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Saving, Investment, Financial Integration, and the Balance of Payments

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Abstract

This paper examines the extent of international financial integration, and its consequences for the current account. The evidence indicates that financial liberalization in the 1970s and 1980s has resulted in a substantial movement towards closer integration of world capital markets. By reducing constraints on international capital flows, this movement makes the current account more of a residual factor in agents' decisions.

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Summary

The paper examines the extent of international financial integration and its consequences for the current account. The last decade has witnessed a marked increase in the degree of current account imbalances among the industrial countries. At the same time, it is evident that capital markets have become more closely linked to each other. For low-risk, short-horizon instruments, at least, capital is now very highly mobile.

Notwithstanding these developments, the evidence indicates that overall net flows of saving and investment are still markedly insular compared with the paradigms offered by fully integrated capital markets and the evidence from the gold standard period. The research reported in this paper suggests that the principal explanation for this is probably that government policy has been conducted in such a way to offset fluctuations in private sector saving-investment balances. Another part of the explanation no doubt has to do with exchange risk.

The integration of world capital markets has profound implications for economic policy. In particular, it would seem to make the current account more of a residual factor in agents' decisions and may also weaken its role as a policy objective. Indeed, it is possible to view events in the 1980s as already confirming these implications. A number of factors, however, might lead a country to be concerned about its external position, even if the current account is regarded as a residual without much consequence in its own right. The current account may serve as a useful indicator of the net effect of saving and investment decisions, the policies that affect such decisions, and the country's net contribution to the world pool of saving.

I. Introduction

The last decade has witnessed a marked increase in the degree of current account imbalances among the industrial countries. As the same time, it is evident that the capital markets of these same countries have become more closely linked to each other. The coincidence of these two observations sets the agenda for this paper, which is the extent of global financial integration and its consequences. In particular, in view of the significance traditionally attached to current account balance as a policy objective and the role that current account balance has acquired in the exercise of international economic policy coordination, the paper enquires whether the new circumstances brought about by capital market integration justify these policy emphases.

The plan for the rest of the paper is as follows. Section 1 looks at some definitions associated with the balance of payments. Section 2 discusses the determination of the external current account balance under various conditions, and the role of international capital market integration in that process. Section 3 examines some evidence on the question of whether capital markets are highly integrated; while acknowledging that the high correlation between national saving and domestic investment seems to indicate a low degree of integration, this discussion suggests some alternative explanations that appear to be more plausible. Section 4 looks at this same issue from a different perspective, asking whether consumption/saving choices have been less constrained in the recent period, as they should have been if capital markets have become more efficient. The main conclusions are summarized in Section 5.

1. Definitions

The basic definition of the balance of payments in focus here is, as explained below, that provided by a rearrangement of the national account definitions as the residual of savings and investment.

To clarify this, recall the following definitions of (i) the current account of the balance of payments, and (ii) the gross national product:

$$(1) \quad CAB \equiv X - M + NPI$$

$$(2) \quad GNP \equiv GDP + NPI$$

where X is the value of exports, M the value of imports and NPI is net property income from overseas. 1/

The definition of GDP can be written in the usual way as:

$$(3) \quad GDP \equiv C + I + G + X - M$$

1/ For the convenience of exposition transfers are omitted.

Disposable income of the private sector is spent on consumption or saved:

(4) $GNP - T \equiv C + S$

Substituting (3) into (1) yields an alternative equation for the current account as:

(5) $CAB \equiv GNP - (C + I + G)$

Substituting (4) into (5) then yields:

(6) $CAB \equiv (S - I) + (T - G)$

(6a) $CAB \equiv NFAp + NFAg$

or

(7) $CAB \equiv (S + T - G) - I$

In (6, 6a) the current account appears as identically equal to the sum of the net acquisition of financial assets by the private and government sectors (the CAB itself may be defined as the negative of the overseas sector's net acquisition of financial assets). In (7) the current account is written as the difference between overall national saving--private savings plus government saving, T - G--and investment. 1/

2. Analysis of the balance of payments

Table 1 summarizes the trends on current account balances of the major industrial countries. As can be seen from the ratio of the absolute sum of these balances to GNP/GDP, the external imbalances are, in the 1980s, some three to four times the levels reached in the late 1960s and early 1970s. This increase is predominantly due to the large surpluses run by Germany and Japan, and the large deficit appearing in the U.S. accounts in the 1980s. (Current account imbalance among the industrial countries outside the seven largest countries has also increased between the 1970s and 1980s, but only by about 20 percent.) The basic evidence would thus appear to suggest that the growing integration of the world's capital markets may have facilitated the emergence of the U.S. deficit and its counterparts in Germany and Japan. In less accommodating circumstances, some adjustment might have been required at a relatively early stage.

1/ These definitions follow convention in assuming that all of G is a "consumption good". In effect, of course, governments typically perform a large amount of investment and this should be recognized in empirical analysis of the problem (as in the work reported on below--see Section 4).

Table 1. Major Industrial Countries:
Current Account Balances, 1965-1990

(In percent of GDP/GNP)

	Canada	United States	Japan	France	Federal Republic of Germany	Italy	United Kingdom	Total Absolute
1965	-1.9	0.8	1.0	-0.6	-1.1	3.4	-0.2	0.9
1966	-1.7	0.4	1.2	-1.1	0.3	3.0	0.3	0.7
1967	-0.7	0.3	-0.2	-1.0	2.3	2.1	-0.7	0.7
1968	-0.1	0.1	0.7	-0.7	2.5	3.1	-0.6	0.6
1969	-1.2	--	1.2	-1.1	1.5	2.5	1.0	0.6
1970	1.2	0.2	1.0	--	0.7	0.8	1.6	0.5
1971	0.4	-0.1	2.5	0.4	0.4	1.7	1.9	0.7
1972	-0.3	-0.5	2.2	1.1	0.5	1.5	0.3	0.7
1973	0.2	0.5	--	0.6	1.5	-1.6	-1.3	0.7
1974	-0.9	0.1	-1.0	-1.4	2.8	-4.4	-3.8	1.2
1975	-2.7	1.1	-0.1	0.8	1.0	-0.3	-1.4	1.0
1976	-2.1	0.2	0.7	-1.0	0.8	-1.3	-0.8	0.6
1977	-2.0	-0.7	1.6	-0.1	0.8	1.0	-0.1	0.9
1978	-2.0	-0.7	1.7	1.5	1.4	2.1	0.6	1.2
1979	-1.8	--	-0.9	0.9	-0.7	1.5	-0.3	0.5
1980	-0.4	0.1	-1.0	-0.6	-1.7	-2.2	1.4	0.7
1981	-1.7	0.3	0.4	-0.8	-0.5	-2.3	2.7	0.7
1982	0.8	-0.2	0.6	-2.2	0.8	-1.5	1.7	0.7
1983	0.8	-1.3	1.8	-0.9	0.8	0.4	1.3	1.2
1984	0.6	-2.8	2.8	-0.1	1.6	-0.6	0.6	2.1
1985	-0.4	-2.8	3.7	-0.1	2.6	-0.9	0.9	2.4
1986	-2.1	-3.1	4.3	0.4	4.4	0.4	--	2.9
1987	-1.7	-3.2	3.6	-0.5	4.0	-0.2	-0.7	2.7
1988	-1.7	-2.6	2.8	-0.4	4.0	-0.6	-3.2	2.5
1989 1/	-2.3	-2.6	2.7	-0.6	4.5	-1.0	-3.6	2.6
1990 1/	-2.3	-2.7	3.0	-0.5	4.4	-1.1	-3.0	2.7

Source: World Economic Outlook, October 1989.
1/ Projections.

As already described, the current account of the balance of payments is definitionally equivalent to the difference between a nation's overall saving rate and its rate of investment. It can also be stated as the difference between exports and imports, adjusted for factor income flows and transfers. These two ways of writing the balance of payments identity have given rise to different theoretical approaches, which should be regarded as offering complementary rather than competing explanations.

The approach which proceeds from the identity of the current account balance with the difference between exports and imports is the well-known "elasticities" approach; this is based on assumptions about the supply and demand conditions in the markets for exports and imports, the dependence on relative prices being summarized in the relevant elasticities. The focus on elasticities connects the analysis directly to the exchange rate in that changes in the latter, through their impact on relative prices will, ceteris paribus, lead to consequential adjustments in the supply and demand for imports and exports. (The caveat "ceteris paribus" indicates that a complete account of the effects of an exchange rate change requires a broader analysis of the origin of the exchange rate change.) As noted below, the elasticities approach has an important role to play, for example, in the determination of "fundamental equilibrium exchange rates."

The complementary "absorption" approach identifies the current account as the difference between national saving and investment (Alexander, 1952). Viewed in this way it is clear that the current account improves or deteriorates as the excess of saving over investment rises or falls. Or, since saving is the difference between income and consumption (including government consumption), the current account improves or deteriorates as "absorption" (consumption plus investment) falls or rises relative to output.

A more modern elaboration of balance of payments theory in the context of integrated capital markets (Sachs, 1981; Frenkel and Razin, 1987) applies modern intertemporal consumption and saving theory for the behavior of the individual to the economy as a whole. The economy is assumed to be able to freely lend to, or borrow from, other economies. The paradigm for individual consumer behavior is that of "consumption-smoothing." In the absence of liquidity constraints, consumers smooth their consumption path relative to their lumpy income stream. The life-cycle hypothesis, which builds on the familiar idea that people will borrow during their early working years, then begin to save for retirement during the remainder of their working lifetimes before dissaving in retirement, is an early representative of this approach. It assumes the ability and willingness of agents to look ahead so that current decisions can be said to be forward-looking. 1/

1/ As saving is simply the addition to wealth, another way to think about the saving process is as an adjustment toward a desired wealth/income position (which itself may be an evolving target). This in turn indicates that current account surpluses (and deficits) are not unbounded;

This forward-looking behavior has important implications. Ceteris paribus, a rising income trajectory will lead to contemporaneous current account deficits that eventually would be followed by surpluses. Temporary shocks will have different effects from permanent shifts. A temporary decline in income will be covered by an increase in the deficit (decrease in the surplus) to support consumption, while a permanent decline in income necessitates a complete readjustment of consumption. The opening up of new investment opportunities that outperform existing returns can be shown to lead to an increase in the deficit (decrease in the surplus) on current account that is somewhat larger than the investment itself (the excess reflects the expected superior returns).

A complication is introduced in the analysis to the extent that government policy may also influence the outcome. Failing full "Ricardian equivalence" when consumers "see through" the government's financial policies, fiscal policy will affect the current account, which by definition is the residual of total investment and saving, both private and public. Nevertheless, the general thrust of the argument remains unimpaired. Government decision-making can also take place in the framework afforded by a relatively integrated world capital market according to its own definition of optimality.

a. The role of financial integration

The basic property of a financially integrated area is that within it there should be no regionally differentiated barriers to the free flow of capital. In consequence, arbitrage will drive the risk-adjusted nominal rate of return into uniformity across the area as a whole. Most political unions are financially integrated areas in this sense. In particular, such areas are normally also currency unions so there is no exchange risk. Following this definition, what has been identified as a movement in the direction of greater integration at the international level is (i) the widespread dismantling of exchange controls and related impediments to the flow of capital between nations, and (ii) the consequent arbitraging of rates of return of assets in different currencies of denomination in different locations. This process began in the mid-1970s with liberalization in Germany, the United States, and Canada among the large countries, but gathered pace at the end of the decade when additional measures of liberalization were undertaken, notably by Japan and the United Kingdom. Since that time, further liberalization has occurred, notably in Europe, where Italy, France, and the other EC member countries have embarked on a path scheduled to result in the complete elimination of exchange controls by the end of June 1990. 1/

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verification of the nature of these processes over long periods is an important objective for future research though one that is somewhat hampered by lack of data availability.

1/ Frankel (1989) provides a comprehensive review of the process of liberalization and computes various associated measures of financial integration.

Since the hallmark of financial integration is the arbitraged uniform risk-adjusted rate of return, its correlate at the level of the global economy is interest parity adjusted for expected exchange rate depreciation. One measurable concept is that of parity between onshore rates of return in different locations after allowing for the cost of cover in the forward market--i.e., covered interest parity (CIP). 1/ What the removal of exchange controls does is to remove barriers to arbitrage between offshore and onshore assets in a currency, and to enable arbitrage--by removing the "country premium"--to bind the onshore rates of return in assets of different currencies located in the corresponding countries of currency issue. The dramatic effect on the onshore/offshore differential of removing exchange controls is illustrated for the cases of Japan and the United Kingdom (both of which removed controls in 1979) in Figure 1. 2/ The removal of controls implies that these differentials are essentially arbitraged to zero. The progress of Italy and France in this direction can be expected to confirm the validity of the same result in their case also. 3/

A more rigorous test of the extent of integration may be judged by estimates of the deviation from uncovered interest parity (UIP); this deviation is simply $i - i^* + \delta$ where i, i^* are the domestic and foreign risk-adjusted rates of return on assets of comparable maturity, and δ is the expected rate of depreciation. Measuring deviations from UIP requires estimating the expected rate of depreciation. Observed deviations ("violations" of UIP) therefore may be due to errors in estimating expectations or may reflect a risk premium. The large literature on this question 4/ generally identifies the persistence of a time-varying risk premium, though one related recent study (Frankel and Froot, 1989) using direct expectations data suggested that the variation was all in the expectations error rather than reflecting a risk premium. 5/

1/ Offshore CIP (i.e., covered parity of returns in Euromarkets) does not imply that arbitrage can operate freely across national boundaries: since the same institutions set both the forward rate for a currency and the Euro-interest rate in that currency by reference to CIP (Johnston 1979), observed deviations from offshore CIP are invariably due to no more than the employment of imprecise (perhaps averaged or inexactly date-matched) data.

2/ We are grateful to Jeffrey Frankel for permission to reproduce this diagram.

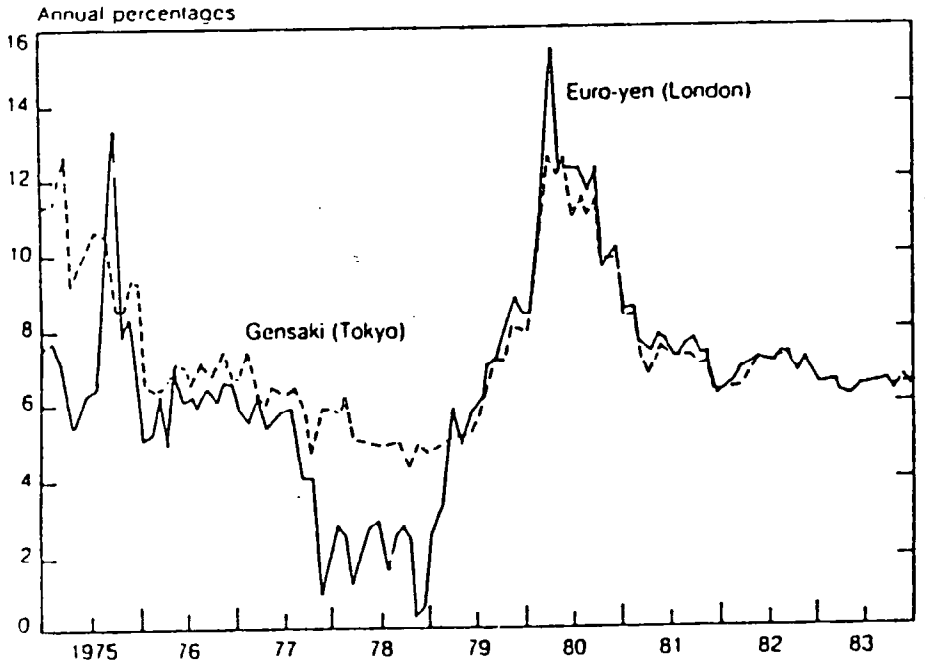
3/ Frankel (1989, Table 6) shows that, prior to 1986 violations of offshore/onshore parity were much more marked for these two countries than for the United States, Germany, the United Kingdom, and Japan, in the 1980s.

4/ A representative recent paper is Hodrick and Srivastava (1986).

5/ Note however that there is no incentive to arbitrage real rates of return. Real return equalization is predicted only where expected depreciation is (correctly) given by relative expected inflation, i.e., where PPP governs the determination of exchange rates.

Figure 1. Financial Liberalization in Japan and the United Kingdom: the Impact on the Offshore/Onshore Differential

Yen interest rates



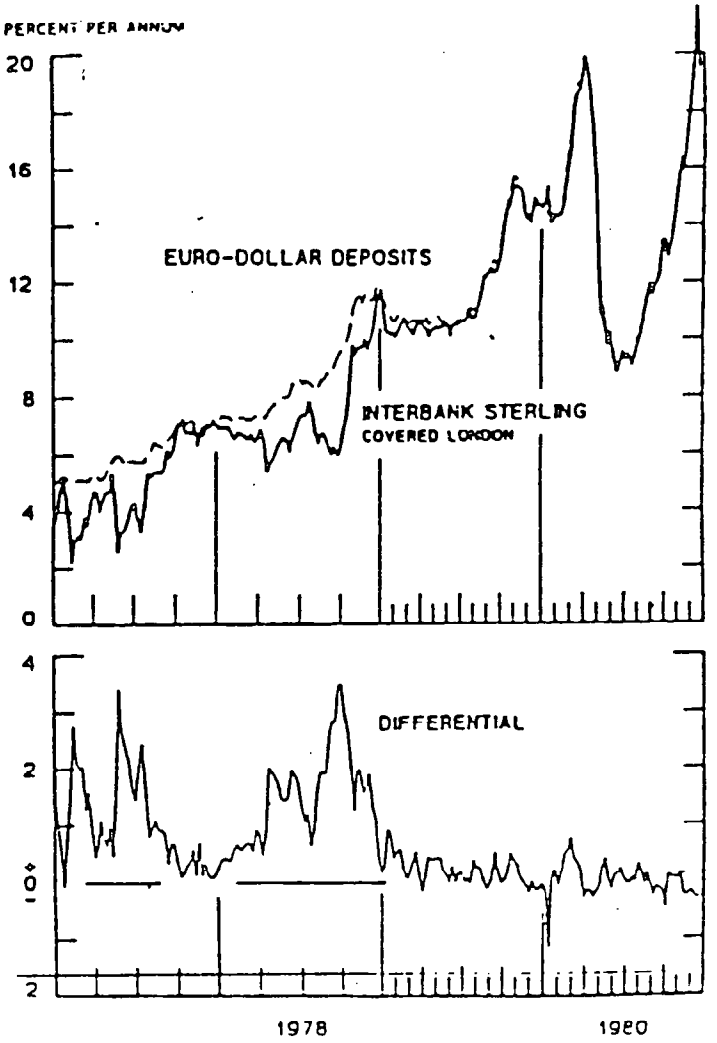
Source: Frankel (1989), based on Economic Report of the President, 1984.

INTEREST ARBITRAGE: 3-MONTH FUNDS

Differential: Plus(+), indicates favor dollar assets

Averages for week ending Wednesday

United Kingdom



To summarize, the ex ante rate of return approach to the measurement of financial integration identifies major shifts, for short-horizon assets, in the direction of integration in the mid-1970s and early 1980s. In fact, Frankel's (1989) conclusion from a review of this process is that "the barriers to cross-border flows are sufficiently low that, by 1989, financial markets can be said to be virtually completely integrated among the large industrial countries (and among some smaller countries as well)." However, exchange risk remains a problem; particularly for assets with longer maturities. It is possible that increased volatility in the foreign exchange markets has made exchange rates harder to predict and has thereby limited the degree of financial integration.

To illustrate the implications of capital market integration for the balance of payments, it may be useful to start from the polar extreme of a world of complete capital immobility, or "financial autarky." In such a world the current account would be required to clear continuously (up to the limit allowed by the availability of official foreign exchange reserves). Given the right conditions for stability, a freely flexible exchange rate could be expected to perform this task with the saving-investment balance cleared domestically by the rate of interest. If the level of output were not fixed, then the task of clearing the external and internal balance could be shared by the level of income. There would be no reason for the rate of interest in different countries to be connected. In such a model there is a binding liquidity constraint on the size of current account deficits, and the "sustainability" question is correspondingly easy to answer: no deficit or surplus is sustainable.

Now consider an intermediate regime of relatively, but not completely, immobile capital. It may be appropriate to think of this in stock rather than flow terms; as a country's stock of borrowing rises, so does the cost of borrowing, ultimately very steeply. A liquidity constraint is still binding but sustainability takes on a more interesting connotation. To answer the sustainability question would require computing whether a country's present and likely future policies will push its accumulated net foreign debt into the constrained region. Deficits that are matched by investments in profitable projects will be rated differently from deficits which correspond to excess consumption because the former may promise a reversal of the cumulative deficit. It is convenient to characterize this intermediate regime as one in which the liquidity constraint, though less tight, is likely to bind prior to a solvency constraint.

In the event, finally, of a fully integrated capital market (in the sense of a market without exchange risk), a borrower--private or public sector agent--needs to meet a solvency constraint, but there is no binding liquidity constraint prior to this. Governments, of course, have greater liberty to meet their solvency constraints than private sector agents; they have taxing powers, for example. Sustainability now becomes a question of solvency; and there will usually be a variety of policy and current account trajectories which are sustainable in the sense of obeying this constraint, and the concept loses, inevitably, some of its apparent precision. This

taxonomy illustrates how the significance of the concept of sustainability is diminished as the relevance of liquidity constraints decreases and ultimately converges toward that, simply, of solvency.

b. The role of the exchange rate

It is important to consider the relationship between the current account balance and the exchange rate. The fixed point here must be the insight of the elasticities approach, which remains valid. Estimated trade equations universally attribute an important role to exchange rates in determining imports and exports, along with other factors.

In this regard, there are two propositions which at first sight might appear contradictory: one is that a current account deficit presages a devaluation, the other that current account deficits are associated with appreciating exchange rates. Both propositions are correct in certain circumstances. For example, when capital mobility is low, the current account deficit is limited; therefore, a prospective rise in the deficit, given the level of other factors, must induce a corrective devaluation. On the other hand, when capital mobility is high and an economy takes advantage of the fact to run a persistent current account deficit, the exchange rate must assume a value, which in conjunction with other determinants, satisfies the elasticities conditions governing the balance. In these circumstances, other things equal, a deficit requires an appreciation to emerge.

Under the Bretton Woods regime, in which capital mobility was restricted, the (fixed but adjustable) exchange rate had to be at the level required (the "fundamental equilibrium level"), along with the setting of demand management policy, to clear the current account (up to the limit given by any long-term net capital inflow). Thus the connection between the current account and the exchange rate was relatively direct. In the liberalized system prevailing today, this link has essentially disappeared.

Following Williamson (1985), a country's fundamental equilibrium exchange rate (FEER) may be defined as the real effective exchange rate that is compatible with the current account balance existing under the "normal" (i.e., cyclically adjusted) functioning of an economy. To be more concrete, an economy operating at normal capacity levels in the medium run will produce, conditional on the policy setting, a rate of saving and investment which imply, through the national accounts identity, a particular current account balance. The equations determining the current account can then be inverted, for given levels of domestic and world activity, and a given level of debt service (property income) so as to yield (via the trade elasticities) the corresponding real exchange rate, the FEER. Calculations of FEERs are intended as a policy guide rather than as a positive estimate of the medium-run exchange rate. However, if the fiscal policy assumption is "realistic," these two ways of regarding the FEER would essentially be identical. In principle, a FEER calculation will yield a trajectory rather than a spot estimate, if only because of debt-service dynamics.

Three problematic areas can be identified in FEER calculations. First, in the absence of full "Ricardian equivalence," the assumption about fiscal policy is critical, and necessarily normative. Second, the debt-service assumption may generate a kind of hysteresis effect. If the course of the actual exchange rate is different from that of the FEER, then the dynamics of debt accumulation and debt-service obligations will deviate from those involved in the FEER trajectory, necessitating in principle its continual recalculation. Third, in circumstances of integrated capital markets, the calculation of FEERs is largely arbitrary. In a fully integrated market, governments and countries have liberty to borrow or lend (net) subject only to a solvency constraint. This constraint can generally be met by a variety of policy and associated current account trajectories.

c. Policy toward the current account

The discussion above raises the question of whether a country should conduct policy on the basis of targets for its current account. Traditionally, there is little doubt that for most countries the balance of payments on current account has been a principal objective of (or constraint upon) economic policy. It is easy to see why this came to be so in a regime of limited capital mobility--like the Bretton Woods regime. In such a regime an incipient current account deficit requires exchange rate devaluation or deflation. In the Bretton Woods system, however, devaluation became invested with negative connotations, and in practice the exchange rate was used only sparingly. Accordingly, current account balance, at least up to the limits indicated by the inflow or outflow of long-term capital (as in the notion of the "basic balance"), became a target for generalized economic management, so that an incipient deficit (surplus) prompted deflation (relaxation).

Under conditions of a low degree of capital mobility, the current account is likely to continue to be a target of policy even if the exchange rate regime is formally transformed from a fixed-but-adjustable to a flexible system. Despite the corresponding reduction in the political sensitivity that attaches to exchange rate change, governments are still unlikely to accept the consequences of exchange rate adjustment with indifference and so will continue to treat the current account in some version as a legitimate target for, or constraint upon, economic policy. The question of whether there are rationales for current account targets when capital markets are highly integrated is discussed below. The starting point for this discussion is the insight that when capital markets are highly integrated the current account is simply a residual of decisions taken by agents within a framework of constrained optimization. Cooper (1981) makes the point in this way "In the context of overall saving-investment analysis countries should not take any particular view of their current account positions at all. Some will draw savings form the rest of the world, others will invest in the rest of the world. Nothing is wrong

with this, it is as it should be." 1/ So, while the degree of capital mobility and the adoption of the current account as a target or constraint governing generalized fiscal or monetary policy are conceptually separate items, in practice it seems that the two are likely to go together.

Even in a world of highly integrated capital markets, however, there may be reasons for the government to target the current account. One set of arguments focuses on the inverse of the current account, the capital account, and identifies the possibility of a departure of social from private benefit in decisions about net foreign investments. Private decisions to invest at home or overseas will be taken on the basis of expected after-tax returns; from the point of view of the social benefit of the potential capital exporting country, however, the relevant comparison is between the foreign after-tax rate of return and the domestic pre-tax rate of return since the domestic tax proceeds are retained at home. This suggests that a measure of restraint over capital outflow might be an appropriate response. In a similar vein, where the private investor will compare expected rates of return adjusted for the probability of losses due to fraud or confiscation, the government of the potential capital exporter could argue that this does not fully take account of the social interest. If confiscation or fraud occurs at home, the losses of one domestic private investor become the gains of another--whereas if the loss occurs overseas, it is an overseas resident (or government) who benefits. These considerations also could justify an interest in limiting capital outflow. By contrast, concern about the influence of foreign capital on the domestic economy may motivate restrictions on capital inflows. Explicit restrictions reduce the mobility of capital and will tend to elevate the current account as a policy goal; even in the absence of such restrictions--and their progressive dismantling is a feature of post-war history--it can be argued (e.g., Summers, 1988) that the state of the current account--which is after all just the inverse of the capital account--will not be a matter of indifference to governments.

It is also possible to think of policy motivations which, though not aimed at the current account per se, nevertheless have predictable implications for it. In practice, the degree of imbalance on current account, even if not itself an explicit target, will therefore be limited in some way. For example, current account deficits may be a symptom of inflationary pressure, representing a vent for excess demand: this, after all, is the interpretation customarily associated with the "absorption approach." To the extent this is true, it would not be surprising to find that the conduct of counter-inflationary policy could look rather like a

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1/ The fact that markets react to current account announcements does not necessarily indicate that capital mobility is low. If markets look to governments as a source of information and governments act as if financial constraints require current account balance, then the market will continue to react to deviations from balance since they imply changes in policy stance, and governments will feel justified in continuing to target the current account.

policy of targeting the current account. But it is very far from the case that the reduction of inflation and the reduction of current account deficits are synonymous; in fact, the policy combination of lax fiscal policy and tight monetary policy, which promises the reduction of inflation through the appreciation of the exchange rate, has the opposite implication for the current account. Indeed, it is interesting to note that the targeting of national wealth has been advocated recently by writers in the Keynesian tradition (Weale et al., 1989) precisely on the grounds that it is necessary to correct for a bias toward the tight money/lax fiscal policy solution to the full employment/inflation problem. For given values of capital investment, such a target would again imply, residually, a current account target. In contrast to this, policies designed to secure the "over"-devaluation of a currency with a view to promoting the growth of tradables production may result in current account surpluses and thus look like a latter-day mercantilism, privileging a trade surplus as a policy goal. 1/

3. Saving-investment correlations

The ex ante rate of return approach to the measurement of financial integration described above may be contrasted with the ex post approach of examining whether flows of saving and investment have exhibited behavior indicative of integration. Such an alternative test, based upon the behavior of saving and investment between countries, was proposed by Feldstein and Horioka (1980). They argued that in a world characterized by high capital mobility there is no a priori reason to expect saving and investment to be correlated across countries. Savers in different countries face the same interest rate; hence the relative level of saving in one country compared with another is determined by structural factors in the different economies. Similarly, investors also face the same interest rate, so investment decisions simply depend upon relative investment opportunities. Assuming that structural factors affecting saving and investment are not correlated, domestic saving and investment rates will also be uncorrelated. If, on the other hand, capital mobility is restricted then domestic investors will face a wedge between the cost of domestic and foreign saving, and hence domestic saving and investment will be correlated. Indeed, in the extreme case of zero capital mobility, saving and investment would be perfectly correlated.

In order to test this hypothesis, Feldstein and Horioka ran the following cross-section regression:

$$(1) \quad (I/Y)_i = \alpha + \beta\ (S/Y)_i + \epsilon_i$$

where I represents domestic investment, S national saving, Y output, subscript i represents different countries and ϵ is an error term. They

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1/ This case was elaborated by Schmitt (1979); the subsequent findings of Krugman and others in regard to the nature of international trade underline the relevance of this model (see Vines and Stephenson, 1989).

interpreted the coefficient β as measuring the amount of domestic saving required to finance an extra dollar of investment. These regressions revealed that saving and investment rates were highly correlated, in terms both of levels and medium term changes over time. The estimated coefficients were generally significantly different from zero, but not from one, using both ordinary least squares and instrumental variable techniques, and showed no signs of declining over time. Subsequent work has confirmed that these coefficients are large and significantly different from zero, although recent data indicate that the coefficients may have fallen somewhat in the 1980s. 1/

The results from regressions using equation (1) on data for 23 industrial countries over various time periods are presented in Table 2. The regressions show large and significant coefficients; for the full 1960-1986 period the estimated coefficient using gross saving and investment is 0.79. 2/ There is also some evidence that the coefficient has been falling over time. The coefficient estimate for the period 1960-1973 is 0.91, and insignificantly different from unity; for the 1974-1986 period the estimated coefficient falls to 0.67, and for the period 1980-1986 it falls further to 0.61. 3/ When net saving and investment data are used, however, the coefficient shows almost no decline over time.

Table 2. Results from Regressions of National Saving on Investment

Sample Period	1960-86	1960-73	1974-86	1980-86
Gross Saving and Investment	0.79(0.09)	0.91(0.07)	0.67(0.15)	0.61(0.13)
Net Saving and Investment	0.87(0.11)	0.89(0.08)	0.88(0.15)	0.79(0.14)

Source: Feldstein and Bacchetta (1989).
Notes: The table reports estimates of the coefficient β in equation (2). Standard errors are indicated in parentheses.

1/ Both gross and net saving and investment have been used in the literature. The data are generally averaged over several years in order to avoid bias caused by the correlation of saving and investment over the business cycle.

2/ Similar regressions for developing countries also show a significant correlation over time, although the coefficients are somewhat lower than that for industrial countries (Dooley, Frankel and Mathieson, 1986).

3/ These estimates use ordinary least squares. Typically researchers have found instrumental variables results to be similar to OLS.

In addition to these cross-section results, various authors have found a close correlation between saving and investment over time. Bayoumi (1989), for example, reports the results from running the following equation on annual time series data for ten industrial countries.

$$(2) \quad \Delta(I/Y)_t = \alpha + \beta \, \Delta(S/Y)_t + \epsilon_t$$

This equation is found to yield a positive correlation between saving and investment in all cases except Norway. Moreover, the estimated coefficient is insignificantly different from unity and significantly different from zero for seven of the ten countries. 1/

Three broad sets of explanations for these high correlations have emerged:

--Low international capital mobility. Despite other evidence, international capital mobility may be low, owing to factors such as information constraints, lack of enforceability of contracts, exchange rate risk and, in earlier periods, exchange controls. This is the original interpretation proposed by Feldstein and Horioka, reaffirmed in Feldstein and Bacchetta (1989).

--Private sector behavior. Several authors have built models in which there is perfect capital mobility, but saving and investment are correlated because of factors such as productivity shocks, population growth, or low integration of international goods markets. In this interpretation saving and investment are correlated because they both react to some common conditions (Tesar, 1988).

--Government targeting of the current account. Governments may use fiscal and monetary policy to target the current account (Summers, 1988).

These explanations have substantially different policy implications. Low international capital mobility implies that policies to promote domestic saving should also raise domestic investment. In contrast, if the correlations reflect private sector behavior in a world of high capital mobility, policy-induced increases in domestic saving will tend to flow abroad unless accommodated by measures to promote investment. Finally, the possibility that governments have been targeting the current account raises the question of the optimality of such a policy, as discussed above.

In order to differentiate among these hypotheses, it is necessary to go beyond the simple regressions outlined in Table 2. One avenue of investigation involves calculating the behavior implied by theoretical models. Obstfeld (1986) found that the correlations implied by a simple model of saving-investment behavior were of the same order of magnitude as

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1/ Frankel (1989) reports that for the United States regressions, the inclusion of the period 1984-1987 significantly reduces the estimated correlations. However, Bayoumi (1989) does not find such an effect.

the observed ones; Frankel (1989) and Tesar (1988) report similar results for somewhat different theoretical models. Although these results show that the correlations can be explained by private sector behavior, they do not demonstrate that they are caused by such behavior. 1/ Furthermore, these models are usually directed at the time series behavior of saving and investment, and hence are less useful for explaining the cross-section correlations.

A second line of inquiry has involved disaggregating total saving and investment. Feldstein and Horioka examine data for several sectors and conclude that there is little evidence of different sectoral behavior. Summers (1988) regresses the private sector saving investment balance on the government deficit, and finds a strong negative correlation, a result which he attributes to government targeting of the current account. Roubini (1989) proposes a model where government policies to smooth taxation produce time series correlations between total saving and investment, and presents regressions supporting this model. However, in both these cases the results also appear compatible with the hypothesis of low international capital mobility. 2/ Bayoumi (1989) looks at the correlation between private sector saving and investment, and finds lower correlations for private sector data than for total data. He argues that this is evidence against explanations based on private sector behavior. He also finds that the time series correlations between saving and investment are reduced when fixed investment is substituted for total investment.

Studies have also been made of saving and investment correlations for alternative data sets. Murphy (1984) reports the results of running saving-investment regressions using data for the top 150 U.S. corporations. He finds high correlations and argues this shows evidence that the observed correlations are caused by private sector behavior. Another approach has been to process data derived from regimes which are known to exemplify a high degree of capital market integration. In this spirit, Bayoumi (1989) runs saving-investment regressions on international data from the classical gold standard period (1880-1913), while Bayoumi and Rose (1989) use postwar data on regional saving and investment for the British Isles: in neither case do the correlations reveal any significant relationship between saving and investment. 3/ These results argue against the private sector behavior hypothesis, since one would not expect different behavior across regimes.

1/ Feldstein and Bacchetta (1989) argue that Obstfeld's model cannot explain the correlations when "realistic" parameter values are used.

2/ Feldstein and Bacchetta (1989) disaggregate the data in the Summers study further and argue that they support the hypothesis that capital mobility is low.

3/ Issues of data reliability suggest that cross-section correlations are more reliable for the gold standard period than correlations performed on the time series. However, it should be noted that Obstfeld (1986), using a different data source to Bayoumi's, reports quite a high coefficient for a Gold Standard time series equation for the United Kingdom.

At the same time, however, they do not help distinguish between the government policy and low mobility hypotheses. Unlike the currency union of the United Kingdom and the stable exchange rate of the gold standard period, today's capital markets have to cope with exchange risk; and whereas it can be assumed that government intervention in the gold standard period or between the regions of the United Kingdom was minimal or zero, no such confidence can be expressed about the absence of current account targeting in the post-war period. A direct approach to this last question is possible, however.

A third approach is to estimate government reaction functions to establish whether the current account has been a major policy objective and, if so, whether there is any evidence of change in this regard. Generally, policy reaction functions are estimated as reduced-form equations with the government policy variable as the dependent variable, and lagged values of policy targets as the independent variables. Black (1983), in a wide-ranging study of monetary policy in the major industrial countries, concludes that external variables (which in his case do not include the current account) are relatively unimportant for the United States, but generally have greater weight for other major countries. Joyce (1986), in a summary of the reaction function literature, comes to similar conclusions about monetary policy; she also surveys the rather smaller literature on fiscal reaction functions and concludes that the evidence of systematic fiscal policy "is weaker" than for monetary policy.

Appendix I reports some new work on government reaction functions. Reasonably stable monetary policy reaction functions are identified for several countries; these functions suggest that the current account was a policy target in the 1970s, and that its importance declined in the 1980s. Interestingly, these results appear as strong for the United States as for other countries. While attempts to estimate stable fiscal policy reaction functions based on lagged variables were not successful, this work did identify a strong negative contemporaneous correlation between the saving-investment balances of the government and private sectors. These results indicate that the two balances almost completely offset each other in the 1970s, although the correlations have fallen somewhat in the 1980s. If this reflects a policy response, it must be admitted that the degree of policy success is rather surprising; the correlation is of course not incompatible with the alternative hypothesis of low capital mobility.

4. Consumption paths and financial integration

The fundamental advantage of closer financial integration between countries is that it allows countries to choose paths for consumption and investment which are independent from each other (subject to a long-run budget constraint). In a situation of financial autarky, consumption and investment are constrained to add up to the product of the economy, and therefore cannot be considered to be independently determined. On the other hand, if international financial markets are open, then the sum of consumption and investment can diverge from national product since foreign saving can be used to bridge such gaps. This section looks at evidence as

to whether national consumption paths have become more "optimal" over time, as international financial markets have become increasingly integrated.

Modern work on consumption usually starts from the Euler equations implied by maximizing behavior. These models assume that the consumer can borrow and lend freely at a given real interest rate. When these assumptions are combined with other more technical ones, the intertemporal path of consumption can be characterized by the following relationship

$$(3) \quad U'(c_t) = \beta \, E_t\{(1+r_t) \, U'(c_{t+1})\}$$

where c_t is the level of consumption in period t, U(.) is the utility function of the consumer, β is the consumer's discount factor, r_t is the real interest rate faced by the consumer and E_t is the expectations operator conditional on information known at time t.

This equation states that the marginal utility of consumption today is equal to the expected marginal utility tomorrow, adjusted by the real interest rate and discount factor. Combined with the assumption of rational expectations, this model predicts that the current change in consumption should not depend upon any lagged information, except the first lag of the real interest rate. The intuition behind this result is that consumption simply depends upon permanent income and the real interest rate. In any given period, the estimate of permanent income includes all information up to that point, hence no other information should be pertinent to the decision. This characteristic can be used to test whether consumption paths deviate significantly from the "optimal" path implied by (1). 1/

The international implications of equation (3) have been explored by Obstfeld (1986). He noted that, in a world of perfect capital mobility, consumers have access to both home and foreign capital markets. As a result, while home consumers have access to a real return of $(1+i_t)(P_t/P_{t+1})$, the foreign consumer has access to a real return of $(1+i_t)(P^*_tX_t/P^*_{t+1}X_{t+1})$, where asterisks represent foreign variables and X_t is the current exchange rate measured in home currency. Using a particular functional form for the utility functions, and equating the terms in interest rates for home and foreign consumers, produces the following equation:

$$(4) \quad E_t\{(C_t/C_{t+1})^{\alpha}(P_t/P_{t+1}) - (C^*_t/C^*_{t+1})^{\alpha^*}(P^*_tX_t/P^*_{t+1}X_{t+1})\}=0$$

1/ This model has been tested extensively on data for the United States. The overall conclusion is that the model works reasonably well as a first approximation, but that a significant proportion of consumption emanates from households that are liquidity constrained. These households consume out of current, rather than permanent, income. Tests for other countries have tended to reject the model more readily than for the United States (Hall, 1988).

A similar expression can be derived using the foreign interest rate.

Obstfeld estimated equation (4) using data for the United States, Japan and the Federal Republic of Germany. He rejected the model for the period up to the break-up of the Bretton Woods system, but not for the period afterwards. While these results are suggestive of an improvement in the path of consumption, considerable caution should be exercised. The reason for this is the inclusion of a term in the change in the exchange rate in equation (4). The floating rate period has been characterized by considerable volatility in exchange rates. This adds noise to the realizations of the term within the expectation, making it more difficult to reject the hypothesis.

This framework was also used by Bayoumi and Koujianou (1989), using data for six countries from the floating exchange rate period, to examine two hypotheses: whether the model holds for the entire period, and whether it holds better for the (more deregulated) 1980s than for the 1970s. Their results indicate that for the entire time period the model can be rejected. There is, however, some evidence that the path of consumption has become "more optimal" as a result of international financial market deregulation in the 1980s.

5. Conclusions

The interpretation of the evidence presented above is not entirely without ambiguity. Certain facts are, however, clear. First, considerable liberalization has continued from earlier decades through the 1980s, which has resulted in a closer integration of world capital markets. For low-risk, short-horizon instruments, at least, capital is now very highly mobile. Second, there has been a marked increase in current account imbalances in the 1980s compared with earlier decades. Third, however, the evidence shows that overall net flows of saving and investment are still markedly insular compared with the paradigms offered by fully integrated capital markets and the evidence from the gold standard period. The research reported in this paper suggests that the principal explanation for this is probably that policy has been conducted in such a way as to offset to a large extent the fluctuations in private sector saving-investment balances, reducing countries' net involvement in the world capital market. Another part of the explanation no doubt has to do with exchange risk. Exchange risk raises the cost of forward cover and may exert a strong deterrent force for those maturities for which forward facilities are non-existent.

If it is accepted as a basic finding that there has been a genuine increase in the integration of the world's capital markets, a movement more likely to be continued than reversed, the next question to be addressed concerns the implications of this trend for policy. Current account imbalances have long been a leading target of economic policy and are one of the indicators closely monitored by the Fund in the context of its surveillance activities, both in consultation with member countries and in the World Economic Outlook.

A movement toward more integrated capital markets makes the current account more of a residual factor in agents' decisions, and inevitably weakens its role as a policy objective; indeed, it is possible to view events in the 1980s as already confirming this. There are a number of factors, however, that might lead a country to be concerned about its external position, particularly in the longer run, even if the current account is regarded as a residual without much consequence in its own right. It may serve as a useful indicator of the net effect of saving and investment decisions, the policies--micro as well as macro policies--that affect those decisions, and the country's net contribution to (or withdrawal from) the world pool of saving.

Policy Reaction Functions

This appendix reports the results obtained from policy reaction functions estimated across a number of different countries. The main focus of this work is to examine the degree to which government policy has reacted to the current account, in order to investigate the hypothesis of Summers (1988), among others, that the observed cross-country correlations between saving and investment are due to government policy. Since there has been a fall in the observed correlation between the 1970s and the 1980s, this work also investigates whether there has been a fall in the importance of the current account as a policy target over the last twenty years.

Monetary and fiscal policy reaction functions are estimated directly, using reduced form equations with a policy instrument as the dependent variable and (lagged) targets as the independent variables. While there are other, more structural, methods of estimating reactions functions (Pissarides, 1977), the reduced form approach has been widely used in the literature (Joyce, 1986). Since they have rather different problems and complications, the monetary and fiscal reaction functions will be discussed separately.

1. Monetary reaction functions

The monetary reaction functions are based on estimated equations of the following form:

$$(A1) \quad \Delta(i_t) = \underset{?}{\alpha_1} + \underset{+}{\alpha_2(i)}\ \Delta(y_{t-i}) + \underset{+}{\alpha_3(i)}\ \Delta(p_{t-i}) + \underset{-}{\alpha_4(i)}\ (CA/Y)_{t-i},$$

where i is an interest rate, y is the logarithm of real output, p is the logarithm of the price level, (CA/Y) is the ratio of the current account surplus to output and Δ is the first difference operator. This equation states that the authorities raise or lower interest rates depending upon the recent behavior of three target variables, namely growth of output, inflation, and the size of the current account. The expected signs on these targets are given below the coefficients. Growth and inflation represent the basic internal targets of monetary policy, while the current account variable represents the external target.

Before estimating an equation such as (3) above, there are several issues that should be discussed. The first is the possible endogeneity of the policy variable; if the chosen interest rate is not fully under the control of the authorities, the estimated coefficients may in fact represent endogenous behavior rather than policy decisions. To avoid this problem the interest rates chosen were the official discount rates. These rates are fully under the control of the authorities, and are generally adjusted in discrete steps such as half a point.

A second issue involves the treatment of expectations. The authorities react to expected future changes in the economy, not those which have occurred; hence, ideally, rather than using lagged values of the targets, it would be preferable to use expected future values. Unfortunately, it is not the actual outcomes of the targets which should be used, but the outcome in the absence of any policy intervention. Since changes in the policy variable affects the future outcome of the targets, it would be necessary to specify a model of the effects of targets upon the economy before the correct expected values could be derived, and any results for the reaction function would involve a joint test of the rest of the model. To avoid these problems, lagged targets were used in the regressions. This procedure is justified if future expected outcomes are based upon past behavior. 1/

Finally, there is an econometric issue which should be considered. As was noted above, the dependent variable in these regressions moves in discrete steps, while standard regression analysis assumes that the dependent variable is continuous. If it is assumed that there exists an underlying continuous reaction function, but that the actual outcomes are then rounded to the nearest (say) half a percentage point, the rounding introduces a new source of error into the regression. As a result, while the estimated coefficients are still unbiased, estimated standard errors will be upward biased. The reported results have been adjusted to take this into account.

Table 3 reports these regressions for four countries: the United States, Japan, the Federal Republic of Germany, and Italy. 2/ The results are reasonably encouraging; in every case the sum of the coefficients on the targets has the correct sign. The coefficient associated with growth is significant at conventional levels in three of the equations, although somewhat surprisingly inflation is only significant for the United States. Using a one-tailed test the coefficient on the current account is significantly different from zero for both Japan and Germany, is totally insignificant for the United States and has a t-value of 0.9 when the Italian data are used. These results confirm the conventional view that external factors have been relatively unimportant in the United States, but played a larger role in other countries.

1/ For example, if a variable is projected using a first order autoregressive process, the first lag will contain all the information needed to project its future values.

2/ Full data sets were not available for other countries. The interest rates are end quarter data, while the other variables are quarterly averages. For each country the change in the interest rate was regressed on the current value and first lag of growth, inflation and the current account ratio. Since the interest rate data are end-period, the use of current period data on targets is justified, although it does assume a short lag between changes in targets and changes in instruments.

Table 3. Regression of Change in Interest Rate on Lagged Targets 1/

	United States	Japan	Germany	Italy
Growth	32.4 (8.5)	0.8 (8.8)	6.4 (5.7)	1.7 (4.0)
Growth (-1)	7.0 (7.9)	6.1 (9.4)	21.8 (5.7)	11.0 (4.1)
Inflation	43.4 (14.5)	3.1 (7.2)	8.4 (11.6)	50.5 (17.5)
Inflation (-1)	-9.1 (16.2)	0.9 (7.2)	2.5 (12.9)	-40.4 (17.6)
CA/Y	11.8 (14.1)	-12.8 (8.5)	-6.6 (4.5)	-3.4 (9.4)
CA/Y (-1)	-13.0 (13.8)	3.7 (8.5)	0.4 (4.2)	-2.7 (9.4)
DW	2.19	1.24	1.37	2.34
R^2	0.36	0.11	0.24	0.29
Se	0.62	0.64	0.51	1.11

1/ The data period is 1971:3-1988:2. Adjusted standard errors are indicated in parentheses.

If government policy is a major cause of the observed correlations between saving and investment, the fall in these correlations between the 1970s and the 1980s should show up in terms of a decline in the importance of the current account as a policy target. Table 4 reports the results of regressions designed to investigate this hypothesis. In addition to the targets, these regressions include dummy variables that represent the values of the targets in the 1980s. The coefficients on the target variables represent the importance of these targets in the 1970s, while the coefficients on the associated dummy variable show the change in the value of the targets between the 1970s and the 1980s. (The coefficient on the targets for the 1980s can be calculated from the sum of the coefficient on the target and its associated dummy variable). In order to simplify the presentation only current values of the targets are included in the regressions; results using lagged values are broadly similar.

These results are also encouraging. The most striking results pertain to the current account variable; all the coefficients relating to the current account in the 1970s have the expected sign and have t-ratios well above unity. Furthermore, all the regressions show a fall in the size of the current account coefficient between the 1970s and the 1980s. 1/ This fall reduces the coefficient to near zero for the United States and the Federal Republic of Germany, halves the coefficient for Italy while leaving it relatively unchanged in the case of Japan. Turning to the domestic targets, in the 1970s inflation has a larger and more significant coefficient than growth in all the regressions, and is significant at conventional levels in three of the four. 2/ The results for the 1980s show less uniformity, with growth becoming more important than inflation in the United States and Japan, but not in the Federal Republic of Germany or Italy.

Overall, these results appear to confirm that the current account was a significant policy target for monetary policy in the 1970s, but that its importance diminished somewhat in the 1980s. This behavior appears to correspond to a reduction in the correlation between saving and investment among OECD countries. Since the major effect of monetary policy is probably on private sector saving and investment, rather than on the government balance, these data do not provide support for the hypothesis of Summers (1988) that it is fiscal policy which has been used to target the current account, rather it appears that governments have sought to influence private sector behavior in response to current account imbalances.

One last issue which should be addressed is whether the estimated reaction functions are stable over time. The data in Table 2 indicate that there are significant changes in the estimated coefficients between the

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1/ Using a simple sign test, the probability of four coefficients all turning up negative is 6.25 percent, close to conventional significance levels.

2/ However, these results are not robust to the inclusion of lags.

APPENDIX

Table 4. Differences in Target Coefficients Between 1970s and 1980s 1/

	United States	Japan	Germany	Italy
Growth	21.9 (9.4)	0.0 (10.0)	2.7 (8.5)	6.3 (5.6)
DUM x Growth	27.1 (13.9)	18.4 (15.8)	-1.5 (12.1)	-10.8 (8.7)
Inflation	39.5 (10.5)	6.0 (6.7)	21.7 (14.4)	23.4 (12.4)
DUM x Inflation	-17.9 (9.0)	-2.1 (13.0)	-13.2 (14.7)	-10.7 (11.1)
CA/Y	-26.5 (14.6)	-11.4 (8.7)	-12.6 (7.8)	-12.9 (8.8)
DUM x CA/Y	30.7 (16.3)	1.5 (9.8)	9.0 (8.9)	6.5 (16.4)
DW	2.16	1.17	1.24	2.19
R^2	0.42	0.13	0.09	0.18
Se	0.59	0.63	0.56	1.19

1/ The estimation period is 1971:3-1988:2. Adjusted standard errors are indicated in parentheses. DUM equals 0 in 1970s and 1 in 1980s.

1970s and the 1980s; the question is whether this instability is important for shorter time periods. One way of testing this proposition is to estimate rolling regressions. These involve choosing a fixed time period, in this case 24 quarters, 1/ and regressing a given equation over this time interval starting in successive time periods; hence the first regression runs from 1972:1 to 1977:4, the next from 1972:2 to 1978:1, etc. The estimated coefficients, plus their standard errors, can be plotted in order to give a visual impression of the stability of the regression coefficients. This exercise has been carried out using a regression with only current target variables. The results (not reported here) are somewhat mixed. For the United States and the Federal Republic of Germany the data indicate fairly gradual movements in the coefficients, the Italian data show severe instability while the Japanese data show some instability at the beginning and end of the period. Overall, these results do not appear to invalidate the results for the longer periods, in that the estimated policy reaction functions are not excessively unstable.

2. Fiscal reaction functions

In theory, fiscal reaction functions can be estimated in exactly the same manner as monetary functions. However, in practice several factors make estimation more difficult. The first, and most important, has to do with the exogeneity of policy. Fiscal systems are extremely complex, and the policy instruments which are under the direct control of the government, such as tax rates or allowance provisions, are numerous. Summary measures of policy, such as the deficit or average tax rate, are not entirely under the control of the government given that they are likely to be affected by growth and other factors. 2/ The empirical work in this section uses the budget deficit as the basic definition of policy, but allows for some endogenous effects. (This work could be extended to other summary statistics, such as average tax rates.)

A second issue concerns the time scale over which fiscal policy is planned. While some adjustments often take place during the year, most fiscal policy changes are announced in the budget. Hence, while monetary policy can be analyzed on a quarterly or monthly basis, fiscal policy is probably best approached using annual data. This reduces the number of data points available, and lowers the precision of the estimates.

1/ This length of time was chosen because it is long enough to produce reasonable coefficient estimates, but short enough to allow genuine changes in coefficients to become apparent.

2/ Concepts such as the full employment deficit, which aim to take out these endogenous factors, depend upon the model used; furthermore, using such concepts in a reaction function assumes that governments disregard endogenous effects when choosing their fiscal stance.

Two reaction functions were estimated for twelve industrial countries. The first regressed the ratio of the budget deficit 1/ to GDP (the policy variable) against its own lagged value and lagged values of the three targets, growth, inflation and the current account; in the second, contemporaneous values for growth and inflation were included as proxies for possible endogeneity effects. The expected signs for the targets are the same as in the monetary regressions; growth and inflation should be associated with rises in the government surplus (reductions in the deficit) in order to stabilize demand, while changes in the current account should be negatively correlated with the government surplus if the current account is a target.

Table 5 shows the results from estimating the first equation; those from the second equation were broadly similar and are not reported. The coefficients are generally positive, but not significant. More worrying is the fact that all the coefficients on inflation fail to produce the expected sign; it appears that governments reacted to inflation by allowing their budget positions to deteriorate. This may be a result of the fact that inflation raises interest payments on government debt. The current account coefficients have no consistent sign, and are generally insignificant. The last column of the table shows the results when the six major industrial country equations were estimated as a system, with all the coefficients except the constant constrained to be equal across countries. The system results, which can be seen as a summary of the individual country regressions, indicate that growth has a positive effect on the government surplus, inflation has an insignificant coefficient, while the current account has a significantly positive effect, the opposite to the sign that would be expected if governments target the current account. 2/ Attempts to find differences in the importance of the current account between the 1970s and the 1980s also produced unsatisfactory results.

3. The contemporaneous saving-investment correlation

The above results from estimating policy reaction functions are mixed. Monetary policy appears to have reacted to the current account, but there is little evidence that fiscal policy did. This section explores the existence of a contemporaneous correlation between the government and private saving investment balances.

The following regressions were estimated using a first order autocorrelation adjustment:

$$(A2) \quad Priv\{(S-I)/Y\} = \alpha + \beta\ Govt\{(S-I)/Y\},$$

1/ General government data were used because central government data were only available for a few countries.

2/ When contemporaneous growth and inflation are included in the regression, the coefficient on lagged growth falls to near zero, while the coefficient on inflation becomes significantly negative.

Table 5. Regressions of General Government Deficit on Lagged Target Variables 1/

$$DEF/Y = \alpha + \beta_1 DEF/Y(-1) + \beta_2 GROWTH(-1) + \beta_3 INFL(-1) + \beta_4 CA/Y(-1)$$

	DEF/Y(-1)	GROW(-1)	INFL(-1)	CA/Y(-1)	R^2
United States	0.49 (0.30)	0.29 (0.20)	-0.22 (0.23)	0.90 (0.41)	0.64
Japan	0.92 (0.13)	0.18 (0.10)	-0.18 (0.07)	-0.15 (0.20)	0.89
Germany, Fed. Rep. of	0.34 (0.34)	0.21 (0.27)	-0.27 (0.29)	-0.19 (0.37)	0.40
France	0.63 (0.30)	-0.04 (0.31)	-0.11 (0.14)	0.69 (0.38)	0.67
United Kingdom	0.21 (0.12)	-0.03 (0.08)	-0.04 (0.05)	0.21 (0.110	0.70
Canada	0.88 (0.23)	-0.18 (0.30)	-0.47 (0.30)	-0.36 (0.50)	0.69
Belgium	0.59 (0.15)	-0.11 (0.17)	0.00 (0.15)	0.64 (0.18)	0.91
Finland	0.77 (0.14)	0.24 (0.13)	-0.19 (0.13)	-0.48 (0.18)	0.84
Norway	0.04 (0.20)	0.33 (0.36)	-0.25 (0.27)	0.39 (0.10)	0.81
Sweden	0.79 (0.18)	0.04 (0.38)	-0.21 (0.34)	-0.01 (0.44)	0.81
Austria	0.39 (0.20)	0.50 (0.15)	-0.30 (0.15)	0.60 (0.23)	0.90
Australia	0.33 (0.19)	0.15 (0.15)	-0.10 (0.09)	-0.17 (0.12)	0.60
System 2/	0.44 (0.09)	0.15 (0.04)	0.02 (0.04)	0.28 (0.05)	

1/ The estimation period is 1972-1986. Standard errors are indicated in parentheses.

2/ Uses data on first six countries.

where Priv means private sector, Govt is general government, and S,I and Y represent nominal saving, investment and GDP respectively. The coefficient β can be regarded as the degree to which changes in the government balance offset changes in private sector balance; a coefficient of -1 indicates that changes are fully offset. It should be emphasized, however, that the direction of causation is not clear.

The results from these regressions are presented in Table 6. In eight of the twelve regressions the estimate of β is insignificantly different from -1, with estimated values ranging from -0.8 to -1.1. Of the other four regressions, two have sizable negative estimates of β, while the two regressions with positive estimates of β, for the United Kingdom and Norway, also have the highest standard errors. 1/

To test how robust these findings are two further sets of regressions were estimated. Contemporaneous values of growth and inflation were included to test whether the correlations were caused by automatic stabilizers; the results were similar to the initial regressions. Finally, the possibility that these correlations reflect the treatment of all nominal interest payments as income in the national accounts was also examined. In times of inflation this artificially boosts the income, and hence saving, of net creditors, such as the private sector, while lowering the income and saving of net debtors, such as the government. A crude adjustment for this can be made by increasing government saving by the product of net outstanding government debt and inflation and reducing saving by the private sector by an equal amount. These calculations were made for the six major industrial countries in the sample, starting in 1977; the resulting regressions were similar to those without the inflation adjustment.

There is also evidence that the importance of these correlations has fallen over time. Table 7 reports the results when a dummy variable representing the change in the coefficient β in the 1980s is included in the regressions. The results support the thesis that the coefficient has fallen between the 1970s and the 1980s. Although rarely significant at conventional levels, the results show a fall in the implied correlation over the 1980s in eight of the 12 equations. 2/ This fall in the observed correlations parallels the observed decline in the correlation of national saving and investment rates.

Overall, there is powerful evidence of a negative correlation between the saving and investment balances of the private and government sectors. The cause of this correlation suggests two explanations, not necessarily

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1/ These results are not simply a product of Ricardian effects. Using similar data, Bayoumi (1989) finds a negative correlation between government and private saving, but the effect is not as powerful as the one documented here.

2/ Using a simple one-tailed sign test this result is significant at the 10 percent level, but not at the 5 percent level.

Table 6. Regressions of Private Sector and Government Saving-Investment Balances 1/

$$Priv(S-I)/Y = \alpha + \beta Govt(S-I)/Y + e_t$$
$$e_t = \rho e_{t-1} + \epsilon_t$$

	β	γ	R^2
United States	-1.07 (0.13)	0.91 (0.09)	0.84
Japan	-1.05 (0.28)	0.77 (0.16)	0.52
Germany, Fed. Rep. of	-0.83 (0.21)	0.68 (0.23)	0.47
France	-0.98 (0.21)	0.03 (0.29)	0.62
United Kingdom	0.43 (0.52)	0.69 (0.18)	0.05
Canada	-0.99 (0.15)	0.29 (0.27)	0.77
Belgium	-0.93 (0.24)	0.85 (0.12)	0.59
Finland	-1.00 (0.32)	0.33 (0.25)	0.44
Norway	0.11 (0.47)	0.65 (0.20)	0.01
Sweden	-0.66 (0.16)	0.35 (0.26)	0.57
Austria	-0.56 (0.11)	-0.29 (0.28)	0.65
Australia	-0.80 (0.37)	0.70 (0.17)	0.29

1/ The estimation period is 1972-1986. Standard errors are indicated in parentheses.

Table 7. Difference in Saving Investment Correlations Between the 1970s and 1980s 1/

$$\text{Private}(S-I)/Y = \alpha + \beta\ \text{Government}(S-I)/Y + \gamma\{DUM*\text{Govt}(S-I)/Y\} + e_t$$
$$e_t = \rho e_{t-1} + \epsilon_t$$

	β	γ	ρ	R^2
United States	-1.17 (0.18)	0.28 (0.26)	0.83 (0.14)	0.83
Japan	-1.10 (0.29)	0.31 (0.37)	0.78 (0.17)	0.55
Germany, Fed. Rep. of	0.88 (0.24)	0.69 (0.63)	0.53 (0.29)	0.51
France	-1.68 (0.34)	0.87 (0.48)	0.40 (0.31)	0.72
United Kingdom	0.59 (0.50)	-0.92 (0.44)	0.47 (0.24)	0.30
Canada	-0.43 (0.18)	-0.62 (0.18)	-0.01 (0.35)	0.92
Belgium	-1.17 (0.36)	0.20 (0.24)	0.87 (0.11)	0.61
Finland	-1.03 (0.32)	0.54 (0.89)	0.31 (0.27)	0.47
Norway	-0.24 (0.94)	0.39 (0.43)	0.62 (0.23)	0.03
Sweden	-0.84 (0.28)	0.40 (0.46)	0.41 (0.25)	0.56

1/ The estimation period is 1972-1986. Standard errors are indicated in parentheses. DUM is a variable equal to 0 for the 1970s and 1 for the 1980s.

exclusive. The first is that international capital mobility is low, although it has risen somewhat over time; hence any imbalance between saving and investment in one area of the economy requires an offsetting imbalance in another sector due to crowding out. An alternative explanation is that the government targets the current account. Fiscal policy adjustments could be made during the year, producing the contemporaneous correlation, or monetary policy could be directed to the current account, causing movements in both the private and government balances.

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