate reduced domestic investment, but assumed no direct effect on domestic savings (which depended only on the level of income). On these assumptions, he showed that if the exchange rate impact on domestic investment were sufficiently large, an appreciation would increase the current surplus. If the decline in investment so induced exceeds the decline in savings (as income falls with an appreciation), then the current account surplus would increase. However, the empirical results in this paper suggest that his key assumption – that a higher exchange rate does not reduce the propensity to save – is probably unrealistic. See Chapter IV below.

The condition for equilibrium in the foreign exchange market is that capital flows are sufficient to finance any current account deficit. Foreign interest rates and the expected future exchange rate are taken as given, so that capital flows depend only on the present exchange rate and the domestic interest rate[9] (This assumption that the expected future exchange rate is taken as given, plausible only as a short-run proposition, is actually quite restrictive — a point that is taken up below.).

$$F(r,e) + (X - \frac{M}{e}) = 0 \tag{4}$$

where $F > 0$ indicates inflow of capital (outflow of bonds)
$F_r = f$
$F_e = -f$ (by defining units appropriately)

Hence, by differentiation,

$$-(f+q)de + f \cdot dr - m \cdot dy = 0. \tag{4a}$$

Equations (2a), (3a) and (4a) may be summarized in matrix notation thus:

$$\begin{pmatrix} -h & 1 & 0 \\ -i & -(s+m) & -(q-u) \\ f & -m & -(f+q) \end{pmatrix} \begin{pmatrix} dr \\ dy \\ de \end{pmatrix} = \begin{pmatrix} dMS \\ -dG \\ 0 \end{pmatrix}$$

Denoting the determinant of the coefficient matrix by $|A|$,

$$\begin{aligned} |A| &= +h\,[(s+m)(-1)(f+q) + m(q-u)] + i\,[-(f+q)] - f(q-u) \\ &= -h\,[(s+m)(f+q) - m(q-u)] - i(f+q) - f(q-u) < 0. \end{aligned} \tag{5}$$

Changes in G can be taken to represent the effect of a "shock" to aggregate demand. Solving for dr, dy and de assuming that $dMS = 0$ gives

$$dr = \frac{(f+q)dG}{-|A|} > 0 \tag{6}$$

9. This specification follows fleming (1962). Although more recent work has argued that the stock of assets should be a function of the interest rate (not the change), the Fleming simplification is a useful simplification in the short-run considered in this paper.

$$dy = \frac{h(f+q)dG}{-|A|} > 0 \tag{7}$$

$$de = \frac{(f-hm)dG}{-|A|} \tag{8}$$

The sign of the final term is ambiguous. It is positive or negative according to

$$f \gtrless hm.$$

Essentially, this key inequality depends on two factors:

(i) internationally, the ratio of f (openness of financial markets) to m (import dependence). Where f is relatively high $de/dG > 0$;[10]

(ii) domestically, the responsiveness of money demand with respect to interest rates (this is essentially the shape of the LM curve in a closed economy).

The ambiguity of this result arises because higher G increases both the rate of interest (tending to drive up the exchange rate) and the level of income (tending to depress the exchange rate).

This inequality may have some important implications for understanding the present situation. First, the increased liberalization of capital movements has probably increased the size of f, and so made it more likely that the initial effect of an increase in autonomous expenditure will be an exchange rate appreciation. Equally, changes which tend to reduce the marginal propensity to import will reinforce this tendency (for instance, the reduced Japanese propensity to import raw materials since 1980 may have worked in this direction). Secondly, there are likely to be important differences between countries. A country such as the United States with both high f and low m appear particularly likely to face an exchange rate appreciation on fiscal expansion.[11] But in small, highly-open economies, m is likely to be very

10. In a pure Mundellian world, f is infinite, so that capital flows dominate. In this case, $dy/dG \rightarrow 0$ and fiscal policy is ineffective. Interest rates remain constant, and the exchange rate rises until the foreign balance declines to exactly offset the expansionary influence of higher G: there is 'crowding out' through the exchange rate.

11. Oudiz-Sachs (1984) advance an additional reason why f is likely to be especially large for the United States. In their model, the issue of bonds of finance budget deficits increases the wealth of the private sector; the excess supply of bonds thus rises by the difference between the increased supply of bonds and the wealth-induced increase in the demand for domestic bonds. The latter term depends on the marginal propensity to hold bonds out of wealth, and this is likely to be larger for dollar-denominated bonds. Accordingly, the excess supply of bonds tends to rise by less in the case of a United States fiscal expansion, so that the necessary increase in interest rates is reduced.

large; also, the scope for attracting capital flows — denominated in their own currency — will probably be significantly smaller than for large, more self-sufficient economies. In such countries, therefore, even the initial impact of higher expenditure is more likely to be an exchange rate depreciation.

A simple diagram corresponding to the case where $f > hm$ is shown in Figure 1: this shows the full equilibrium relation between output and the exchange rate with the rate of interest allowed to vary. The GG curve indicates equilibrium in the goods market and the money market for given G and MS. Using equation (2a) to eliminate dr from equation (3a),

$$de/dy = \frac{s + m + i/h}{u - q} < 0.$$

The FF curve gives the condition for equilibrium in the foreign exchange market and the money market. Again using (2a) to eliminate dr from equation (4a) gives:

$$de/dy = \frac{mh - f}{-h(f + q).}$$

This will be positive when f is large enough to dominate the direct trade effects (m): in this case, the FF curve will slope upwards. Finally, the CC curve gives the condition for constant current balance (by differentiating $B(y,e)$ = Constant):

$$de/dy = \frac{-m}{q} < 0.$$

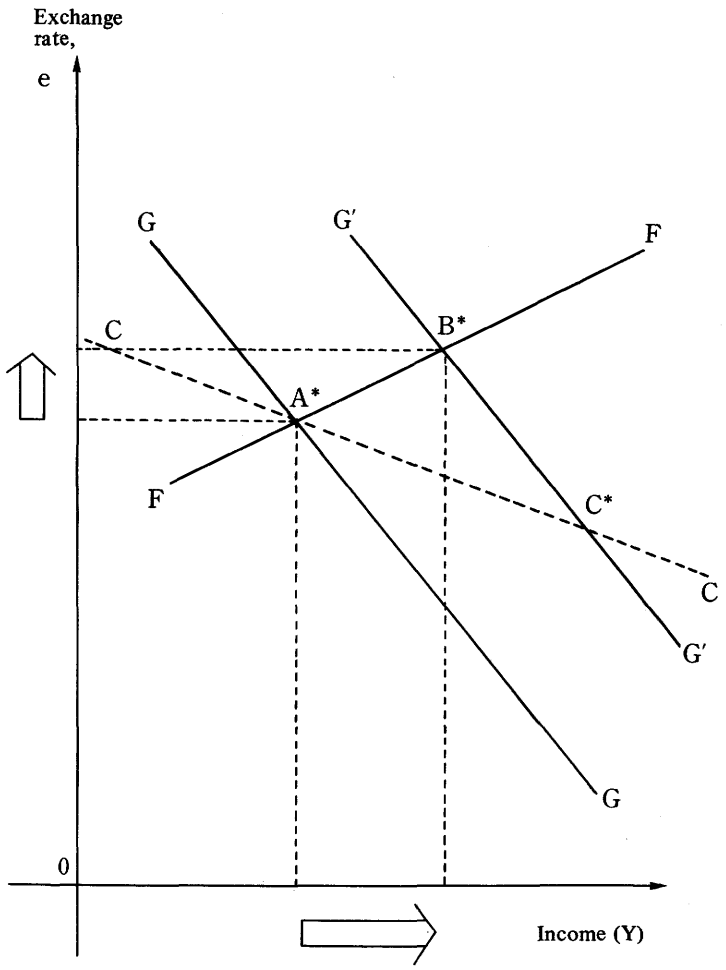
The conclusion from this analysis that a positive demand shock (reducing excess savings) can drive up the exchange rate applies only in the short run. It depends critically on the assumption that the expected future exchange rate is inelastic with respect to current dissavings. But lower aggregate savings increase indebtedness (or lower net worth), and eventually lower the future exchange rate. Once this enters into expectations, the exchange rate is likely to fall even if *ex ante* savings imbalances persist. Figure 1 provides a convenient way of illustrating the ultimate effect on the exchange rate. An increase in autonomous expenditure (G) shifts GG to G'G': the new position of temporary equilibrium is B^*, where the current account is in deficit. This deficit will be financed by capital inflows which will in turn require interest payments abroad, lowering the CC schedule and thus the eventual future exchange rate. In the absence of capital flows (where the current balance is kept continuously in equilibrium) an increase in autonomous expenditure would lead to an immediate depreciation, to point C^* in the diagram. With capital flows, the exchange rate is ultimately driven lower than it would have been in the case of instantaneous adjustment to the current account. These considerations are relevant for the exchange rate misalignments prior to September 1985. The view that such misalignments would

tend to persist as long as SI imbalances persist incorrectly generalizes a short-run conclusion into some indefinite future.

The analysis above does provide some insight into what might be important determinants of the short-run appreciation of the exchange rate. It follows from equation (8) that the short-run appreciation of the exchange rate will be greater the smaller is the coefficient matrix |A|. That is (for given f and m), the

— smaller is the aggregate marginal propensity to save (s);
— smaller is the sensitivity of domestic investment to interest rates (i);
— smaller the direct sensitivity of the current balance to the real exchange rate (q);
— greater the direct sensitivity of domestic savings to exchange rate changes (u).

Figure 1 Savings-Investment Balances: the Mundell-Fleming Case



The economics of the first two elements is that a positive demand shock (lower *ex ante* excess domestic savings) drives up income and interest rates: if domestic SI balances are highly sensitive to income and interest rates, a substantial increase in excess domestic savings will be induced so that the capital inflows needed from abroad will be limited. Thus the potential exchange rate appreciation is damped. In this sense, both income and interest rate effects tend to stabilize SI balances. But the higher exchange rate tends to *reduce* domestic savings still further, and thus magnify the exchange rate appreciation that will result. The reason for this is that the resultant expansion of income is greater because the exchange rate rise stimulates domestic consumption; as this puts greater pressure on interest rates (given fixed money supply), the exchange rate is pushed still higher.

One concrete example of these elements is that the emergence of large budget deficits combined with an aggregates-oriented monetary policy in the United States led to a sharp appreciation of the dollar up to 1984. This appreciation may have tended to reduce excess *private* savings in the United States, leading to a particularly large imbalance between savings and investment. The very big increase in interest rates that took place did not appear to have generated significantly higher private savings — and this is at least partly because the exchange rate was pulling in the opposite direction (How important quantitatively this consideration was is considered in more detail in Chapter V below).

The equations estimated in Chapter IV below reveal major differences in the sensitivity of domestic savings and investment to interest and exchange rates. These differences are likely to have an important bearing on the determination of the exchange rate. As the overview in the next section shows, aggregate propensities to save also differ appreciably between countries, with further implications for the exchange rate.

III. Overview

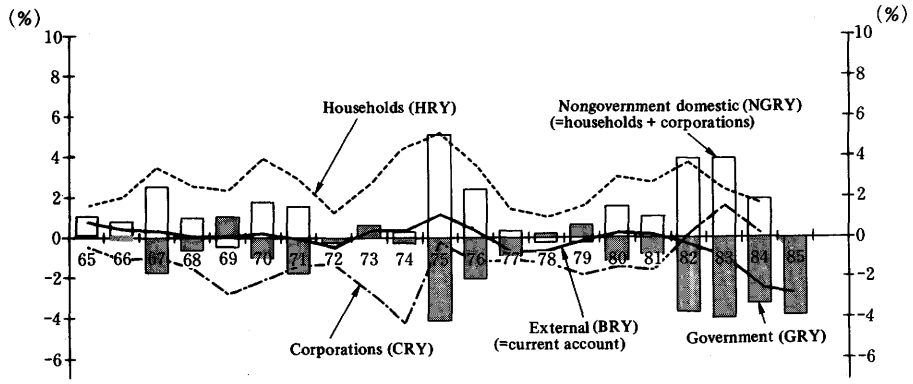
Before considering the various components of aggregate savings and investment, it is useful to review the broad historical patterns of the development of SI balances in major OECD countries and their principal components (see Figures 2 to 8). The most notable structural feature of the United States savings performance is the extremely low rate of excess household savings, amounting to around 2 1/2% of GNP over the period 1965-80. Indeed, up to 1983, the three years of large U.S. current account deficits (1972, 1977 and 1978) were years of particularly low household savings (less than 1 1/2% of GNP in each year). And the largest current account surplus occurred when household savings were at a peak (in 1975). Although it is also true that the corporate demand for funds is also relatively low,[12] the nongovernment sector as a whole is generally characterised by a rather low propensity to save. This

characteristic appears to imply that — in normal circumstances — the scope for financing large government deficits from domestic sources is quite limited. In the event, the recent emergence of larger budget deficits (compare the shaded histogram in Figure 2a) led partly to an increase in the current account deficit, but also partly to increased excess savings by the nongovernment sector.

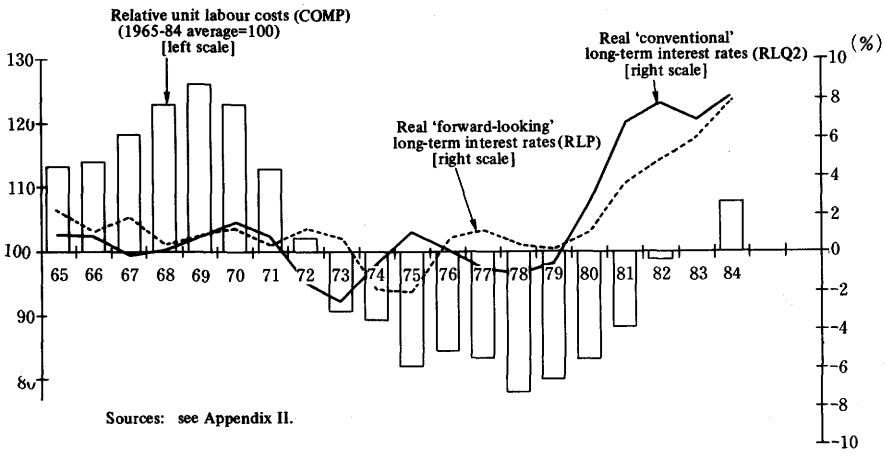
There has been a rather different pattern in Canada, as in Figure 3, where larger budget deficits have, until recently, been associated with current account surpluses.

Figure 2 United States

a. Savings and investment balances by sector (as % of GDP)



b. Interest and exchange rates (in real terms)



Sources: see Appendix II.

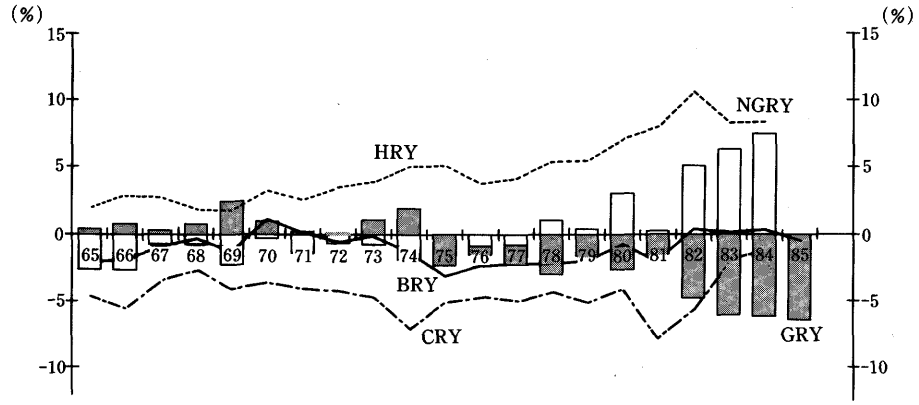
12. This partly reflects the importance of the nonincorporated business sector (classified with the household sector in OECD National Accounts). The same is true of Italy.

Canadian financial markets are closely integrated with those of the United States so that Canadian rates have closely followed those in the United States. But much higher interest rates in Canada appear to have encouraged household savings and reduced both corporate and household investment – in marked contrast with U.S. experience.

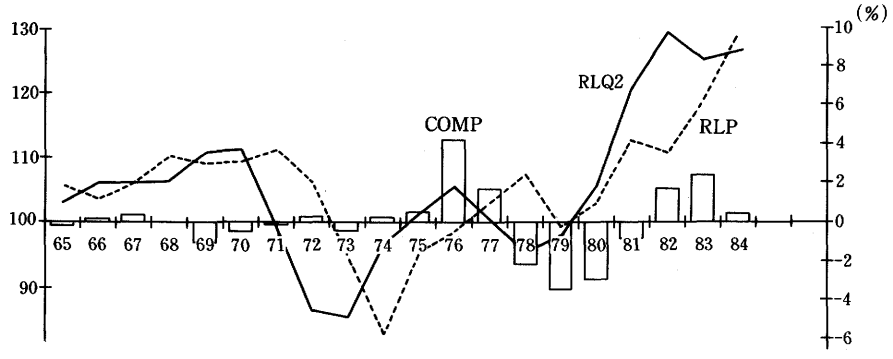
Japan is characterised by an exceptionally high household savings rate, as in the Figure 4: excess household savings currently amount to some 8-9 % of GDP. Perhaps the most important structural change to affect Japanese savings-investment balances was the end of the High Growth Era in the early 1970s. Up to 1973, potential GNP was growing at around 10% annually; thereafter it fell to something

Figure 3 Canada

a. Savings and investment balances by sector (as % of GDP)



b. Interest and exchange rates (in real terms)



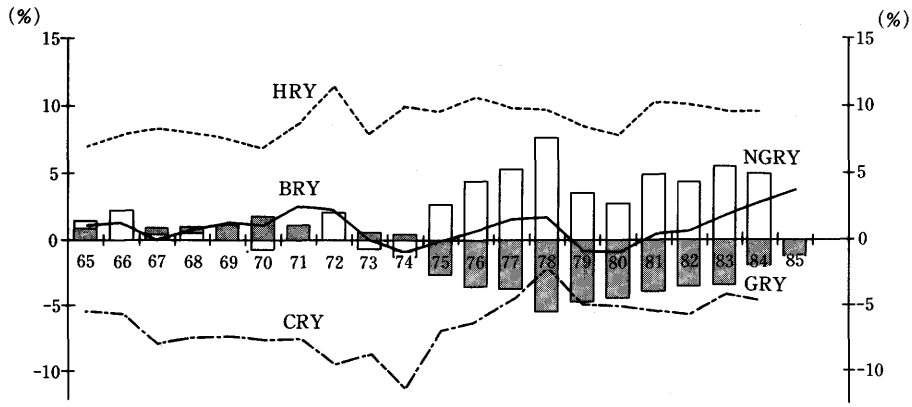
Note: see Figure 2 for definitions.

less than 5%. This radical change reduced the corporate sector's net demand for funds from a little less than 8% of GDP in 1965-74 to under 4 1/2% of GDP after 1976. At the same time excess household savings actually rose, partly because the earlier housing boom came to an end, and partly because gross savings also rose. The upshot of this is that the nongovernmental sector, only a modest provider of excess savings before 1975, has in recent years generated net savings of around 5% of GNP. At the same time, government borrowing has been reduced from over 4% of GDP in the late 1970s to about 2% by 1984. With total excess domestic savings thus rising, large current account surpluses (savings outflow) have emerged.

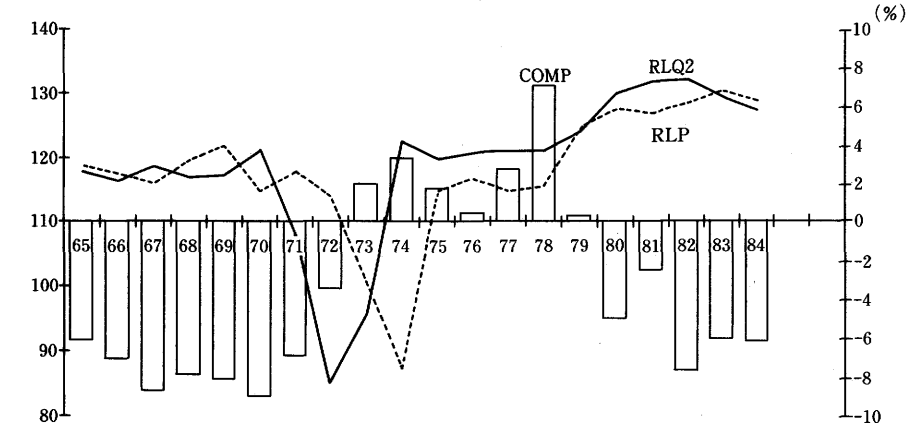
A similar pattern, though perhaps less marked, can be noted in the case of Germany, particularly in the drop of the corporate sector's net demand for funds (see

Figure 4 Japan

a. Savings and investment balances by sector (as % of GDP)



b. Interest and exchange rates (in real terms)



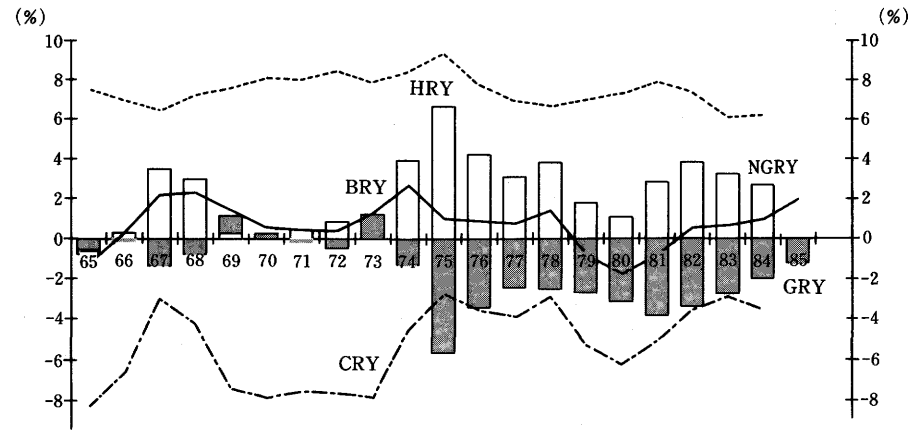
Note: see Figure 2 for definitions.

Figure 5a).[13] The main difference between German and Japanese experience has been in household saving trends. Unlike Japan, excess household savings rose steadily from the mid-sixties, peaked in 1975, and thereafter tended to decline.[14]

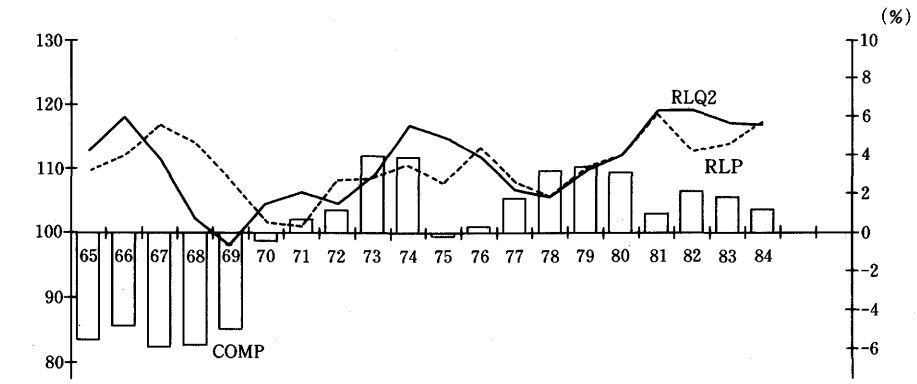
As in Figure 6, France's brief attempt at fiscal expansion in the early 1980s led almost one-for-one to a deterioration in the current external deficit (compare the

Figure 5 West Germany

a. Savings and investment balances by sector (as % of GDP)



b. Interest and exchange rates (in real terms)



Note: see Figure 2 for definitions.

13. It should be noted that the corporate sector – as defined in the German national accounts – includes investment in dwellings.

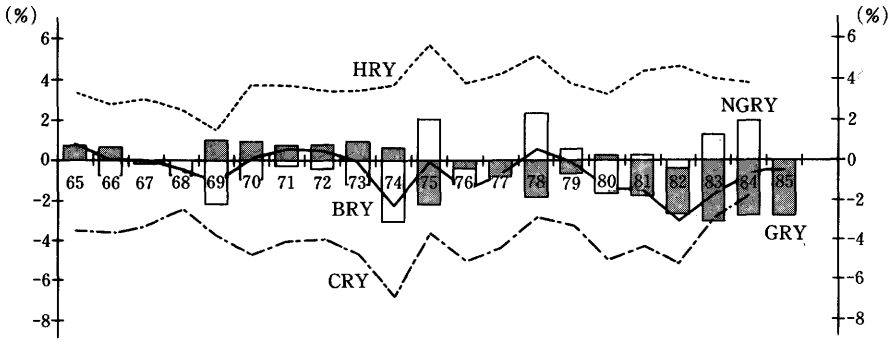
14. The diagram is a little misleading in that the 1965 current account deficit was exceptional: in the fifties and early sixties, Germany ran large and persistent current account surpluses that seemed quite insensitive to import liberalization and successive appreciations of the DM (see Kindleberger (1976)).

government balance and current account movements in 1981 and 1982, shown in Figure 6a) that brought about a sizeable increase in real interest rates and some exchange rate depreciation. As domestic investment in the nongovernment sector fell, the current account moved closer to equilibrium.

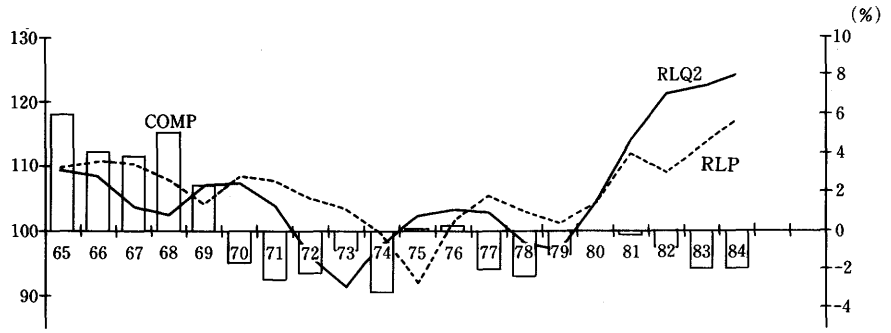
SI balances in Italy have been dominated by enormous, and persistent, government deficits (averaging 12 1/2 % of GDP since 1981) as in Figure 7; yet these deficits have been financed mainly internally – thanks to a household saving ratio that exceeds even Japan's.

Figure 6 France

a. Savings and investment balances by sector (as % of GDP)



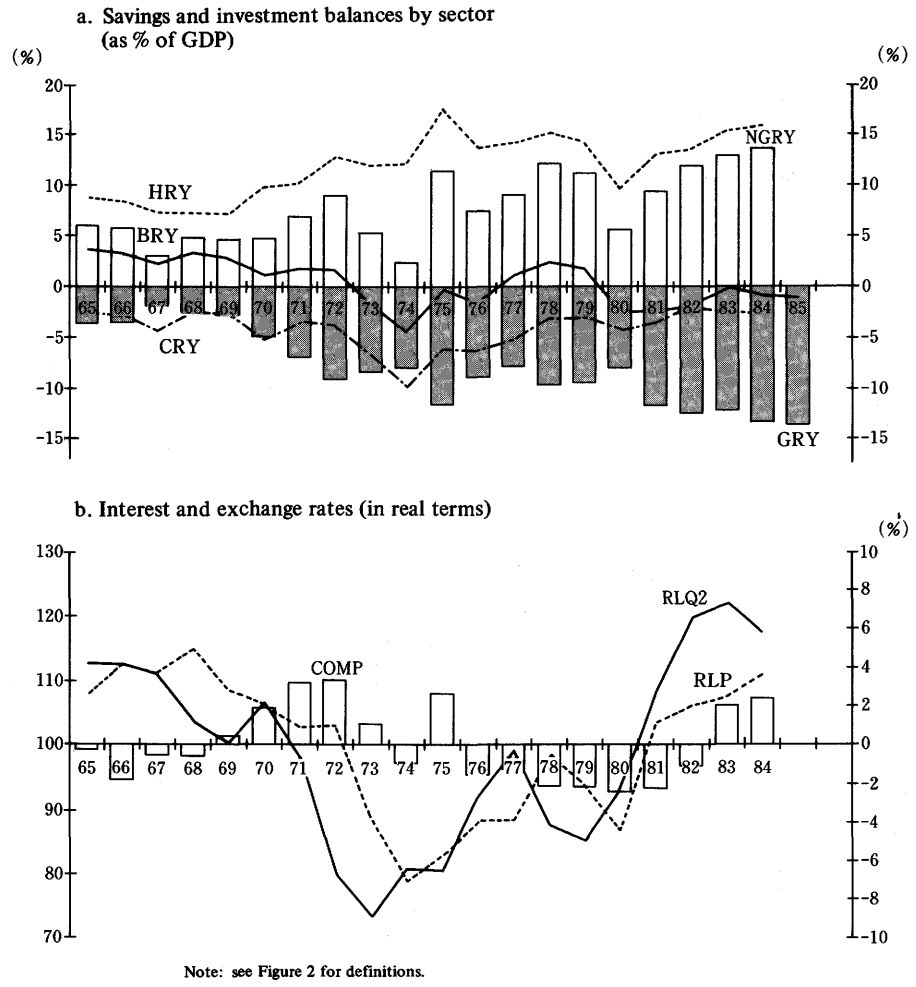
b. Interest and exchange rates (in real terms)



Note: see Figure 2 for definitions.

The advent of North Sea oil has transformed the corporate sector in the United Kingdom into a significant net contributor of savings, roughly equalling the contribution of the household sector (see Figure 8). From 1974 to 1982, the current account closely mirrored the trend in the corporate sector's SI balance.

Figure 7 Italy

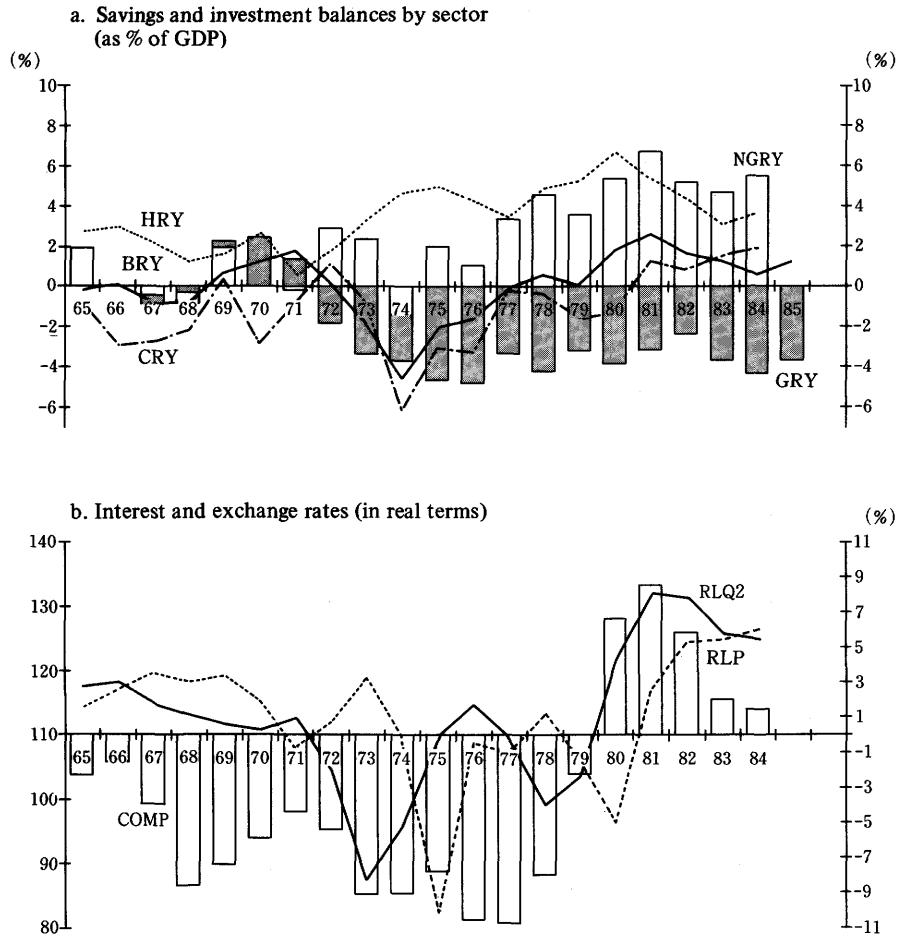


Note: see Figure 2 for definitions.

IV. Saving and Investment Equations by Sector

The statistical tests reported below were based on annual national accounts data published by the OECD.[15] Savings and investment are available by three broad sectors: general government, corporate business and household (including nonincorporated businesses) sectors.[16] Expanding the expression for excess private sav-

Figure 8 United Kingdom



Note: see Figure 2 for definitions.

15. Fuller details on data sources are given in Appendix II.

16. For some countries, the corporate sector is further subdivided into public and private. Where this is the case, the public corporate sector is added to the general government sector (to get the public sector).

ings, equation (1) in Chapter I above can be rewritten as:

$$X - M = CS - CI + HS - HI + T - G - ST\ [+STAT] \qquad (9)$$

where:

CS	= Gross savings, corporate sector
CI	= Gross fixed capital formation, corporate sector
HS	= Gross savings, household sector
HI	= Gross fixed capital formation, household sector
T − G	= General government budget surplus
ST	= Increase in stocks
STAT	= Statistical discrepancy (added to savings).

An explicit statistical discrepancy appears in the accounts of Canada, the United States, Japan and the United Kingdom. For the other three countries, presumably one or more elements of savings-investment balances are derived residually. Only annual data are available.

The basic approach was to estimate equations for CS, CI and (HS-HI).[17] The main aim was to estimate equations that could be applied to all countries, including – where possible – terms to capture cyclical, interest rate and exchange rate effects.[18] The need to estimate directly comparable equations inevitably limited the sorts of variables that could be used. Before discussing in more detail the particular equations estimated, one general issue needs to be addressed: the appropriate specification of real long-term interest rates.

As real expected interest rates depend on unobservable expectations of future inflation, they cannot in general be measured. There are of course many theories about how expectations might be formed, and many more ways of generating series for expected inflation. The simplest method is to deflate interest rates by the present rate of inflation — this is perhaps the 'conventional' real interest rate. In this case, expected future inflation is simply the prevailing rate of inflation. At the other extreme, a number of researchers have calculated 'ex post' real interest rates by using actual inflation over the borrowing period. This implicitly assumes that future inflation rates are perfectly foreseen. For instance, the real rate of interest on a ten-year

17. The reasons for combining HS and HI are considered more fully below.

18. For studies that attempt to incorporate income and interest rate effects, see von Furstenberg (1980) and Ueda (1985). The former applied a fully-specified simultaneous equation system for the United States; the latter adopted a much simpler approach, but in a two-country model (United States and Japan). Neither appear to include direct exchange rate effects.

bond issued in 1973 would be defined by reference to the actual rate of inflation in the period 1973-83. Both methods are clearly imperfect, and it is difficult to decide how best to combine these two extreme approaches. The solution adopted in this paper was to examine two variants of both real interest rates.

First, *the 'conventional' real interest rate* was defined by the nominal rate of interest (RLP) divided by the year-on-year change in the GDP deflator (DPY):

$$RLP = [1 + RL/100]/[DPY]$$

where RL = long-term nominal rate of interest; and
DPY = PY/PY(−1) where PY is the GDP deflator.

The GDP deflator, the broadest measure of a country's fundamental inflation, was used in preference to an expenditure deflator (such as the consumer expenditure deflator) because import prices – which have had large, but temporary, effects on inflation during the last decade or so – are excluded.

Secondly, *a 'forward-looking' measure of real interest rates* was defined as:

$$RLQ2 = [1 + RL/100]/[DPY(+1)\cdot DPY(+2)^{1/2}.$$

Here actual future rates of increase in the GDP deflator were used as proxies for expected inflation. The rationale is that temporary surges in inflation (such as occurred in 1974/75 and again in 1980) were not at that time expected to persist. But while perhaps inflation can be accurately forecast one or two years ahead, it would be unrealistic to assume that this can be done over a much longer period.

These two measures have diverged sharply during the last decade or so (see Figures 2 to 8). In the case of Japan, for example, the inflationary consequences of the First Oil Crisis, the slow adjustment of policy and the inflationary response of labour were particularly severe: in 1974 the GDP deflator rose by over 20%. In that year, nominal long-term interest rates rose to 11-12% implying real rates – conventionally defined – of around minus 7%. But in 1975 and 1976, inflation fell to around 7%: those who had bought long-term bonds in 1974 therefore earned a real interest rate – defined in the forward-looking way used in this paper – of over 4%. The gap between the two measures thus amounted to around 11 percentage points. As inflation fell further in later years, actual *ex post* returns have been still greater.

What was particularly striking about the estimated equations (described in more detail below) was that the 'forward-looking' measure of real interest rates performed better than the conventional measure in household excess saving equations for all countries (Table 3), whereas almost exactly the opposite was the case for the corporate investment equations (Table 2). Overall the forward-looking measure was statis-

tically significant in virtually every case; this was not true for the real interest rate conventionally defined.

Incidentally, these calculations throw some doubts on one of the supposed "facts" of the interest rate effects of the First Oil Crisis. The usual view is that excess world savings (as income was transfered from low- to high-savers) in the mid-1970s put downward pressure on interest rates worldwide. But this is only true for real interest rates conventionally-defined: on a forward-looking definition, real interest rates rose steadily from 1973 in every major country – by 1975, interest rates were positive in all countries bar Italy.

1. Corporate Savings

The analysis of savings-investment balances in Chapter II suggested that one important potential channel whereby the exchange rate can directly affect aggregate domestic savings is through the profitability of the corporate sector as a lower real exchange rate increases the profitability of producing tradeable goods. This is primarily a short-run effect. Long-run equilibrium profits depend only on the cost of capital and the necessary return to entrepreneurship: an exchange rate appreciation temporarily reduces profits and, if sustained, leads eventually to exit from the industry. Also, profitability is cyclically sensitive. The CS equation was therefore specified as follows:

$$CS/YN = a + bCOMP + cCU + dRSP$$

where YN = GDP at factor cost;
COMP = Relative unit labour costs in manufacturing expressed in a common currency (that is, ratio of ULCs in a given country to a weighted average of ULCs in other countries; 1980 =100);
CU = Ratio of actual to potential GDP;
RSP = Real short-term interest rate.

In this paper, COMP was taken as a measure of the real exchange rate, so that it reflects differential inflation movements as well as changes in nominal exchange rates. The final term was included for those countries where the corporate sector is heavily dependent on bank loans at terms that follow domestic short-term interest rates. In some cases, profit shares appear to have a distinct secular trend that is captured by the inclusion of a time trend. Finally, the First Oil Crisis and its immediate aftermath appear to have abnormally depressed profit levels, perhaps because it had consequences that enterprises found hard to predict in advance, perhaps because

Table 1 Regressions of Corporate Savings

Dependent variable is gross corporate savings as a ratio of GDP at factor cost	International Competitiveness	Cyclical Term	Real short-term interest rate	Time trend	Dummy Variable	Constant term	Adjusted R^2	DW or (RHO)	Period of observation	Form of regression
CS/YN	COMP X 10^3	CU (or DG) (DG X 100)	RSP	X 10^{10}						
United States	–0.0207	0.167DG		0.224	–0.0122D7374	0.109	0.69	1.08	1965-84	OLS
	(2.4)	(3.9)		(2.2)	(3.4)	(15.4)				
	–0.0252	0.129DG		0.188	–0.0110D7374	0.113	0.88	(0.61)	1965-84	AR1
	(1.7)	(3.8)		(1.6)	(3.3)	(9.3)		(3.0)		
Japan	–0.132	0.356	–0.707		–0.0648D74	0.643	0.85	1.78	1965-84	OLS
	(7.4)	(3.4)	(6.0)		(4.1)	(3.2)				
Canada	–0.128	0.299	–0.199	0.414		0.154	0.60	2.20	1965-84	OLS
	(3.2)	(3.0)	(2.1)	(1.7)		(0.9)				
France	–0.054	0.493	–0.107	0.641	–0.0147D74	–0.244	0.84	1.62	1970-84	OLS
	(1.0)	(6.6)	(1.6)	(3.8)	(2.5)	(1.8)				
Germany	–0.0955	0.157		0.398		0.075	0.66	1.91	1965-84	OLS
	(4.6)	(1.9)		(2.1)		(0.8)				
Italy	–0.0532	0.290				–0.183	0.85	1.76	1965-84	OLS
	(3.1)	(9.1)				(4.8)				
United Kingdom	–0.0733	0.0019DG	–0.070	0.272	–0.0317D(74-76)	0.226	0.69	1.11	1965-84	OLS
(excluding profits of	(5.7)	(2.2)	(1.1)	(1.4)	(4.7)	(3.7)				
N. Sea oil companies)	–0.0738	0.0015DG	–0.010	0.218	–0.0319D(74-76)	0.147	0.83	(0.64)	1965-84	AR1
	(4.7)	(2.1)	(0.2)	(1.2)	(5.9)	(3.0)		(3.5)		

Note: Figures in parentheses are t-ratios.

it was associated with wage explosions of varying intensities in different countries. Dummy variables were therefore added to prevent the regressions being unduly influenced by what was clearly a rather special event. The regression results obtained are shown in Table 1.

It is clear that international competitiveness has a significant positive impact on corporate savings for five of the seven countries studied, with the greatest impact noted for Japan and Canada. This may reflect these countries' relatively high export dependence on the United States where export pricing is often in terms of dollars. In Japan, a 10 % increase in the real exchange rate (that is, in relative unit labour costs) reduces corporate profitability (measured by gross corporate savings) by the equivalent of 1.32 percentage points of GDP; this clearly implies a major current account impact. German profitability was next most sensitive, followed by the United Kingdom (nonoil companies only) and Italy. Although not significant, the coefficient in the French equation was about the same size as that for Italy. As might be expected, profitability in the United States was least affected by international competitiveness, although even there, some effect is detectable. There were, however, some indications that this competitiveness effect may not be linear. In particular, there was a large unexplained residual in the equation for Japan for 1978 when the real exchange rate peaked. It is possible that very large – and sudden – changes in international competitiveness cannot be absorbed in profits: instead, less profitable production ceases, and output falls thus limiting the decline in average profitability (Major exchange rate changes that are less sudden allow greater scope for structural adjustment in exporting industries; — see Onitsuka (1983) for a discussion of this process in Japan.)

2. Corporate Investment

Corporate investment, sensitive to profitability, is also likely to depend inversely on the real exchange rate. A higher real exchange rate may make marginal investment projects less attractive. Also, multinational corporations may react to a higher real exchange rate in their own country by locating plants 'offshore' – a phenomenon that may have been important recently in the United States. In addition, investment depends on capacity utilisation and real interest rates. In general, time lags are likely to be more important than in the case of corporate saving equations. The general form of the equations used was (the lags used are shown in Table 2):

$$CI/Y = a + \Sigma b_i \, COMP_{t-i} + \Sigma c_j \, CU_{t-j} + \Sigma d_k \, R_{t-k} + ePOTG$$

where: R = Long-term real rate of interest (defined in both 'conventional' and 'forward-looking' ways);

Table 2 Regressions of Corporate Investment

Dependent variable is gross fixed corporate investment as a ratio of GDP		International Competitiveness	Cyclical Term	Real long-term interest rate		Growth rate of potential GNP	Constant Term	Adjusted R^2	DW or (RHO)	Period of Observation	Form of Regression
				Conventional	Forward-looking						
CI/GDP		COMP $\times 10^3$	CU	RLP	RLQ2	POTG $\times 10^2$					
United States	(a)	−0.0285 (0+1) (3.2)	0.084 (1) (2.8)	0.0421 (1) (0.7)			−0.019 (0.4)	0.47	1.47	1966-84	OLS
	(b)	−0.0147 (0+1) (1.3)	0.020 (1) (0.4)		−0.070 (1) (1.1)		0.148 (1.5)	0.43	1.60	1966-84	OLS
Japan	(a)	−0.0595 (0) (4.5)	0.518 (0+1) (10.1)	−0.212 (0+1) (3.4)		0.31 (3.2)	−0.112 (1.0)	0.95	1.79	1966-84	OLS
	(b)	−0.0340 (0) (2.5)	0.542 (0+1) (7.5)		−0.0671 (1.1)	0.43 (3.6)	−0.323 (2.5)	0.91	1.25	1966-84	OLS
Canada	(a)	−0.171 (0+1+2) (5.3)	−0.089 (0) (1.6)	−0.330 (1+2) (5.6)			0.733 (7.0)	0.74	1.73	1967-84	OLS
	(b)	−0.0755 (0+1+2) (1.8)	−0.247 (0) (2.7)		−0.271 (1+2) (4.0)		0.737 (5.2)	0.60	1.55	1967-84	OLS
France	(a)	−0.0083 (0) (0.9)	0.209 (1) (7.8)	−0.115 (1) (3.0)			0.026 (0.6)	0.79	2.05	1966-84	OLS
	(b)	−0.0095 (0.9)	0.175 (1) (4.7)		−0.052 (1) (1.5)		−0.003 (0.03)	0.71	1.84	1966-84	OLS
Germany	(a)	−0.0494 (1+2) (2.6)	0.198 (1) (2.7)	−0.484 (0+1) (3.7)			0.509 (2.7)	0.78	0.92	1966-84	OLS
	(a)	−0.0521 (1+2) (2.2)	0.169 (1) (2.4)	−0.561 (0+1) (3.9)				0.92	(0.55) (2.7)	1966-84	AR1
	(b)	−0.0321 (1+2) (1.5)	0.232 (1) (2.9)		−0.282 (0+1) (2.8)		0.249 (1.6)	0.73	1.20	1966-84	OLS
Italy	(a)	0.0139 (0) (0.8)	0.035 (1) (0.8)	−0.243 (0+1) (7.4)		0.66 (6.4)	0.250 (4.3)	0.84	1.71	1966-84	OLS
	(b)	0.0031 (0) (0.1)	0.076 (1) (1.4)		−0.132 (0+1) (5.2)	0.13 (1.1)	0.126 (2.0)	0.73	1.24	1966-84	OLS
United Kingdom	(a)	0.0081 (0.9)	0.168DG (1) (2.2)	−0.187 (0+1+2) (3.0)			0.260 (4.1)	0.30	1.81	1967-84	OLS
	(b)	0.022 (2.1)	0.074DG (1) (1.1)		−0.174 (0+1+2) (3.3)		0.232 (4.9)	0.36	1.07	1967-84	OLS

Note: Figures in parentheses under the estimated coefficients are t-ratios. Figures in square brackets to the right indicate the pattern of lags employed: (0) no lag; (1): one year lag; (2): two-year lag; and sums indicate that a simple arithmetic average was used.

POTG = Potential growth rate of the economy.

The potential growth rate was included because the transition to much slower growth in most countries after 1973 would itself have tended to reduce the investment/GDP ratio. The results obtained are shown in Table 2.

It is noteworthy that in virtually every case there were significant, and quite powerful, interest rate effects on investment, however real interest rates were defined. In the case of Japan, for instance, a one percentage point rise in real interest rates reduces the investment/GDP ratio by 0.212 percentage points, equivalent to a 1.56 percentage fall in investment.[19] Direct interest rate effects appeared to be most powerful in the case of Germany. For Canada and Italy, interest rate impacts were also quite high, and the total effect of recent changes has been particularly large because real interest rates have risen steeply in these countries (see Figures 3 and 7).

The striking exception to this picture of high interest rate sensitivity was the United States. The coefficients on both conventionally-defined and forward-looking measures of real interest rates were low and insignificant. The reasons for this have been widely explored, and may reflect the substantial gap between pre- and post-tax interest costs in the United States. This difference has two important international consequences. The first is that higher interest rates worldwide, however caused, are likely to tend to reduce the United States current account surplus (or increase the deficit) relative to that of other countries where investment is more interest rate elastic. Secondly, the Mundell-Fleming model outlined in Chapter II above suggests that low interest sensitivity of domestic investment tends to magnify the exchange rate appreciation that may result from a positive demand shock. The low interest rate sensitivity of U.S. investment may help to explain why the dollar appreciated so far in the early 1980s and thus explain the emergence of recent current account imbalances.[20]

A higher exchange rate appeared to depress investment in four of the seven countries studied. But the impact was almost always smaller than on corporate savings (compare the coefficients on COMP in Tables 1 and 2). Therefore McKinnon's perverse case (cited in footnote 8 above) was not obtained: a higher exchange rate reduced excess corporate savings because gross savings are depressed more than gross

19. The average investment/GNP ratio over the period of the regression is 0.136: 1.57=0.213/0.136.

20. In a study based on the period 1958 to 1978, von Furstenberg found that about half of the fall in underlying U.S. saving rates was reflected in lower foreign investment, and not domestic investment. This appears to be broadly consistent with the recent experience of the major savings shortfall in the United States: despite high interest rates, investment had held up quite well while net exports declined sharply.

investment.

For France and Italy, the coefficients were not significant; the case of the United Kingdom was more ambiguous and sensitive to specification. Taking again Japan, a 10% increase in the real exchange rate reduced the investment/GDP ratio by 0.581 percentage points (or investment by 4.27%, applying the average investment/GDP ratio cited earlier). Some idea of the relative magnitudes of interest and exchange rate effects can be obtained by looking at recent Japanese experience where investment was stimulated by the lower real exchange rate, and depressed by higher real interest rates. Comparing the period 1982/84 with 1975/79, real interest rates rose by around 5 percentage points, depressing the investment/GDP percentage by 1.1 points. But the real exchange rate fell by around 25% and this is estimated to have increased the investment/GDP percentage by 1.9 points. Overall, then, the exchange rate effect dominated. The last fifteen years have witnessed enormous shifts –up and down – in the real exchange rates of major currencies. The size of the impact of exchange rate terms in these equations suggests that these swings have not in general been discounted by corporations as being purely temporary. Because the real exchange rate has affected the level of investment – and thus potential output – exchange rate misalignments are likely to have had durable consequences.

The inclusion of POTG to investigate whether the transition to slower growth led to lower investment produced clear results only in the case of Japan and Italy. In Japan, there was apparently a particularly sharp break in the economy's potential growth rate in the early 1970s: the shift that occurred (from a growth rate of around 9% to one of around 4 1/2%) is estimated to have reduced the investment/GDP percentage by about 1 1/2 percentage points. Italy was affected in a broadly similar way. These changes have important implications for structural shifts in savings-investment balances (see below).

3. Excess Household Savings

The regressions of the excess household saving ratio included terms for the cycle, real interest rates and a proxy for the wealth effects of inflation. Statistical studies – particularly those conducted after the First Oil Crisis – have generally shown that households react to higher inflation by increasing their savings. The rationale for this is often thought to be that higher inflation reduces the real value of households' stock of financial assets, and that higher savings are necessary to restore their earlier position. Theoretically, the correct variable to capture this is the average nominal rate of return on financial assets held by households minus the rate of inflation. However, construction of this variable using short-term interest rates to proxy for the nominal rate of return performed better than the rate of inflation entered alone only for the United Kingdom. With this exception, the regression

equation used was:

$$(HS - HI)/YDH = a+b[PC/PC(-1)] + cCU + dRLQ + other$$

where:

YDH = Disposable income, household sector;
PC = Private consumption deflator;
RLQ = Real rate of interest, defined in a 'forward-looking' way
RS = Nominal short-term rate of interest.

For the United Kingdom, the wealth effect term was proxied by

$$[PC/PC(-1)]/[1+RS(-1)/100].$$

The choice between long- and short-term interest rates was made statistically. Where households have access only to short-term interest rates (whether because only short-term financial assets are held or because the return on financial assets available to them tends to be influenced by short-term interest rates, as, for example, is the case for long-term Postal Savings in Japan), short-term interest rates will be appropriate. It turned out that for Japan and for France the explanatory power of real short-term interest rates was greater:

$$RSPF = [1 + RS/100]/DPY(+1).$$

This applies the actual rate of inflation over the following year to the current short-term interest rate. For other countries, the long-term interest rate was used, as described above. For the United Kingdom, the actual average rate of inflation over four successive years was used to deflate nominal interest rates:

$$RLQ4 = [1+RL/100]/[DPY(+1)\cdot DPY(+2)\cdot DPY(+3)\cdot DOY(+4)]^{1/4}.$$

Although this definition of real interest rates had the greatest explanatory power statistically, the use of shorter averages also produced significant interest rate effects.

While the effect of higher real interest rates on gross savings is theoretically indeterminate,[21] the effect on excess savings seems likely to be positive since higher interest rates reduce real household investment.[22] For three of the countries (Japan, Canada and the United Kingdom), this was clearly the case; for the United States, the estimated coefficient had the right sign, though it was not statistically significant (Table 3). One reason why higher interest rates in the United States did not appear to increase excess household savings is the tax-deductibility of household interest pay-

Table 3 Regressions of Excess Household Savings

Dependent variable is gross household savings minus gross investment as a ratio of disposable income. (HS-HI) / YDH	Wealth Effect		Cyclical Term	Real interest rate		Other variables		Constant	Adjusted R^2	DW or (RHO)	Period of observation	Form of regression
	PC/PC (−1) = P2	P2/RS (−1)	CU	Coefficient	Variable	Coefficient	Variable					
United States	0.343 (1) (2.4)		0.320 (1) (2.7)	0.215 (1.4)	RLQ2 (−1)			−0.858 (2.4)	0.28	1.01	1967-84	OLS
	0.367 (1) (2.5)		0.315 (1) (2.5)	0.245 (1.3)	RLQ2 (−1)			−0.908 (2.6)	0.43	(0.48) (2.1)	1967-84	AR1
Japan	0.091 (1) (2.3)			0.130 (3.3)	RSPF	−0.0091 (9.9)	POTG	−0.075 (1.2)	0.89	1.73	1967-84	OLS
Canada	0.668 (0) (6.0)		−0.597 (1) (3.6)	0.301 (3.1)	RLQ2			−0.347 (1.5)	0.82	2.12	1967-84	OLS
France (a)	0.212 (1) (3.6)			−0.127 (1.8)	RSPF			−0.052 (0.6)	0.41	2.15	1967-84	OLS
(b)	0.193 (1) (4.6)			−0.095 (1.8)	RSPF	−0.017 (3.9)	D6980	−0.063 (1.1)	0.70	2.64	1967-84	OLS
Germany (a) (Gross saving)	0.556 (0) (6.5)			−0.161 (2.2)	RLQ2			−0.292 (3.1)	0.69	1.56	1966-84	OLS
(b)	0.511 (0) (7.1)			−0.176 (3.0)	RLQ2	0.015 (2.9)	D75	−0.231 (2.8)	0.79	1.95	1966-84	OLS
Italy	0.299 (1) (5.9)			−0.268 (3.7)	RLQ2			0.062 (0.7)	0.72	1.94	1967-84	OLS
United Kingdom		0.440 (4.2)		0.102 (3.8)	RLQ4			0.341 (4.2)	0.49	1.72	1966-84	OLS

Notes: Figures in parentheses are t-ratios.

ments. No such deductibility applies in the case of Canada, and virtually none in the case of Japan – the countries with the largest estimated impacts of interest rates on household savings.[23] For Germany (where data on only gross savings are available), higher interest rates actually appear to reduce savings. In Italy, and to a lesser extent in France, higher interest rates actually reduced net savings. One possible explanation for the hard-to-explain Italian results is that very high inflation rates create measurement problems both for savings (gross *versus* net of the inflation-induced loss on financial assets) and for real interest rates (the gap between real and real after-tax rates being widened by inflation). Estimates that take account of these factors suggest that higher real after-tax interest rates in Italy do increase savings: see Lecaldano Sasso La Terza et al. (1985).[24]

The 'forward-looking' measure was clearly superior to the 'conventional' interest rate (which was generally insignificant) – the opposite of the result obtained for the corporate sector. The reason for this is that loans for housing investment typically

21. In the case of an individual household, two cases can be considered:
i) If a consumer can borrow to finance future consumption, savings are guided by the maximisation of the present value of aggregate consumption through time. In this case, the theoretical impact of high interest rates is indeterminate because income and substitution effects work in opposite directions.

However, a temporary increase in interest rates would presumably have only a small income effect through the whole life cycle so that the substitution effect would dominate (that is, higher interest rates would lead to higher savings). This consideration is probably relevent for household savings through institutions, especially through pension schemes. While a permanently higher level of interest rates reduce the contributions needed to 'buy' a given pension provision (that is, savings are reduced through the income effect) contributions are not in general adjusted for temporary changes in interest rates (that is, there is no income effect for short-run changes in interest rates).
ii) If a consumer needs to save for lumpy future purchases (that is, borrowing is constrained), higher interest rates can 'bring forward' such consumption.

In the case of *households in aggregate,* the relative weight of income substitution effects can differ radically among different groups, and such differences can have an important impact on the aggregrate response of savings to interest rate changes. For example, if a large proportion of financial assets are held by retired people who have a low or negative saving ratio (the situation in the United States?), higher interest rates will tend to reduce savings.

22. Both financial and real assets allow households to provide for future consumption. By increasing the relative attractiveness of financial assets, higher real interest rates will cause some substitution of financial for real asset investment even if total savings (i.e., increase in total assets, whether real or financial) are constant.

23. In Japan, most households' interest earnings are effectively tax-exempt; tax allowances for house purchase – and not for interest payments on mortgages – are rather modest.

24. Strauss-Kahn (1983) found that higher nominal interest rates in France tended to reduce financial savings – a result broadly consistent with the findings in this paper.

carry interest rates that remain fixed for the whole duration of the loan. Households thus tend to be "locked-in" to constant nominal interest rates so that future inflation prospects are central to the household's calculation of interest rate costs. The corporate sector, on the other hand, relies more heavily on short-term finance; and the interest rate charged on long-term loans often changes short-term rates. Because the corporate sector is less "locked-in", expectations may matter less. Another related explanation is that expectations of future movements in house prices dominated the formation of household inflation expectations and that house prices were widely thought to have reached, or even exceeded, their peak at the height of the two major inflationary episodes in 1974/75 and 1980. Aggregate output prices – more relevant for corporate investment decisions – did not in general rise as fast so that the deceleration that occurred may have been rather harder to foresee.

The finding that the transition to slower growth in Japan led to a higher saving ratio (compare the negative sign on POTG in Table 3) is rather puzzling because most theories of the consumption function predict that a lower rate of growth is associated with lower saving ratios (see, for example, Sturm (1983) pp. 153-155 for a further discussion of this point). Horiye (1985) points out that during the High Growth Era the saving ratio followed a rather stable upward trend as might be expected from positive rate of growth effects; but it is hard to explain why the saving ratio remained high (relative to its pre-1970 level) in the early 1980s despite a major deceleration in income growth.

The inflation-rate proxy for financial wealth effects had the theoretically-expected sign in all cases. Inflation reduces the real value of financial assets and thus tends to increase household savings as households strive to restore their earlier position. An exchange rate appreciation, by lowering consumer prices, therefore tends to reduce the household saving ratio through the standard wealth effect. How important has this been in recent years? In the United States, the declining household saving ratio since 1982 has been almost as important as the increased government budget deficit in explaining the large current account deficit, and the sharp drop in inflation in the early 1980s has been a significant factor behind lower household savings. This trend has been influenced by large swings in import prices (ammual percentage changes):

	Saving ratio	PC/PC(=1)	PY/PY(−1)	PM/PM(−1)
1979	2.9	9.0	8.5	17.2
1980	4.2	10.4	9.6	19.9
1981	4.7	9.1	8.9	0.9
1982	5.4	5.9	6.9	−6.3
1983	3.2	3.8	4.5	−4.5
1984	3.6	3.2	3.7	−2.0

While it is impossible to disentangle domestic and international influences without a model of inflation, it is clear that the rapid rise in import prices in 1979 and 1980 led to a rate of consumer price inflation somewhat above the rise in the GDP deflator. The saving ratio rose, and the current account deficit was reduced. As inflation fell back, this process was reversed. The coefficient of P2 (that is, PC/PC(−1) in Table 3) suggests that the 5.3 percentage point drop in the inflation rate from 1981 to 1983 almost exactly explains the fall in the saving ratio in the years to 1984. For all other countries (except, surprisingly, Japan), this wealth effect appears to have been quite strong, and stimulated consumption as declines in international commodity prices have depressed import prices. The result for Japan may suggest that there are rather powerful forces supporting the high saving ratio and that these are rather impervious to terms of trade gains.

4. Budget Deficits and the Dollar

These equations may shed some light on whether excessive fiscal expansion in the United States can explain the overvaluation of the dollar that developed in the first half of the 1980s. In the past most econometric models of a single country have concluded that fiscal expansion worsens the current account and lowers the exchange rate. In other words, trade – not financial – flows dominate exchange rate determination. A recent attempt by the Japanese Economic Planning Agency (EPA) to analyse this question in a multicountry framework concluded that a higher exchange rate would occur only in the case of the United States; for all other countries, the result – with minor exception – was that the exchange rate would depreciate.[25] However, this conclusion has been challenged by Ishii, McKibbin and Sachs (1985) who argued the increase in capital mobility in recent years has invalidated earlier empirical estimates. In particular, they argued that a positive demand shock in Japan would now lead to a rather durable appreciation of the exchange rate.

The model outlined in Section II does indeed suggest that greater capital mobility – as captured by f in the model – does make an exchange rate appreciation a more likely consequence of fiscal expansion. But it is also clear from that model that the exchange rate appreciation will be greater, the lower the aggregate marginal propensity to save and the smaller the sensitivity of domestic investment to interest rates. Both characteristics are evident in the United States, and this may help to explain why the dollar reacted so strongly.

The upward pressure on the dollar was reinforced by lower government deficits in the other giant economies (Germany and Japan). Higher excess savings in these

25. Even in the case of the United States, the induced exchange rate appreciation was rather small. See EPA (1984) for a discussion of these simulations.

countries tended to increase capital flows to the United States: in terms of Figure 1, the FF schedule facing the United States was shifting. This important interaction is captured in Ueda's recent work on the Japan-US imbalance.

It appears, then, that the confluence of a number of rather special factors explain why the dollar appreciated so far. Such conditions are perhaps unlikely to be replicated in other countries. In Germany and Japan, in particular, both savings propensities and the interest rate sensitivity of savings and investment are much higher than in the United States. These characteristics would serve to damp an incipient exchange rate appreciation induced by fiscal expansion.

V. Explaining the Current Account

1. SI Balances: Impact of Interest Rates, Exchange Rates and Income

The next step was to examine how well the savings-investment trends identified in the equations above tracked actual current account developments. The statistical properties of each individual equation were examined in the previous section. To check whether errors in the component equations accumulate, "fitted" excess aggregate savings were calculated by adding the three equation results together. The current account was then regressed on this "fitted"value. Also included were variables for the other components of aggregate savings: the government budget surplus, with both a noncyclical (GOVT) and cyclical component (T – G – GOVT, where T – G is the actual surplus), and stockbuilding (ST).[26] It follows from equation (9) in Chapter IV above that the coefficients of each excess savings term should be one (and minus one in the case of stockbuilding) with a zero intercept term.

The use of only annual data rather severely restricted the degrees of freedom available and thus limited the number of independent variables that could be used. The various components were therefore aggregated in two ways:

(i) The fitted value of excess private savings was added to cyclical changes in the government budget deficit to yield the first variable; the noncyclical government budget deficit and stockbuilding were the other variables used. Rewriting equation (9), the grouped elements of excess domestic savings are gathered within square brackets:

26. The cyclical and noncyclical split is taken from OECD estimates (see OECD (1983) and Muller-Price (1984) for details and further discussion). Where public and private corporate enterprises are shown separately in OECD National Accounts, the net savings of public enterprises are added to the structural government budget deficit.

$$[CS - CI + HS - HI + T - G - GOVT] + GOVT - ST. \quad (10)$$

The results are shown in Table 4. Note that the t-ratios for the estimated coefficients of the various elements of domestic savings are t-ratios testing the null hypothesis that the coefficients do not differ from unity.

(ii) "Fitted" private savings were split into household and corporate savings; other variables were the actual government budget deficit and stockbuilding. Elements of excess domestic savings were grouped as follows:

$$[CS - CI] + [HS - HI] + [T - G] - ST. \quad (11)$$

The results are shown in Table 5.

A particular problem was how to treat, when it existed, the statistical discrepancy between excess domestic savings and the current account. If the measurement errors are deemed more likely to occur in a particular component of domestic savings, the statistical discrepancy could legitimately be added to that component; this was, for example, the tactic adopted by von Furstenberg (1980) in his study of the United States.[27] However, there is no good general reason for supposing that this is so for other countries.

In order to isolate the influence of the statistical discrepancy, but without distoring any particular domestic component of savings, it was added to the current account on the left-hand side of the equations shown in Tables 4 and 5. This obviously tended to reduce some of the 'noise' in the equation. It should be borne in mind that, for some countries for some years, the statistical discrepancy was uncomfortably large and this fact reduces the usefulness of the savings-investment approach for short-term current account prediction. To test the sensitivity of the results obtained to the exclusion of the statistical discrepancy, equations in Table 5 were re-run with the statistical discrepancy left in the residual (see below).

The results for Canada, France, Italy and the United Kingdom shown in Table 4 were satisfactory. The estimated coefficients on net savings were not too distant from unity (minus one in the case of stockbuilding): for these countries, no coefficient was significantly different than one (compare the t-ratios testing the null hypothesis that coefficients equal one). The explanatory power of the equations was also generally high. Results for Japan were quite badly affected by the poor predictive performance of the equations in 1973 and 1978: once these years were excluded (compare equations with dummies added), the results were broadly comparable to those for the other four countries. Nevertheless, the coefficient of the fitted value of private net

27. He concluded that the statistical discrepancy in the United States arose mainly because household savings were incorrectly measured.

savings was significantly different from one, and the intercept term was significantly positive. This implies the persistence of current surpluses in Japan not fully explained by the SI equations. Although no coefficient in the German equation was significantly different from one, the equation's explanatory power is somewhat lower than average, largely because household savings are poorly correlated with current account developments (see Table 5). The explanatory power of the United States equation appeared to be worst of all. Excluding the late 1960s (when large cyclically-adjusted government deficits were associated with virtual current account equilibrium) and 1975 (when there was a major recession associated with the First Oil Crisis) improved matters somewhat. Because movements in net private savings were poorly tracked by the equations (perhaps because private saving behaviour has been relatively stable?), the dominant identified influence on the current account appears to have been the cyclically-adjusted government deficit (compare equation (c) in Table 4) —an echo of a frequent theme of recent discussions about present macroeconomic imbalances in the United States. None the less, the coefficients on all domestic saving terms remained significantly different from unity.

For a number of countries, the current account bears a closer relation to excess corporate savings than to excess household savings (Table 5). For Canada and France, the link is almost one-to-one; and there is a close relation in the case of Germany and the United Kingdom. For all four countries, the coefficients on net savings by corporations are not significantly different from one (Table 5). Only in the case of Italy and Canada was the link between household savings and the current account at all well established. This result may well reflect the greater variability of nonresidential corporate investment, and may be similar to Sachs's finding that investment has tended to dominate current balance developments. But an additional factor is the role played by corporate profitability – in turn heavily dependent on the real exchange rate.

The inclusion of the statistical discrepancy in the residual did not in general lead to any drastic changes in the estimated value of the coefficients. The main exception to this was the coefficient of excess corporate savings in the United Kingdom equation which fell to 0.956 in Table 5 to only 0.481 in Table 5-BIS. This may indicate that the measurement discrepancies that arise in the UK national accounts may reflect measurement errors in corporate income, savings and investment.

It is perhaps not too surprising that the rudimentary equations shown in Tables 1 to 3 were not very useful for short-term prediction of current account equations. This seems evident because:

- stockbuilding, which is not explained, is highly variable and explains much of the short-run variability of SI balances;
- the year-to-year swings in the statistical discrepancy are sometimes quite large;

Table 4 The Current Account and Savings-Investment Balances

All variables are ratios of GDP.	Private net savings (fitted) + cyclical changes in government balance	Cyclically-adjusted government balance	Stockbuilding	Dummy variables	Constant term	Adjusted R^2	DW	Period of observation	Form of regression
	SUMI/GDP	GOVT/GDP	S/GDP						
United States (a)	0.335	0.203	−0.640		−0.0011	0.13	0.79	1967-84	OLS
	(3.9)	(4.7)	(1.1)		(0.3)				
(b)	0.111	0.414	−0.562		0.0032	0.22	1.03	1970-84	OLS
	(4.0)	(2.8)	(0.7)		(0.8)				
(c)	0.172	0.523	−0.425	0.015D75	0.0018	0.42	1.36	1970-84	OLS
	(4.3)	(2.6)	(2.0)	(2.2)	(0.5)				
Japan (a)	0.294	0.742	−1.140		0.0294	0.47	1.67	1967-84	OLS
	(3.8)	(1.3)	(3.1)		(2.1)				
(b)	0.560	1.156	−1.388	−0.021D73+0.027D78	0.03344	0.72	1.54	1967-84	OLS
	(2.5)	(0.9)	(1.4)	(2.2) (3.3)	(3.1)				
Canada	0.927	0.780	−0.991		−0.0016	0.53	1.93	1967-84	OLS
	(0.3)	(1.2)	(0.03)		(0.6)				
France	0.995	0.605	−0.808		0.0002	0.52	1.92	1970-84	OLS
	(0.02)	(1.2)	(0.5)		(0.06)				
Germany (a)	0.636	0.794	−0.715		0.0024	0.25	1.25	1967-84	OLS
	(1.3)	(0.8)	(0.8)		(0.6)				
(b)	0.791	0.929	−0.838	0.017D78	0.00008	0.34	1.35	1967-84	OLS
	(0.7)	(0.3)	(0.5)	(1.7)	(0.02)				
Italy	0.772	0.832	−1.145		0.0094	0.71	1.90	1967-84	OLS
	(0.9)	(1.1)	(0.6)		(0.7)				
United Kingdom	0.705	0.809	−0.748		0.0026	0.78	1.11	1967-84	OLS
	(1.5)	(1.8)	(0.8)		(0.5)				

Notes: The dependent variable is the current account less the statistical discrepancy (if any), divided by GDP.
Figures in parentheses under the coefficients of dummy variables and the constant term are standard t-ratios.
Figures shown in square brackets under the other variables are t-ratio tests of the null hypothesis that the coefficients equal unity (or minus unity in the case of stockbuilding).

Table 5 Household & Corporate Excess Savings and the Current Account

All variables are ratios of GDP	Excess savings (fitted) by:		Government balance (actual)	Stock-building	Dummy Variables	Constant term	Adjusted R^2	DW	Period of observation	Form of regression
	Households	Corporations								
	HNS/GDP	CNS/GDP	P/GDP	S/GDP						
United States (a)	0.472	−0.285	0.110	0.068		−0.015	0.62	1.97	1967-84	OLS
	(2.0)	(6.4)	(9.0)	(3.8)		(1.5)				
(b)	0.367	−0.287	0.124	−0.217		−0.011	0.61	2.08	1970-84	OLS
	(2.1)	(5.8)	(7.4)	(2.7)		(1.0)				
(c)	0.257	−0.229	0.225	−0.278	0.011D75	−0.004	0.72	2.37	1970-84	OLS
	(2.9)	(6.5)	(7.1)	(2.9)	(2.3)	(0.5)				
Japan (a)	−0.214	0.245	0.489	−1.447		0.067	0.61	2.50	1967-84	OLS
	(3.0)	(4.5)	(2.9)	(1.4)		(3.1)				
(b)	0.205	0.516	0.937	−1.624	−0.023D73 +	0.058	0.78	1.82	1967-84	OLS
	(3.7)	(3.3)	(0.4)	(6.3)	(3.0) 0.022D78	(4.2)				
					(3.0)					
Canada	0.884	1.100	0.741	−1.011		−0.004	0.56	2.03	1967-84	OLS
	(0.6)	(0.3)	(1.4)	(0.3)		(0.6)				
France	0.614	1.010	0.761	−0.889		0.015	0.47	1.99	1970-84	OLS
	(0.5)	(0.03)	(0.8)	(0.2)		(0.5)				
Germany (a)	0.289	0.729	0.820	−0.922		0.042	0.26	1.26	1967-84	OLS
	(1.7)	(0.9)	(0.7)	(0.2)		(1.4)				
(b)	0.500	0.884	0.933	−0.996	0.016D78	0.034	0.34	1.42	1967-84	OLS
	(1.2)	(0.4)	(0.3)	(0.01)	(1.6)	(1.2)				
Italy	0.965	0.412	0.933	−1.309		−0.012	0.75	2.32	1967-84	OLS
	(0.1)	(1.8)	(0.4)	(1.2)		(0.7)				
United Kingdom	0.162	0.956	0.567	−1.135		0.018	0.83	1.28	1967-84	OLS
	(2.1)	(0.3)	(3.1)	(0.5)		(1.4)				

Notes: The dependent variable is the current account less the statistical discrepancy (if any), divided by GDP.
Figures in parentheses under the coefficients of dummy variables & the constant term are standard t-ratios.
Figures shown in square brackets under the other variables are t-ratio tests of the null hypothesis that the coefficients equal unity (or minus unit in the case of stockbuilding).

Table 5 - BIS Household & Corporate Excess Savings, the Current Account and the Statistical Discrepancy

All variables are ratios of GDP	Excess savings (fitted) by:		Government balance (actual)	Stock-building	Dummy Variables	Constant term	Adjusted R^2	DW	Period of observation	Form of regression
	Households	Corporations								
United States (c)	0.276 (2.3)	−0.284 (5.6)	0.214 (6.0)	−0.228 (2.6)	0.0138*D75 (2.3)	−0.0052 (0.4)	0.68	2.11	1970-84	OLS
Japan (b)	0.0136 (4.3)	0.442 (3.6)	0.716 (1.6)	−1.278 (1.1)	−0.034D73 (4.1) + 0.023D78 (3.0)	0.0629 (4.3)	0.74	1.60	1967-84	OLS
Canada	0.701 (1.5)	1.054 (0.2)	0.692 (1.7)	−1.398 (1.2)		0.011 (1.5)	0.54	2.18	1967-84	OLS
United Kingdom	−0.154 (2.7)	0.481 (2.9)	0.352 (4.3)	−1.182 (0.6)		0.0218 (1.6)	0.67	0.94	1967-84	OLS

Notes: The dependent variable is the current account divided by GDP.
Figures in parentheses under the coefficients of dummy variables & the constant term are standard t-ratios.
Figures shown in square brackets under the other variables are t-ratio tests of the null hypothesis that the coefficients equal unity (or minus unity, in the case of stockbuilding)

– the residuals of the equations are often appreciable for individual years.

None the less, the tracking of developments over a few years is much better, and provides some insight into the relative importance of different factors.

Specifically, the savings-investment equations developed above can be used to decompose changes in current balances into cyclical, exchange rate and interest rate components. This may be particularly useful in analysing major current balance trends in these countries in recent years in the context of the policies pursued. The purpose of these equations is illustrative, to highlight some interesting policy issues on the basis of actual developments in income, interest and exchange rates. (The analysis of what would happen if one of these factors changed is, of course, a good deal more complicated because they are themselves endogenous.)

The discussion of this in the following paragraphs uses estimates that were derived in a similar way for each country:

(i) *Income.* This is the sum of the impact of the cyclical movements of income on corporate investment, corporate savings and household net savings shown in Tables 2, 3 and 4 plus the cyclical component of the government budget position plus stockbuilding.

(ii) *Interest rate.* This is the sum of the effects on corporate investment and household savings.

(iii) *Exchange rate.* This is the sum of the competitiveness effects on corporate investment and savings. In addition, the wealth effect on household savings due directly to changes in import prices was also added.[28] However, the competitiveness effects on corporate savings were quantitatively much more important.

(iv) *Budget deficit.* The cyclically-adjusted value was used as an indication of fiscal policy.

The split of current balance developments into these four components for selected periods in each country is shown in Table 6.

The deterioration in the United States current balance over the last few years closely mirrors the widening of the cyclically-adjusted government budget deficit. Higher real interest rates (from about 2-3% in 1980 to 7-8% after 1982 – see Figure 2b) tended to increase net private savings, but only by about 0.8% of GDP, not enough to finance the increased budget deficit. The exchange rate effect is rather

28. This decomposition was arrived at purely on the basis of the share of imports in total expenditure. This implicitly assumes that

$$DPC = mDPM + \ldots$$

where m is the share of imports in total expenditure. In practice, the impact of import prices is likely to be much larger than this because of (i) effects on the prices of competing domestic goods; and (ii) wage effects. Without a full model of inflation, it was not possible to capture this effect.

Table 6 Factors Behind Recent Current Balance Trends in Major Countries (% of GDP)

	United States			Japan			Canada			France		
	1980/81	1983/84	Change	1979/80	1983/84	Change	1975/79	1983/84	Change	1980	1982	Change
Current balance:	0.18	−1.84	−2.02	−0.96	2.37	3.33	−2.40	0.30	2.70	−1.38	−3.04	−1.66
due to:												
Exchange rate			0.23			0.89			−0.07			0.01
Interest rate			0.80			0.45			3.54			−0.09
Cycle			−1.80			0.44			−0.97			−0.24
Σ of above			−0.77			1.78			2.50			−0.32
Memorandum:												
Government budget surplus (cyclically-adjusted)			−2.67			1.85			−0.90			−1.98

	Germany			Italy			United Kingdom		
	1979/80	1983/84	Change	1977/79	1981/83	Change	1978/79	1980/82	Change
Current balance:	−1.33	0.87	2.20	1.75	−1.27	−3.02	0.34	2.07	1.73
due to:									
Exchange rate			0.50			−0.37			−2.19
Interest rate			0.55			−1.53			2.03
Cycle			−1.37			0.62			−2.86
Σ of above			−0.32			−1.78			−3.02
Memorandum:									
Government budget surplus (cyclically-adjusted)			3.08			−1.28			5.44

small, largely because the real exchange rate's impacts on savings and investment broadly cancel out.

Canada has witnessed the elimination of large and persistent current account deficits that characterised the second half of the 1970s. The major explanation for this appears to be the sharp rise in interest rates after 1981: in particular, it occurred despite an increased structural government budget deficit and a modest real exchange rate appreciation. By the end of the early 1980s, excess private savings were running at around 6 1/2% of GDP, after having been negative for most of the 1960s and 1970s.

In the case of Japan, the real depreciation of the yen – by 17% from 1979 to 1984 (Figure 3b) – directly explains about one-third of Japan's emerging current account surplus. Interest rates have also risen, although the 'swing' between the late 1970s and the early 1980s was much less dramatic than in the United States. All in all, over half of the observed change in the current balance can be explained by exchange rates, interest rates and cyclical factors. The remainder can be attributed to lower government dissaving while the structural tendency to excess private savings noted since the First Oil Crisis has persisted.[29]

The reemergence of German current account surpluses closely parallels the reduction of government budget deficits. But the lower exchange rate and higher interest rates explain around half of the total 'swing.' Greater cyclical weakness in Europe has implied a substantial cyclical drag on the German current account that appears to have more than offset the exchange and interest rate effects. This factor may explain why the German current surplus had, at least until 1984, risen less than that of Japan despite rather similar policies and competitive positions.

The major macroeconomic episode in recent French history was the adoption of expansionary fiscal policies in 1981 and beyond. This shift in policy fed almost one-for-one into the balance of payments. Italy has had similar experience, although the budget deficits have both been larger and have tended to grow.

Recent United Kingdom experience has been dominated by oil and by the adoption of restrictive fiscal and monetary policies. The reduction of the cyclically-adjusted budget deficit amounted to over 5% of GDP over the period shown in Table 6, partly because of increased tax revenue from oil production. At the same time, higher real interest rates increased net domestic private savings by about 2% of GDP. Between 1978 and 1981, the real value of sterling rose by more than 50%, although it fell back significantly in later years. The deterioration in the current balance caused by this shift is estimated to have amounted to over 2% of GDP.

29. Bergsten-Cline's (1985) estimate that a 20% dollar depreciation against the yen would eliminate about one third of the bilateral US-Japan imbalance appears to be broadly consistent with this estimate.

2. Private SI Balances: Structural Factors

Having used the savings-investment approach to decompose recent current balance developments into interest rate, exchange rate and cyclical effects, does the notion of 'structural' excess savings (or deficiency) have any useful role? In a trivial sense, the answer to this question is 'no' because interest rates, exchange rates or income could always adjust to eliminate the excess. Indeed, there have been occasions for every country when excess savings were negative – whether caused by recession, high exchange rates, or low interest rates: see the Figures for each country. But in a more fundamental sense, savings-investment balances reflect intertemporal choices and constraints, and substantial differences between countries are likely to persist for many years. Indeed, some researchers have gone further and proposed theories of the determinants of excess savings over long historical periods. One approach is the development stages theory of the balance of payments. According to this theory, countries go through various stages in their SI balances (and thus their balance of payments) as they develop. At an early stage of development, savings are low (because of low income) and the rate of return on investment is high (limited capital stock and diminishing marginal productivity of capital) so that it is natural for a country at this stage of development to import capital (that is, run a current account deficit). As income and the capital stock increase, the need to import capital lessens, and the current account moves into surplus as the country becomes a capital exporter. At this stage, the trade account is in surplus to finance interest payments on previously-incurred debt. In time, debt declines and foreign assets are accumulated. The flow of net interest payments reverses and eventually exceeds capital exports: in this final stage, the trade account is once again in deficit.[30]

Another approach focuses on the changing age structure of the population as a key factor. According to the simple life-cycle theory of consumption, households save when they are young to provide income when they are old. Therefore as a population ages, the aggregate saving ratio falls. The international counterpart of this is that 'young' countries tend to run current account surpluses and thus aquire external assets, and that 'older' countries enjoy current account deficits and run down their foreign assets.[31] Whatever the merits of these theories –and it is not difficult to think of exceptions – they do suggest the importance of long-run savings and investment decisions for the current account.

30. For applications of this 'stages' theory, see EPA (1985) and Yoshitomi (1985). The latter argues that Japan moved from being an immature debtor country with current account dificits (stage I; 1945-64); to being a mature debtor country with current account surpluses (stage II; 1965-71); and finally to being an immature creditor country with current account surpluses (stage III; 1972-present). For an extension of the development stages theory of the balance of payments within a simple growth model, see Akiyama-Onitsuka (1985).

An important general conclusion from this is that there is no reason for assuming that savings should equal investment in one country. Optimising consumption over time will in general imply an imbalance between savings and investment, and thus in the current account. This lack of any obvious tendency for the current balance to go to zero is clearly borne out by the savings-investment behaviour of major countries over the last twenty years. The aggregate savings position of the nongovernment sector for the seven major countries is shown in Figures 2 to 8. The country most out of line is the United States where private excess savings has been very low for many years, rising only in years of recession. Of the other six countries studied, three have shown a persistent pattern of excess savings: Japan, Germany and Italy, particularly since 1974. The advent of much slower growth around the time of the First Oil Crisis appears to have lowered the investment ratio in Japan and Italy (compare the coefficients of POTG in Table 2), and to have increased household savings in Japan. The persistence of these savings patterns over many years suggests the existence of major 'structural' differences in saving and investment behaviour that explain current balance performance.

Any assessment of the efficiency of such patterns depends on microeconomic considerations. Actual saving and investment decisions are deeply affected by tax treatment. Because this differs so widely among countries, the observed pattern of SI balances among countries may be distorted. Indeed, it appears that part of the differential sensitivity of SI balances to real interest rates across countries appears to be related to divergent tax provisions. This important topic clearly merits further research, but goes well beyond the scope of this paper.[32]

3. Public SI Balances: the Need for Adjustment

But public SI balances reflect policy decisions, and these may not always be optimal. In particular, inappropriate or unbalanced macroeconomic policies can create current account imbalances that have no justification in optimal savings and investment behaviour.

31. Such demographic factors are said to be important in the case of Japan (see, for example, OECD (1983b)). The main problem with this theory is that young dynamic countries would also be expected to have high investment ratios so that it is not clear how excess savings are affected. Noguchi (1986) provides an interesting analysis whereby the ageing of the population reduces the marginal product of domestic investment implying that excess savings may actually increase with ageing.

32. Corden (Chapter 12, 1986) provides a lucid summary of some of these issues. Salop-Spitaller (1980) also discuss the application of "sustainability" and "optimality" concepts to current account disequilibria viewed as the counterpart of SI balances: pp. 123-34 gives an interesting summary of official current account objectives.

In the extreme case where private sector excess savings can be taken as invariant with respect to interest and exchange rates, an "inappropriate" current account imbalance can be corrected only by adjusting the country's government deficit. This is broadly McKinnon's view.[33] The argument of this paper is that this extreme view is not justified because interest and exchange rates influence excess private savings and thus the current account. But while interest and exchange rates can indeed adjust to eliminate current account deficits (or surpluses) arising from excessive government budget deficits (or surpluses), the costs would be quite high.

One way to illustrate this point is to use the saving and investment equations developed above to calculate how interest and exchange rates would have to adjust to eliminate excess saving (or dissaving) differentials between countries. It appears that this would require extremely large changes in exchange rates.[34] Demonstration of this would of course require a full econometric model and even then different models would yield quite different quantitative, if not qualitative, answers. But one very rough way of illustrating this point is to abstract from purely cyclical factors and assume that the level of income is somehow fixed. Savings and investment then depend on interest and exchange rates only. Given expectations in the foreign exchange market and with internationally open capital markets, a country can choose its interest rate or its exchange rate – but not in general both. For the purpose of this illustration, it is assumed that a 1% increase in real long-term interest rates (typically ten-year rates) increases the spot exchange rate by about 10%[35] (Different assumptions can be applied by weighting the two columns in Table 7 differently). The higher interest rate will tend to increase private excess savings: the estimate of this effect is shown in column (a) of Table 7. The higher exchange rate that results will go in the opposite direction and depress private excess savings (column (b)). For five of the countries shown, savings – and thus the current surplus – are reduced, as would be expected. The implication of this is that a significant reduction of existing SI balances would – at a given level of income – require very large changes in exchange rates and

33. McKinnon (1981), arguing that any "inappropriate" trade deficit or surplus simply reflects an inappropriate deficit or surplus in the country's public finances, concludes that "any official attempt to adjust the exchange rate in such circumstances is likely to generate serious financial instability while having no predictable effect on the trade balance."

34. Artus (1980) made a broadly similar point some years ago, at a time when the yen and the DM were under strong upward pressure. Although the force of his argument was blurred by the subsequent oil crisis, the reemergence of similar imbalances – but combined with exchange rate movements that were decidedly perverse from the perspective of current balances – suggests that his argument had merit.

35. This would be relevant for the choice between 10-year bonds denominated in two currencies, assuming invariant expectations of future exchange rates.

such changes could be disruptive and inflationary. Although not explicitly considered in this paper, the estimates of household excess savings functions in Table 3 strongly suggest that higher inflation does increase household savings. For example, a 10 point increase in the rate of inflation in the United States would increase household savings by about 3% of GNP – enough to eliminate most of the current account deficit. To avoid such an inflationary danger, other policies will be needed.

Possible policies include coordinated action by central banks to alter exchange rates. The G5 agreement in September 1985 is one recent example of this. A major shift in exchange rates occurred and interest rates tended to fall. In the case of appreciating currencies (Japan and Europe), these changes will tend to reduce excess domestic savings and be reflected in reduced current account surpluses. For example, the overall appreciation of the yen from the G5 meeting to the first quarter of 1986 probably exceeded 20% in real terms. At the same time, interest rates fell, perhaps by more than one percentage point. Adding these two effects together (and using the estimates in Table 7) suggest that excess domestic savings could be reduced by around 2% of GDP, implying a significant correction of the external imbalance. Note, however, that this calculation takes income as given: the deflationary effect of the real exchange rate appreciation is assumed to be offset by other policy changes.

But in the case of the United States these effects work in opposite directions as lower interest rates will tend to reduce excess savings. Moreover, the savings-augmenting effect of a lower exchange rate is much weaker in the case of the United States than for most other countries. It is therefore unlikely that the lower dollar will, by itself, be able to eliminate United States current account deficits.

Lower budget deficits will also be necessary. In general, analysis of SI balances

Table 7 Sensitivity of SI Balances to Interest and Exchange Rates

(% of GDP)	Impact on excess private savings of:		
	1 percentage point increase in interest rates	10 % increase in real exchange rate	TOTAL
	(a)	(b)	(a) + (b)
United States	0.12	−0.16	−0.05
Japan	0.32	−0.87	−0.55
Canada	0.53	−0.43	0.10
France	0.01	−0.84	−0.82
Germany	0.36	−1.34	−0.98
Italy	0.01	−1.16	−1.15
United Kingdom	0.27	0.05	0.31

Source: based on equations for CI, CS and (HS-HI) in Tables, 1, 2 and 3.

suggests that the appropriateness of government budget deficits needs to be assessed in relation to, among other things, the size of private savings. For example, the United States budjet deficit, though not a larger proportion of GNP than many other countries, puts particularly heavy strain on the external balance because private savings are so low (Table 8), and because savings and investment appear to be relatively unresponsive to interest rate changes. These characteristics explain why, in

Table 8 Budget Deficits; International Comparisons

a. General government financial balances[1]

Surplus (+) or deficit (−) as a percentage of nominal GNP/GDP

	1980	1985[2]
United States	−1.2	−3.9
Japan	−4.5	−1.7
Germany	−2.6	−1.2
France	+0.2	−3.3
United Kingdom	−3.5	−3.4
Italy	−8.0	−13.4
Canada	−2.7	−6.5
Total of above countries[3]	−2.4	−3.8

Notes: 1) On a SNA basis except for the United States, the United Kingdom, which are on a national income account basis.
2) OECD estimates and forecasts.
3) 1982 GNP/GDP weights and exchange rates.

b. Ratio of budget deficit to net private savings[2]

	1980	1985[1]
United States	21.6	75.9
Japan	28.2	12.7
Germany	35.0	15.3
France	−2.6	47.7
United Kingdom	43.4	34.2
Italy	48.5	92.7
Canada	21.8	55.5
Total of above countries[3]	27.6	47.8

Notes: 1) OECD estimates and forecasts.
2) General government financial *deficit* as a percentage of private savings. A minus sign indicates a financial *surplus*. *Gross private savings* = household + business gross savings, net of stock appreciation where data are available (for the United States, the United Kingdom and Canada) but before allowance for capital consumption. *Net private savings* = gross savings, net of capital consumption.
3) Area deficit and savings aggregated separately at current exchange rates.

most econometric models, changes in fiscal policy in the United States have a larger impact on domestic interest rates than is the case with other major OECD economies.[36]

VI. Conclusion

Is the savings-investment approach useful for understanding the current account? Does it have useful implications for economic policy?

It would clearly be naive to take SI balances as exogenous determinants of the current account. Once the account is taken of their more basic macroeconomic determinants, the savings-investment approach can provide a useful framework for the analysis of current account trends because income, interest rates and exchange rates enter directly into the analysis. At the same time, the long-run nature of savings-investment choices can be highlighted. It provides a useful short-hand way of illustrating some important policy choices. The equations developed above are no doubt too simple, and more sophisticated estimates that incorporate the peculiarities of different countries would probably improve their predictive power. But these equations are probably no more simple than trade equations traditionally used; the alternative (and ideally complementary) approach of estimating savings and investment functions deserves more attention than it has received in the empirical literature of current account determination.

One disturbing characteristic of most empirical applications of the SI approach is that the exchange rate plays no explicit role, while in the traditional analysis (based on trade equations) the real exchange rate plays a key role. An important conclusion of the present paper is that SI balances are themselves highly dependent on the exchange rate.[37] The contrast between the savings-investment and other approaches to the balance of payments with stress the importance of the real exchange rate has therefore often been too sharply drawn.

Nevertheless, there are important structural differences in savings-investment behaviour between countries, and these will be reflected in the current account. But in some cases, imbalances (particularly in the government sector) may arise that have no long-run or structural justification. Such imbalances may in the short-run cause disequilibrating movements in exchange rates that complicate the eventual process of adjustment. Budget deficits may actually appreciate the exchange rate and so further depress excess savings in the private sector.

36. See, for example, EPA (1984). Ishii, McKibbin and Sachs (1985) reach a broadly similar conclusion although their difference is less marked.

37. Parenthetically, it might be noted that the inclusion of direct competitiveness effects in investment equations would appear warranted.

The last fifteen years have seen large (and sometimes apparently erratic) movements in real exchange rates. There would be little need to worry about this if economic decision-makers discounted these fluctuations in taking their decisions. But there is strong evidence that actual exchange rates – not long-run averages – significantly affect both savings and investment. Because of this, the potential growth rate of the economy could also be affected. These dangers – amply illustrated in recent years – raise important questions of domestic and international economic policy.

The realignment of exchange rates that took place in the months following the G5 agreement will go some way to correcting current account imbalances among major countries. But exchange rate changes alone will not suffice. In particular, the empirical estimates in this paper suggest that the recent decline in the dollar will not increase private excess savings in the United States by enough to domestically finance the country's large government deficit. This is partly because U.S. savings are so low and relatively insensitive to exchange rates; and partly because interest rates have fallen (tending to reduce private savings). Without a sizeable reduction in United States budget deficits, large current account imbalances are therefore likely to persist.[38]

38. Marris's (1985) scenario – based on exchange rates prevailing in the six months to March 1985 – envisages that the United States would have the world's largest external debt by 1986; by 1990 its external debt would amount to $1.3 trillion.

APPENDIX I

Domestic Savings Equal Domestic Investment? The Feldstein-Horioka Test

Feldstein-Horioka's famous article (1980) sought to provide very simple test of the degree of capital mobility between countries.[39] They estimated the relation between savings and investment rations across OECD countries by the following simple equation (hereafter the FH test):

$$\frac{I}{Y} = a + b\frac{S}{Y}$$

where I = gross domestic investment;
S = gross domestic savings;
Y = gross domestic product.

Averaging annual data for the period 1960-74, they found that the estimated value of b was generally close to one (actually around 0.9). They therefore concluded that the evidence "indicates that most of any incremental savings tends to remain in the country in which the savings are done. The substantial capital flows that exist thus do not appear to respond to international differences in saving rates." Feldstein (1983) repeated this test for 1975-79 — when the scale of international capital movements had grown much larger — and, getting an estimated value of b of 0.865, concluded that "the earlier finding that international differences in savings rates are associated with nearly equal differences in investment rates is reconfirmed.

But the strength of this conclusion is dependent on the exclusion of certain countries from the original data set, largely because of the absense of a long-run of comprehensive data. Such data were needed for the more detailed tests reported by Feldstein. However, *aggregate* data exist for all OECD countries despite the occasional existence of small discontinuities due to the adoption of new systems of national accounts. The purpose of this Appendix is to investigate how the Feldstein results change once all OECD countries are included in the sample.

Six OECD countries were dropped: Iceland, Norway, Portugal, Spain, Switzerland and Turkey. These countries exhibited some of the largest gaps between domestic savings and investment, implying major current account imbalances. The regression result for the restricted set of data are shown in equation 1 of Table A1: this is roughly the same as equation 1 in Table 2 of Feldstein (1983), allowing for some data

39. For a review of the issues raised by Feldstein-Horioka paper (including an illuminating discussion of the precise meaning of international capital mobility), see Frankel (1985).

revisions in the interim. The addition of six other countries reduces the coefficient of S/Y to 0.718, and the explanatory power of domestic saving ratios is drastically reduced.

To capture short-term capital mobility, it is interesting to estimate the FH test equation on annual data by pooled cross-section of time series. The resultant equation for the earlier period (1960-74) is shown in equation (5) in Table A1: the short-run coefficient is 0.753, lower than the coefficient of 0.831 obtained by averaging over 15 years (equation (3)). In the later period, the short-run coefficient has fallen to 0.583. In other words, on average only 58 per cent of domestic investment in OECD countries is now "paid for" by their own domestic savings in the short-run, compared with 75% earlier. To test this more formally, the regression equation was run with a dummy variable for the period from 1975, used interactively with the S/Y ratio:

$$\frac{I}{Y} = \underset{(0.008)}{0.056} + \underset{(0.012)}{0.045} *D + \underset{(0.031)}{0.735}\frac{S}{Y} - \underset{(0.053)}{0.152}\frac{S}{Y} *D$$

Adjusted $R^2 = 0.573$

Table A1 Relation between Domestic Savings and Investment Ratios

Equation	Constant	S/Y	R^2	Sample period	Sample of countries
1	0.044 (0.035)	0.820 (0.153)	0.64	1975-1979	n = 17; Iceland, Norway, Portugal, Spain Switzerland and Turkey excluded.
2	0.073 (0.045)	0.718 (0.201)	0.35	1975-1979	n = 23;
3	0.033 (0.018)	0.831 (0.073)	0.85	1960-1974	n = 23;
4	0.073 (0.034)	0.715 (0.153)	0.48	1975-1983	n = 23;
5	0.056 (0.006)	0.735 (0.026)	0.70	1960, 1961 ... 1974	n = 345; (15 years observations, pooled)
6	0.102 (0.012)	0.583 (0.054)	0.36	1975, 1976 ... 1983	n = 207; (9 years observations, pooled)
7	0.093 (0.016)	0.611 (0.068)	0.47	Two year averages, 1976-77 ... 1982-83	n = 92;
8	0.082 (0.018)	0.667 (0.079)	0.51	Three year averages, 1975-77 ... 1981-83	n = 69;
9	0.090 (0.025)	0.642 (0.113)	0.41	Four year averages, 1976-79 ... 1980-83	n = 46;

Source: OECD National Accounts. Figures in parentheses are standard errors.

where D takes the value 1 for 1975 onwards, and zero elsewhere. This suggests that domestic saving ratios have become much less important as determinants of domestic investment since 1975, and foreign financing thereby more important.

To assess the importance of capital flows over the medium term, recent annual data can be averaged over two, three and four years. Although the coefficient of S/Y increases, it remains at around 0.65 (compare equations (7), (8) and (9)): capital flows now appear to be able to sustain domestic investment levels that significantly diverge from domestic saving rates, and to do so over a number of years.

It is not clear whether averaging over a larger number of years provides any additional information about international capital mobility. If countries that are initially international borrowers (that is, domestic investment exceeds domestic savings) and substantially repay their debts (that is, domestic savings exceed domestic investment), long-term averages will merely hide capital movements that occur in the meantime. Even so, equation (4) suggests that over the 1975-83 period as a whole, each extra dollar of domestic savings implied only 0.715 dollars of additional investment. Domestic saving ratios explain a little less than half of the persistent cross-country differences in investment ratios. Insufficient savings in many small countries have been supplemented by capital inflows, and external debt/GNP ratios have risen steeply. The cross-section evidence of all OECD countries, then, indicates that savings-investment imbalances, maintained in some cases over many years, can explain current account disequlibria.

APPENDIX II

Data Sources and List of Variables

1. Savings and Investment

These are taken from "Capital transactions of the nation" in Table 1 of *OECD National Accounts, volume II.* Gross savings (that is, net savings plus consumption of fixed capital) were used throughout. Investment was defined as gross fixed capital formation. For Canada, household gross savings were taken from Table 8. Other data were used in three special cases:

(i) United Kingdom corporate profit data are dominated by the exceptionally large profits earned from North Sea oil. The ratio of gross trading profits of North Sea oil companies to total profits was derived from UK statistics of the appropriation account of industrial and commercial companies (source: *Financial Statistics)*:

1964-75	0	1980	0.309
1976	0.049	1981	0.372
1977	0.113	1982	0.375
1978	0.124	1983	0.387
1979	0.224	1984	0.381

OECD data for gross corporate savings were then multiplied by one minus this ratio: the resultant series is the dependent variable used in Table 1 of this paper.

(ii) Household excess savings estimate for Italy are taken net of household sector stockbuilding - which is both large and variable. This is rather different from the pattern in most ORCD countries (where stockbuilding is typically rather small) and probably reflects the importance of the self-employed sector.

(iii) For Germany, gross fixed investment excluding investment in residential buildings (from Table 4 in OECD National Accounts) was used.

Estimates for 1984, for all countries except France, were largely derived from national sources and from ORCD estimates in *Economic Outlook*. Principal sources were:

United States:	*Survey of Current Business*
Japan:	*Annual Report on National Accounts*
Canada:	*Bank of Canada Review*
Germany:	*Monthly Report of Deutsche Bundesbank*
Italy:	*Bank of Italy Annual Report*
United Kingdom:	*Economic Trends; Financial Statistics*

Absence of OECD data for Italy for 1983 also meant that estimates from national sources had to be used. However, a large and growing statistical discrepancy appears when the independent estimates of each component are aggregated, suggesting some data errors (Italian national accounts are so defined as to balance without an explicit statistical discrepancy).

2. Net Lending

SI balances for individual countries shown in Figures 2 to 8 show net lending by resident sectors, from Tables 7 and 8 in *OECD National Accounts*. This is the sum of gross savings minus gross investment (including stockbuilding) minus net capital transfers paid minus land and intangible asset purchases.

3. Interest Rates

Interest rates used in this paper are those used in the OECD's half-yearly *Economic Outlook:*

	Long-term	Short-term
United States	10-year government bonds	
Japan	NTT subscriber bonds	Call money
Canada	Long-term government bonds	90-day finance company paper
France	Public and public sector bonds	Call money
Germany	Public sector bonds	
Italy	Special credit institution bonds	
United Kingdon	20-year government bonds	3-month Treasury bills

GDP deflators were taken from *OECD National Accounts, volume II* with subsequent updating from *Economic Outlook.*

4. Cyclically-corrected General Government Balances

This is calculated by the OECD for use in *Economic Outlook*. Briefly, this budget balances are net of changes due to the built-in stabilizers that arise from the operation of marginal tax and unemployment benefit rates with respect to the divergence between actual and potential GNP growth rates. Fuller details and historical data are given in Muller and Price (1984). Estimates of potential GNP growth rates are derived from the following sources: United States- Survey of Current Business; Japan-Economic Planning Agency; Germany- Bundesbank; Canada- Department of Finance; estimates for UK, France and Italy (as well as some updating for the other countries) are prepared by the OECD.

5. Relative Unit Labour Costs

This is calculated by the OECD and is published in *Economic Outlook.* For more details, see OECD *Economic Outlook Occasional Studies* (June 1978.).

List Of Variables Used

The aggregates used in Section II are:

B = $X - \frac{M}{e}$ = Current account surplus (deficit, if negative);
F = Inflow of capital from abroad (outflow, if negative);
G = Government expenditure;
I = Gross private investment;
L = Demand for money;
M = Imports of goods and services (in foreign currency terms);
S = Gross private savings;

T = Total taxation;
X = Exports of goods and services.

The three endogenous variables are:
e = Exchange rate (units of foreign currency per unit of domestic currency);
r = Rate of interest;
y = Income.

The partial derivatives used in Section II are all defined to be positive:
$f = \partial F/\partial r$
$h = -\partial L/\partial r$
$i = -\partial I/\partial r$
$m = -\partial B/\partial y$
$q = -\partial B/\partial c$
$s = s_p(1-t) = \partial S/\partial y$
$s_p = \partial S/\partial(y-T)$
$t = \partial T/\partial y$
$u = -\partial S/\partial e$

The data used are defined as follows:

CI	Gross fixed capital formation, corporate sector
COMP	Relative unit labour costs in manufacturing expressed in a common currency
CS	Gross savings, corporate sector
CU	Ratio of actual to potential GDP
DPY	PY/PY (−1)
GOVT	Government budget surplus (cyclically-adjusted)
HI	Gross fixed capital formation, household sector
HS	Gross savings, household sector
PC	Private consumption deflator
POTG	Growth rate of potential GDP
PY	GDP deflator
RL	Long-term nominal rate of interest
RLP	"Conventional" real long-term rate of interest = [1+RL/100]/[DPY]
RLQ2	"Forward-looking" real long-term rate of interest = $[1+RL/100]/[DPY(+1)\cdot DPY(+2)]^{1/2}$

RS	Short-term nominal interest rate
RSP	Real short-term rate of interest = [1+RS/100]/DPY
RSPF	"Forward-looking" measure of real short-term interest rates = [1+RS/100]/DPY (+1)
ST	Increase in stocks
STAT	Statistical discrepancy
T – G	Government budget surplus
Y	GDP at market prices
YDH	Disposable income, household sector
YN	GDP at factor cost

REFERENCES

Akiyama, Taro and Onitsuka, Yusuke, "Current Account, Capital Exports and Optimal Patterns of Development Stages of the Balance of Payments," Mimeo, October 1985.

Artus, Jaques R., "Persistent Surpluses and Deficits on Current Account among Major Industrial Countries," in John A. Sargent ed., *Europe and the Dollar in Woldwide Disequilibrium,* 1980.

Bank of Japan, "On the Present Payment Disequilibrium," *Special Paper* No. 124, Research and Statistics Department, July 1985.

Bergsten, C. Fred and Cline, William R., "The United States-Japan Economic Problem," *Policy Analysis Series* No. 13, Institute for Internaitonal Economies, October 1985.

Brunner, Karl, and Meltzer, Allan H., *Public Policies in Open Economies,* Carnegie-Rochester Conference Series on Public Policy, Volume 9, 1978.

Corden, W. Max, *Inflation, Exchange Rates and the World Economy,* 3rd Edition, 1986.

David, Paul A., and Scadding, John L., "Private Savings : Ultrarationality, Aggregation, and Denison's Law," *Journal of Political Economy,* March/April 1974.

Economic Planning Agency, "EPA World Economic Model : vol. 1", *Discussion Paper,* No. 16, Economic Research Institute, July 1984.

————, *Economic Survey of Japan (1983-84),* English edition, 1985.

Feldstein, Martin, "Domestic Saving and International Capital Movements in the Long Run and the Short Run," *European Economic Review* 21, 1983.

————, and Horioka, Charles, "Domestic Saving and International Capital Flows," *Economic Journal* 90, 1980.

Fleming, J. Marcus, "Domestic Financial Policies under Fixed and Floating Exchange Rates," *IMF Staff Parers,* November 1962.

Frankel, Jeffrey, "International Capital Mobility and Crowding Out in the U.S. Economy : Imperfect Integration of Financial Markets or of Goods Markets?," *Paper Presented at a Conference on Economic Policy at the FRB of St. Louis,* October 1985.

Horiye, Yasuhiro, "Saving Behavior of Japanese Households," *Bank of Japan Monetary and Economic Studies,* Vol. 3, No. 3, December 1985.

Ishii, Naoko, McKibbin, Warwick and Sachs, Jeffrey, "Macroeconomic Interdependence of Japan and the United Sates : the Simulation Results," *NBER Working Paper* No. 1637, June 1985.

Lecaldano Sasso La Terza, E., Marrota, Giuseppe and Masera, Rainer S., "Households' Saving and the Real Rate of Interest : the Italian Experience, 1970-83," Bank of Italy, 1985.

Kindleberger, Charles P., "Germany's Persistent Balance-of-Payments Disequilibrium Revisited," *Banca Nationale del Lavoro Quarterly Review* No. 117, June 1976.

Marris, Stephen, "Deficits and the Dollar : the World Economy at Risk," Institute for International Economics, *Policy Analysis Series* No. 14 November 1985.

McKinonn, Ronald I., "Exchange-Rate Instability, Trade Imbalances and Monetary Policies in Japan and the United States," in P. Oppenheimer, ed. *Issues in International Economics,* 1980.

————, "The Exchange Rate and Economic Policy : Changing Post War Perceptions," *Journal of Economic Literature,* June 1981.

Muller, Patrice and Price, Robert W. R., "Structural Budget Deficits and the Fiscal Stance," *OECD Working Paper Series* No. 15, 1984.

Noguchi, Yukio, "Demographic Conditions, Social Security and the Capital Accumulation," Mimeo, January 1986.

Obstfeld, Maurice, "Aggregate Spending and the Terms of Trade : Is There a Laursen-Metzler Effect?," *Quarterly Journal of Economics* Vol. 97, May 1982.

Onitsuka, Yusuke, "The Oil Crisis and Japan's Internal-External Adjustment Mechanism," Mimeo, September 1983.

Oudiz, Gilles and Sachs, Jeffrey, "Macroeconomic Policy Co-ordination among the Industrial Economies," *Brookings Papers on Economic Activity,* 1, 1983.

OECD a "Public Sector Deficits," in *OECD Economic Outlook Occasional Studies,* 1, 1984.

————, *Economic Surveys 1982/83 : Japan,* July 1983.

————, *Economic Surveys 1984/85: Japan,* August 1985.

Person, Torsten and Svensson, Lars, "Current Account Dynamics and the Terms of Trade : Harberger-Laursen-Metzler Two Generations Later," *Journal of Political Economy,* February 1985.

Sachs, Jeffrey D., "The Current Account and Macroeconomic Adjustment in 1970s," *Brookings Papers on Economic Activity,* 1, 1981.

Salop, Joanne and Spitaller, Erich, "Why Does the Current Account Matter?" *IMF Staff Papers,* March 1980.

Strauss-Kahn, Dominique, "Explaining the Composition of Household Saving Flows and Their Relationship to Aggregate Saving in France," in Franco Modgiliani and Richard Hemming, ed., *The Determinants of National Saving and Wealth,* 1983.

Sturm, Peter, H., "Determinants of Saving : Theory and Evidence," *OECD Economic Studies,* Vol. 1, Autumn 1983.

Ueda, Kazuo, "The Japanese Current Account Surplus and Fiscal Policy in Japan and the United States," *Paper Presented at NBER-MOF's Joint International Symposium on Current Policy Issues in the United States and Japan,* October 1985.

von Furstenberg, George M., "Domestic Determinants of Net U.S. Foreign Investment," *IMF Staff Papers,* December 1980.

Yoshitomi, Masaru, "Japan as Capital Exporter and the World Economy," *Group of Thirty, Occasional Paper,* No. 18, 1985.