Macroeconomic Consequences of Financial Liberalisation: A Summary Report

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A SUMMARY REPORT

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ABSTRACT/RESUME

Macroeconomic consequences of financial liberalisation: Summary report

This paper brings together a number of interrelated issues concerning the implications of financial liberalisation for macroeconomic outcomes. Deregulation has tended to reduce the importance of liquidity constraints within and between countries, while at the same time giving markets a much greater role in utilising available information to achieve efficient outcomes. This has had implications for private spending behaviour and the transmission channels of monetary policy; for the volatility of financial prices; for the price and credit risks which arise; and for the integration of international financial markets and the process of external adjustment.

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Conséquences macroéconomiques de la libéralisation financière: Rapport résumé

Le présent document rassemble un certain nombre de conclusions afférentes aux conséquences macroéconomiques de la libéralisation financière. La déréglementation a contribué à réduire l'importance des contraintes de liquidité sur les marchés domestiques et entre les pays, tout en donnant un plus grand rôle aux marchés dans l'utilisation des informations disponibles pour obtenir des résultats efficaces. Ceci a eu des conséquences sur les comportements de dépense des agents du secteur privé et sur les mécanismes de transmission de la politique monétaire, de même que sur la volatilité des prix financiers, sur les risques accrus de prix et de crédit, sur l'intégration des marchés internationaux de capitaux et sur le processus de l'ajustement extérieur.

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I. INTRODUCTION AND SUMMARY

There has been a substantial degree of financial liberalisation in some, though not all, major OECD countries. This has led to benefits including efficiency gains, greater possibilities for smoothing expenditure in the face of disturbances, and reduced sensitivity of economies to short-run financial price volatility. There have also been some perceived macroeconomic costs. While these are less pervasive than in regulated financial systems, it is nevertheless important to reduce them without sacrifice of the gains derived from the increased role of markets. This paper outlines how to achieve this objective through an overall evaluation of the macroeconomic consequences of financial liberalisation.

A.   The process of liberalisation

The liberalisation of financial markets in the 1970s and 1980s has seen the abolition of credit and interest rate ceilings, of controls on international movements of capital, and of regulations affecting a wide range of financial activities in a significant number of OECD countries. These developments have increased competition in the provision of financial services, and have also seen innovations leading to the creation of new financial instruments. For the consumers of financial services this has meant increased access to credit, to new forms of "financial engineering" designed to handle diversifiable risks, and to technological advances such as automatic teller machines, point-of-sale electronic funds transfer and credit cards. For the suppliers of such services, it has been a time of major expansion, with significant human resources being allocated to competing in existing markets and in developing new ones.

Once the process of liberalisation began, one act of deregulation quickly spawned others. Within domestic markets this contagion took the form of pressures to level the playing field, as some newly-deregulated institutions greatly increased their market share at the expense of those affected by remaining regulations. But the process was equally forceful between countries, as policy makers recognised that maintaining regulations would lead to the decline of domestic financial institutions, through their inability to compete effectively with foreign rivals.

This process, however, has been uneven between countries (1). The United States, Canada and the United Kingdom moved relatively early, and with some rapidity. Japan too has made important steps in the 1980s, while developments proceeded more cautiously in France and Italy, and somewhat later. Germany, which was one of the first countries to remove rate and quantity regulations in the 1960s and early 1970s, has been relatively slow to authorise various financial activities. As a result, competition amongst German banks is limited, and short-term financial instruments paying market returns have not been readily available throughout the 1970s and 1980s. Australia, New Zealand and most of the Scandinavian countries have been prominent amongst the smaller economies that have moved most quickly in the direction of financial liberalisation in the mid-1980s. Some small financial centres such as Belgium, Luxemburg, the Netherlands and Ireland have also sought to compete internationally in recent years. Others, such as Spain, Portugal and Greece, while having made some reforms, still retain more highly regulated financial systems. As Europe moves towards a single market in 1992, and as the pressure for liberalisation continues to build, more countries will be affected by the issues discussed below.

B. Macroeconomic implications

There is a general presumption that financial liberalisation has improved welfare. Not only have services been extended, but households and companies have greater flexibility for smoothing shocks to incomes and outlays, via the use of credit and capital markets, and economies have become more resilient to short-run financial price volatility. Improvements in efficiency have also followed, with competition reducing operating costs of financial intermediaries, and hence the cost of their services. Moreover, the gradual reduction of credit rationing has led to improvements in the allocation of resources. Although such gains are difficult to "prove" via quantitative illustration (2), taken together their beneficial impact is likely to be substantial. Thus, it is a premise of this study that financial liberalisation is an important step towards better-functioning market economies.

Nevertheless, concerns have often been expressed that liberalised financial markets may be associated with a number of undesirable macroeconomic outcomes. Examples include:

-- the increased use of credit to purchase assets and to finance consumption, resulting in a substantial and potentially unsustainable build up of private sector debt, and in some cases declines in household saving rates which might jeopardise future growth potential;

-- asset price inflation and volatility, including periods when nominal wealth has grown quickly and financial market prices have sometimes appeared out of line with "fundamentals";

-- the emergence of inflation and balance-of-payments difficulties, as slower moving goods markets respond to financial developments in the new environment;

-- the limited response to changes in monetary policy designed to contain inflation and balance-of-payments pressures; and

-- problems of financial fragility (excessive exposure of borrowers to sharp increases in debt servicing, and thus increasing probability of default) particularly when monetary policy has led to sharp increases in interest rates and falls in asset prices.

As an illustration, the behaviour of household saving and gross debt as a share of household income is shown in Chart 1 for ten OECD countries. There is an inverse correlation between household borrowing and savings ratios beginning from the early to mid-1980s in most countries -- Germany and Italy being exceptions. The average inflation and current account performance of fifteen OECD countries in the second half of the 1980s is shown in Chart 2. Countries with above 3 per cent inflation and current account deficits worse than 1 per cent of GDP are those which have moved most quickly towards financial liberalisation.

Correlations, of course, do not imply causality. Also, these developments may reflect the lack of experience of economic agents and policy makers alike in the changing environment, rather than "problems" with financial

markets per se. A corollary to the apparent reduced sensitivity of economies to monetary conditions has been their resiliency to disturbances in financial markets -- the stock market plunge of October 1987 being a notable example. To put the above issues into perspective, therefore, it is helpful to consider how deregulation might be expected to impact on the macro economy -- both in the short-run and in the longer run.

Financial regulations have the effect of constraining liquidity in the domestic economy, and of inhibiting the allocation of world savings to countries where expected returns on investment are highest. Thus, for example, interest ceilings restrict banks in attracting deposits to fund their lending, while capital controls limit the extent to which lending can be financed offshore. Exclusion of non-bank financial intermediaries from full participation in the payments system restricts the liquidity of their deposits. Not permitting wholesale money market instruments precludes competitive alternatives to bank liabilities.

As a result agents are relatively less able to act on their expectations about future income and wealth, as well as to respond to the signals provided by relative prices in making decisions about spending and portfolio investment. Constrained decision making also implies a much smaller role for markets in capturing and transmitting information in the determination of financial prices. Domestic investment and savings decisions are constrained to be closely linked, as mobile international capital flows are not readily forthcoming to finance any significant gaps. Exchange rate behaviour is therefore more heavily governed by trade and current account developments.

The removal of financial regulations changes this situation. In more liberalised financial markets, interest rates play a larger role in clearing the supply and demand for credit, and financial intermediaries are able to fund lending in wholesale markets at home and abroad. Hence financial markets become more integrated and prices more interdependent. At the same time greater competition stimulates innovation, progressively enlarging the means for risk and liquidity management. This process reduces the influence of liquidity constraints in the economy, giving greater scope to private agents to achieve their portfolio investment and spending objectives, and for market expectations to be reflected in financial prices.

Financial liberalisation has led in some cases to increased spending and to portfolio reallocations that have affected financial market prices. Much of this initial adjustment is presumably transitional (or short run) in nature. But financial liberalisation leads also to more on-going changes in private sector behaviour, with long-lasting consequences for macroeconomic policy. It is these latter issues which are the main concern of this paper.

The <u>first</u> of these issues concerns the implications of reduced liquidity constraints for private spending and portfolio decisions. As capital and credit markets can be used more flexibly, current income and the availability of money (or current liquid wealth) are less binding constraints on expenditure and portfolio behaviour. Monetary policy is forced to operate to a much greater extent through the incentives implied by changes in relative financial prices. At the same time, however, these prices are also affected by market perceptions about the implications of current policies for future demand and inflation. Monetary policy is therefore likely to be complicated by greater uncertainty about the extent to which interest rates have to be changed to affect aggregate demand and by financial market responses to such actions.

The <u>second</u> set of issues concerns the functioning of liberalised financial markets. Inefficiencies may arise in liberalised markets under certain circumstances. Prices in auction markets, which are supposed to reflect information about fundamentals, may suddenly be driven by speculators in seemingly unsustainable directions, as apparent price "bubbles" emerge. In allocating credit, intermediaries have less information than would-be borrowers about the expected profitability of individual projects. Situations can be envisaged where adverse selection and moral hazard problems arise, and where the likelihood of default implies that credit is rationed, even in the absence of regulation. Although these problems are probably less acute than the misallocation of resources and risks implicit in a regulated environment, they may nevertheless affect the efficiency and stability of the financial system.

The <u>third</u> broad set of issues are those associated with the globalisation of financial markets. The increased opportunities for diversifying risks associated with the accumulation of external assets and liabilities enables domestic savings and investment balances to diverge over sustained periods. World savings can be allocated more readily to those countries with the highest expected returns on investment. This changes the concept of what is a sustainable current account deficit, as there is a reduced need for real exchange rates to clear the external accounts in the short run. Important policy issues may arise to the extent that exchange rate determination in globalised markets is more affected by speculative moves which drive real rates away from fundamentals. This raises questions about the appropriateness of alternative exchange rate regimes and policy co-ordination.

The remaining sections of this paper analyse these three broad sets of issues and their implications for policy.

II. THE EFFECTS OF LIBERALISATION ON LIQUIDITY AND SPENDING BEHAVIOUR

If financial liberalisation helps to ease liquidity constraints, it would follow that (3):

    i)   permanent income would become a more important determinant of consumption expenditure;

    ii)   financial aggregates (such as money and bank credit) would become less closely linked to economic activity, as "liquidity" tends to be more broadly defined and as the aggregates tend to lag rather than lead activity;

    iii) financial prices would become better indicators of future changes in real activity and inflation, given the greater role for expectations; and

    iv)   the influence of monetary policy on financial prices would become more complex and perhaps weaker because of the growing influence of expectations, and comparable foreign financial prices.

A. <u>Private expenditure and easing liquidity constraints</u>

Typically, private consumption has been found to vary with transitory income, rejecting the pure permanent income hypothesis (PIH). Has permanent

income become a more important determinant of consumption via reduced liquidity constraints, as financial liberalisation has proceeded?

According to the PIH, consumption should follow a random walk if capital markets are perfect and expectations are rational (4). This means that the present level of consumption is the best forecast of its future level or, equivalently, that changes in consumption cannot be forecasted. In particular, changes in current or past income should provide no useful information for forecasting consumption behaviour, except to the extent that they signal innovations in permanent income. Controlling for the effects of such innovations statistically, the significance of current and lagged income terms in consumption regressions would constitute evidence against the PIH (5). Tests were thus conducted for the 1960s, the 1970s and the 1980s to examine whether there has been an increase in the relative importance of permanent income in each successive decade. The results are reported for the major OECD countries in Table 1 (6).

For the United States, Canada and Japan the results are broadly consistent with a pattern of reduced sensitivity to transitory income, particularly by the 1980s. In the case of the United Kingdom, on the other hand, the significance of transitory income increases slightly in the 1980s, suggesting that liquidity constraints if anything actually increased. One explanation of this could be that credit rationing may still occur in liberalised systems, particularly following sharp increases of indebtedness in the initial transitional phases of deregulation, as mentioned in Section III.

In Germany, France and Italy, where liberalisation measures and competitive innovation have been less pronounced, there is less evidence of reduced liquidity constraints. In Germany, sensitivity to current income is highly significant in all periods considered. In France, sensitivity to current transitory income is large and highly significant in the 1960s, and it declines somewhat in the 1970s and 1980s. But the overall tests suggest that the PIH is rejected in all periods. The Italian results are marred by inappropriate statistical properties (7).

Using pooled data for the United States, Japan, the United Kingdom and Canada, the tests show significant declines in the importance of transitory income (8). Pooled data for Germany, France and Italy, where a priori considerations suggested a slower trend towards deregulation well into the 1980s, demonstrate the continued importance of transitory income.

B.   The diminished importance of monetary aggregates

Financial liberalisation gives rise to numerous options for financing expenditure. The distinctions between banks and other financial institutions become blurred and assets with characteristics similar to money multiply. As banks pay competitive rates for deposits, the motives for holding money balances are similar to those for holding other forms of wealth. In such circumstances it becomes less evident that money should have a close relationship with nominal demand. There is increased scope for liquidity management, and an increasing array of new financial products, which shift the demand for money.

Long-run relationships

If financial deregulation spawns an on-going process of innovation into the indefinite future, there may be no tendency for stable money-income relationships to re-emerge -- even in the long run. Cointegration methods permit a direct test for whether there is a general long-run equilibrium relationship between money and nominal income. If some linear combination of the broad swings in both cancel each other out, any remaining short-run errors, or deviations from the long-run relationship, can be expected to be eventually reversed. Results for such tests between money and nominal income for the major OECD countries are shown in Table 2.

For the United States and Germany, there appears to be no long-run relationship between narrow aggregates (M1 and central bank money, CBM, respectively) and nominal income. These aggregates were the focal point of monetary policy for many years. There is, however, evidence of a long-run relationship for broad aggregates. This is consistent with the view that financial liberalisation affects first the stability of velocity of narrow money. For all of the other countries, however, there is no evidence of a long-run relationship between money and nominal income for any aggregate (whether narrow or broad) (9). Thus controlling the growth of the money supply even over long periods of time could not be expected to contain the longer-run growth of nominal income.

Short-run relationships

Short-run relationships between money and income may exist and be useful for policy. Such relationships would arise, for example, if there were a short-run flow demand for money related to changes in transactions requirements, which does not presuppose any long-run portfolio demand. This can be examined by looking for relationships between current and lagged changes in any group of variables, without assuming that any longer-run equilibrium exists (10). This was done for money, nominal income, the exchange rate and the interest rate.

Periods where money appeared to lead income are shown in Table 3. For some countries a significant break was found, and the nature of the relationship among the four variables was then examined both for the period up to the break, and for the whole period, including years after the break. This second set of results is shown for broader monetary aggregates in Table 4 (11). All of the permutations of the reverse relationships (money, interest rates and the exchange rate as dependent variables, as well as nominal income) were also estimated to assess whether two-way or reverse "causation" is present -- thus giving some idea as to whether money indeed lags nominal income, as suggested earlier.

For those countries in which liberalisation has been relatively more prominent, at least one definition of money has led nominal income for a period, after which the relationship has broken down, or the "causation" became two-way. For the United States, both M1 and M2 ceased to be good predictors of nominal income by 1978 (12), after which only the reverse relationship of nominal income predicting money is present. While the money-income relationships appear to hold up well for Japan, with both narrow and broad aggregates leading income in both the 1970s and 1980s, in the latter decade the

reverse relationship is also at work for M2+CD (13). In the United Kingdom the role of sterling M3 as a predictor of future fluctuations in nominal income broke down in 1983. Similarly, the role of M1 as a leading indicator of income in Canada broke down in 1984, even though financial markets had undergone considerable liberalisation in the 1970s. While Canadian broad money (M2) does lead income, reverse causation is also present, with income significantly leading money.

Amongst the other countries, where financial liberalisation or competitive innovation has been comparatively less important, monetary aggregates appear to have been more reliable as short-run predictors of nominal income. In Germany, M3 became a leading indicator from the early 1980s, and there has been no tendency for this relationship to break down or for evidence of two-way causation to emerge. For both Italy and France, broad money emerged as a sound leading indicator of nominal income in much the same way that it did for Germany.

As the general level of interest rates rise, so too do the rates paid by banks competing for funds in the open market (14), with, perhaps, less of a direct impact on monetary aggregates. The evidence on this issue reported in Table 4 is very mixed, with only Canada following the expected pattern of interest rates becoming less significant predictors of money in the 1980s. This is because the pricing of deposits by banks is often sluggish even in liberalised markets, so that movements in the overall level of interest rates can have a __temporary__ impact on money. As liberalisation and innovation proceed, and foreign competition increases, domestic banks will likely tend to adjust their rates faster. This will further reinforce the tendency for money to become a lagging indicator -- a change in interest rates affecting the quantity of money only after its impact on economic activity.

C.   __The increasing role of financial prices__

Financial prices in a liberalised market react quickly to expectations, and "jump" to new levels in response to "news", well before expenditure and goods prices adjust. For example, if the authorities suddenly ease monetary policy, this may be interpreted as new information that nominal demand and goods prices will increase in the future. The exchange rate may immediately depreciate, stock market and house prices rise and the yield curve might steepen. Financial prices therefore become leading indicators of expected future economic outcomes, and a part of the transmission mechanism of policy.

__Financial prices as indicators__

The term structure of interest rates is often considered a good leading indicator (15). A previous OECD study suggested that the term structure contains useful information for forecasting future activity and inflation (16). Has this information content increased as financial markets have become more liberalised? The results presented in Table 5 attempt to answer the question of whether information contained in the yield curve improves forecasts of nominal GDP and/or inflation, over and above any predictability based on the past behaviour (lagged changes) of these variables (17). These results suggest that the yield gap contains very little information useful for such forecasting in the 1970s. But over the full sample period the yield curve adds significant explanatory power for both nominal GDP and inflation for all countries. Estimates for the 1980s alone show, for all countries except Japan, that explanatory power is improved for either or both of these variables.

Financial prices as monetary transmission channels

The term structure of interest rates also reflects the transmission of monetary policy in a more liberalised environment. Two effects operate on its slope. The first is a direct "liquidity" effect, whereby the monetary authority, for example, restricts liquidity to the economy, driving up nominal short rates (18). The second arises from the interaction between inflation expectations and the credibility of monetary policy. For example, a contractionary policy which is expected to be anti-inflationary will reduce the inflation premium incorporated in long rates. These two effects are interdependent. Unless the monetary authorities can influence nominal rates on financial instruments of sufficiently long maturity to have a bearing on private expenditure, there is no reason for people to expect a subsequent abatement in inflation and to bid long rates down (19).

With borrowers and lenders having greater freedom to choose the maturity of instruments, any change in market rates induced by central bank operations at the short end of the maturity spectrum will tend to be dampened. This results from simple portfolio substitution, whereby any tendency for rates on short-term securities to rise will be partially offset by substitution away from a wide array of longer-term assets in the expectation of obtaining a higher yield. The practical relevance of the weakened liquidity effect can be seen from the ad hoc regressions of long rates against both short rates and foreign long rates presented in Table 6. For most countries the elasticity of long rates in response to short rates is reduced, while the correlation with foreign long rates is increased.

In sum, financial deregulation serves to impart a larger role to expectations in the determination of interest rates. As the liquidity effects of monetary policy actions become weaker, the effects of policy working through expectations become more important.

III. VOLATILITY AND RISKS IN LIBERALISED FINANCIAL MARKETS

The process of financial liberalisation extends the role of market forces in the allocation of resources. The degree to which market forces improve resource allocation depends on how liberalised financial markets work. In this respect, it is worth distinguishing between two broad types of markets in liberalised financial systems: (i) auction markets, where offers and bids determine the market-clearing price of assets (including securities, equities, foreign exchange, housing, etc.); and (ii) markets involving financial agents who intermediate between borrowers and lenders for a fee -- intermediaries being better placed to monitor relevant information at lower costs than individuals. Information problems, typically involving asymmetries between participants, may arise in both markets, with potential consequences for the allocation of resources and financial fragility.

A.   Volatility and efficiency in financial auction markets

Auction market prices respond immediately to news about "fundamentals" -- changes in policies or economic surprises that influence expectations about the future. Such volatility is implicit in the efficient functioning of markets and, indeed, it plays a vital role in the transmission of information

to ensure that the economy adjusts (20). Nevertheless, questions do arise as to how well this role has been performed. The standard against which to assess the performance of financial markets is the efficient markets hypothesis. Market efficiency in this sense means that arbitrage ensures there is no unexploited information that would permit speculation to produce more than a normal rate of return on the funds employed. To the extent that this hypothesis is not true, because of informational inefficiencies, financial prices may become misaligned in relation to "fundamentals".

Three issues about financial auction price determination in liberalised markets are worth exploring:

    i)   the degree of price volatility and of "spillovers" from one market to another;

    ii)   the persistence of excessive returns, which would signal departures from the efficient markets hypothesis; and

   iii) the implications for economic activity of departures from efficiency.

Historical volatility patterns

Estimates of the monthly volatility of bond yields, stock returns and exchange rates are presented in Table 7 (21). In the case of bond yields, volatility is noticeably smaller than in other markets, and for some countries it has actually fallen in recent years. This is consistent with the discussion in Section II, which suggested that more active portfolio management across the term structure has weakened the impact of more volatile short rates driven by monetary policy. Moreover, in the 1970s high and volatile inflation was more strongly reflected in both short and long rates. In the 1980s, with more sustained commitment to anti-inflationary monetary policy, this link has been weakened. Bond yields are also less likely to be affected by speculative "bubbles", given that the price of bonds at maturity is known with certainty. In the case of stock market returns, volatility appears to have increased somewhat during the second half of the 1980s in most, though not all, larger markets. More detailed investigation suggests that this was concentrated in transitory periods of extreme changes in returns -- for example, in the October 1987 and 1989 market breaks (22). Measures of volatility based on higher frequency data show that, following such periods, markets quickly revert to much lower levels of variability. Finally, in the case of percentage changes in the exchange rate, there has been a very clear increase in volatility across the board in the 1980s -- monthly volatility is approximately 25 per cent higher compared to the 1970s (23).

The evidence for spillovers between financial price volatility in different national markets is presented in Table 8. The monthly volatility of bond yields appears to be correlated between some markets in both the 1970s and the 1980s. This probably reflects the outcome of worldwide inflation and oil shocks during the 1970s. These types of shock were less important in the 1980s, yet there are still significant correlations with volatilities vis-à-vis United States bond yields. For stock market return volatilities, the correlations between the few major markets appear to be strong in the 1970s, probably also as a consequence of common world-wide shocks. Significant

correlations remain present in the 1980s, and evidence for the second half of that decade (bottom panel of Table 8) suggests that correlations have increased most recently as liberalisation has proceeded. Furthermore, in times of unusually large volatility, international spillovers become even stronger (24). One explanation of these joint phenomena relates to the technological improvements stimulated by the process of financial innovation. Given transactions costs, there may be "dead zones" for portfolio substitution when markets are relatively calm. In instances of large price changes, shifting between markets becomes more profitable, and intermarket volatility of returns become more highly correlated (25). On this argument, average costs of transactions have been reduced by technological innovation and increased turnover, reducing the frequency of "dead zones" where trading is light.

In summary, bond yield volatility has if anything declined with financial market liberalisation; there has been some tendency for stock market volatility to rise in the later 1980s, although this is related mainly to short episodes; and there has been a substantial and widespread increase in the volatility of exchange rates. Financial market liberalisation also appears to have been associated with increased international spillovers between stock and (to a lesser extent) bond markets, particularly in the later 1980s.

Efficiency issues

Some volatility episodes may be associated with destabilising speculation and departures from fundamentals (informational inefficiencies). Cutler, Poterba and Summers (1990a), attempted to establish whether observed departures from fundamentals show any common pattern across a wide set of financial markets (26). Specifically they examined data from thirteen countries on: the performance of equity and bond markets since 1960; house prices and collectables over a couple of decades; and the behaviour of ten exchange rates (plus the price of gold) since floating began in 1973. They found that there were excess returns available in these markets which were positively serially correlated at high frequency, and negatively correlated at longer horizons. These patterns emerged repeatedly in their samples, and their pervasive nature was taken to imply that they were inherent features of the speculative process, rather than variations in risk premia which tend to be associated with particular markets.

The efficiency of stock markets has been questioned for some time, since stock prices have appeared to move excessively in relation to the efficient markets proposition that they should reflect "news" about fundamentals, and that the current price is an efficient estimate of the present value of discounted future dividends (27). The stock market crash of October 1987, which resulted in large falls of 20 to 35 per cent right across the board, without any obvious cause in the form of new information, led to more widespread doubt. One explanation of the market break in the United States is that the activities of hedgers, in particular programme traders who created synthetic options (portfolio insurance), induced an element of "positive feedback" in the market, where price falls led to sell orders and these to further price falls (28). To what extent such features of the stock market might have been responsible for the market break -- and whether the market has adapted sufficiently to avoid the risk of a repetition -- are still matters of some debate. But the overall argument is certainly consistent with the phenomenon of "feedback trading", and the tendency this implies for short-run extrapolation, which is contrary to the efficient markets hypothesis.

The efficiency of the foreign exchange market is also of particular interest for two reasons. First, the degree to which the exchange rate fluctuates depends to a large extent on the desire for national monetary independence (greater independence requiring floating, whereas EMS type arrangements require the co-ordination of domestic monetary policies). Free floating of the exchange rate is not an essential part of the commitment to competitive markets (although refraining from the use of capital controls is) -- since competition may prevail under a gold standard, under fixed exchange rates, or with a common currency. The extent to which the foreign exchange market is believed to be efficient is one factor pertinent to choosing between these regimes, and hence to the question of monetary policy independence or inter-dependence. Second, more than any other asset price, liberalisation and the increased integration of world financial markets has been associated with substantially increased exchange rate volatility.

Most tests of the efficiency of the foreign exchange market are evaluations of the extent to which the forward exchange rate is an unbiased predictor of future spot rates (29). This proposition has been rejected in virtually all recent attempts to test it (30). It was particularly flawed in the case of the dollar in the first half of the 1980s, which sold consistently at a forward discount vis-à-vis the Deutschemark while it was persistently appreciating. A visual inspection of Chart 3, which shows forward premia and actual changes in exchange rates for a number of currencies, illustrates the size and persistence of the deviations which resulted in the biases in question. Attention has been focused on two propositions that have been offered as explanations of this type of phenomenon: i) time varying exchange risk premia, which drive a wedge between the forward discount and expected depreciation because of uncertainty attached to the market forecast of future exchange rates; and ii) that markets are inherently bad at predicting future outcomes according to available information about fundamentals. There are other possible explanations. For a limited period, ex post observations of excess returns may arise by chance. But given the pervasiveness of the observed biases, this explanation has been increasingly difficult to maintain. Some types of uncertainty may also give rise to ex post excess returns in an efficient market -- for example, if markets make allowance for an important contingency that occurs infrequently. This phenomenon (the "Peso problem") is commonly observed in periods when a change of policy is expected in a fixed exchange rate, but is less convincing as an explanation of relatively freely floating rates.

Of the two preferred explanations, some of the more recent evidence tends to suggest that expectational errors are responsible for much, if not all, of the finding that the forward discount is a biased predictor of future exchange rate changes. Thus Frankel and Froot (1989) use direct observations of exchange rate expectations from survey data to separate out these effects from those due to risk premia, and find the latter play a relatively small role (31). They also find that those respondents who make forecasts over longer horizons, i.e. one year or more, tend to have expectations based on long-run equilibrium considerations, whereas those who forecast over short horizons (one week to three months) tend to follow extrapolative rules. This is consistent also with the findings of Cutler, Poterba and Summers mentioned earlier. Both of these sets of authors, and others, have postulated models to explain such empirical regularities (32). These appeal to the asymmetric distribution of information in markets, with participants divided between those

basing their decisions of expectations about future fundamentals (either immediately or via a learning process), and those whose asset demand is based on an extrapolation of past trends in prices. Such models explain the cumulative deviations from fundamentals over short horizons, while fundamentals dominate in the longer run. At the present time, however, there is no consensus amongst researchers in this field as to which explanation is the right one.

Costs of volatility and misalignments

Short-run volatility of financial prices could be associated with costs for the real economy. This issue has been investigated extensively for exchange rates, where not much evidence has been found for significant volatility impacts on exports (33). This is not surprising, given the ability to hedge in futures markets. Moreover, the work of Dixit (1989a,b) suggests that firms contemplating entry or exit from export markets incur certain fixed costs which give rise to bands of inertia in the face of a fluctuating exchange rate. They will delay entry (or exit) until the rate has moved to a significantly more favourable (or unfavourable) level. While this may eventually trigger action, it helps explain why short-run volatility may have little direct impact. Thus short-run movements in exchange rates, in and of themselves, may not be cause for concern. Welfare losses may be involved, on the other hand, if volatility exceeds fixed cost inertia bands, so that temporary exchange rate movements (if they are large enough) can lead to such losses on a permanent basis. Similar comments would seem to apply to stock prices and investment decisions.

Increased price volatility in financial auction markets may contribute to a general shortening of time horizons in investor behaviour ("short-termism"). This tendency may also be exacerbated by the fact that money managers, particularly those employed by institutional investors such as pension funds and insurance companies, being rewarded for short-term performance themselves tend to invoke the same criteria in choosing their investments. Survey evidence suggests that company managers feel that such short-term behaviour is not conducive to major investment in research and development (34). A testable implication of such myopia is greater weight being attached to current (relative to future) dividends by stock market investors than the efficient markets hypothesis would suggest. One recent study reports supporting evidence for this theory (35). It has also been widely argued that another manifestation of the consequences of such short-termism is the growing number of management buyouts since the mid-1980s, particularly in the United States, in an attempt by managers to escape what they perceive as the whims of the stock market.

A simple test of the effect of financial price volatility on activity variables is reported in Table 9, for stock market volatility vis-à-vis industrial production, and exchange rate volatility vis-à-vis exports. Confirming other studies, there is very little evidence that exchange rate volatility matters in either the 1970s or 1980s. With regard to stock market volatility, significant effects can be demonstrated in the 1970s for the United States, Japan and the United Kingdom. In all cases this significance is eliminated in the 1980s, as real variables appear to have become more independent of price volatility. Real growth may be more robust to financial price volatility induced by policy and other shocks as the process of liberalisation proceeds. Casual observation of the robust performance of OECD economies in the second half of the 1980s provides some corroboration of this.

In contrast to short-run volatility, the question of prolonged movements in financial prices not explicable by fundamentals has long been recognised as a matter for policy concern, particularly in regard to the special case of the exchange rate. There are two reasons for this. First there may be identifiable welfare costs of misalignment (36). Second, cumulative fluctuations of real exchange rates of the order of 10 to 20 per cent that are sustained for six months or more have important effects on trade flows (37). (The question of whether such swings can be attributed to "fundamentals" is taken up in Section IV.) Similar comments apply to other auction market prices, including stock and house prices. The key issue for policy is how to reduce the extent to which expectations drift away from fundamentals, without resorting to regulations which inhibit the working of markets.

B.   Information problems confronting financial intermediaries

As financial liberalisation has proceeded, the role of agents or intermediaries in financial transactions has also greatly increased. This has facilitated the task of transferring funds between borrowers and lenders and, in principle, should reduce transactions costs. As with auction markets, however, information problems can at times arise so that the role of agents is not neutral with respect to resource allocation and the real economy (38). Three issues are examined:

  i)   the nature of informational asymmetries which preclude first best contractual arrangements;

  ii)   the potential interaction between information problems for intermediaries and other developments in liberalised financial markets; and

  iii) examples of possible financial fragility that arise from both of these issues.

Information problems in loan markets and their potential costs

Lenders need information about the expected returns from borrowers projects. Information asymmetries can prevent this, and resource misallocation can result. The nature of these asymmetries produces moral hazard and adverse selection problems. Firms with a potentially high return but high risk projects have the incentive to borrow heavily, as their exposure is limited by bankruptcy laws. Attempts to clear the excess demand for credit by raising interest rates may simply increase the probability of default. Indeed, as interest rates rise, risk-averse investors may withdraw from the pool of potential borrowers, so that the average quality of borrowers may decline.

Intermediaries may attempt to reduce the importance of such problems through credit rationing (39). This sets a limit to the extent to which liberalisation can ease liquidity-constraints. Thus if private expenditure and credit demand is rising and the authorities move to tighten monetary policy, a decline in expected returns for lenders may lead to lending criteria becoming more stringent. This may reinforce the effect of monetary policy on real activity in ways not yet known. Resource allocation may also be affected if intermediaries lend more readily to well-known clients to the exclusion of others.

These types of issues are more likely to arise in countries (e.g. the United States, the United Kingdom, Canada and a number of smaller countries) where there is greater separation between borrowers and lenders as depository institutions are precluded from holding large equity in non-financial corporations. On the other hand, such arrangements generate competition between agents which reduces transactions costs for borrowers, and may also induce innovations that help to ameliorate some of the above-mentioned agency costs (40). Information problems may be less apparent in countries (e.g. Japan, Germany and also some continental European countries), where banks hold large equity and/or proxy voting rights in the corporate sector and have significant representation on supervisory boards. They are, therefore, much more aware of the risks implicit in the projects for which they lend. Such banks often continue to make liquidity available to clients even in hard times. On the other hand, such systems tend to be characterised by substantially reduced competition and hence higher transactions costs. At the same time, the position of small firms outside of close relationships with banks is unclear (41).

Excessive exposure to loans with low expected returns can lead to insolvency problems, and the failure of financial intermediaries which are the focal point of large numbers of individual transactions could have economy-wide implications. Because an increasing number of intermediaries participate in the general payments system, the potential for "domino effects" can lead to significant real economic costs.

Other aspects of financial liberalisation bearing on financial fragility

Information problems confronting financial intermediaries can be compounded by a number of factors related to the process of liberalisation. First, a greater amplitude of swings in short-term interest rates may be necessary to have the same impact on private demand compared to regulated financial markets. Since lending rates may still be inflexible, because old loans remain subject to ceilings, or new loans still favour stable rates (42), insolvency problems may arise. Also, it is more difficult to interpret financial indicators associated with temporary excessive ease or tightness. Auction prices may be driven to levels that ultimately prove to be inconsistent with the inflation goal. If sufficient borrowing goes on using assets with inflated prices as collateral, the inevitable reversal of monetary policy may lead to financial fragility problems, as asset prices fall and servicing costs rise (43).

Second, greater competition in financial markets has tended to increase risk taking. Indeed, as competition between intermediaries reduces profit margins, incentives arise to increase turnover, to engage in high risk/high return activities, and to earn fees with off-balance-sheet exposures. The regulatory framework may reinforce these tendencies. For example, unconditional guarantees for depositor's and investor's funds reduce the incentive for management to be risk averse so that such moral hazard situations may arise more easily.

Finally, financial auction markets may be associated with increased price volatility and speculation quite independently of the stance of policy. If such volatility is not perceived in advance by the parties to loan contracts, the risks attaching to them will be mispriced, and the financial intermediary may become excessively exposed to bad debts (44).

Recent practical examples of financial fragility

Among factors of potential fragility, the deterioration of the liquidity position of non-financial corporations in the United States has raised concern in recent years. To illustrate this, changes in the ratio of gross debt to total assets of non-financial corporations (a commonly-used measure of leverage) in the major OECD countries are shown in Table 10. It appears that the United States, the United Kingdom and Canada have significantly lower levels of leverage than Japan and Germany. In most countries leverage has remained stable or declined since the early 1980s. Only in the United States has there been a marked and sustained increase in corporate leverage in the recent past (45).

Two elements have contributed to this increase in indebtedness. First, tax reforms affecting both corporate and personal taxation in 1981 and 1986 may have increased the incentive to substitute debt for equity in the 1980s (46). Second, financial deregulation (the Department of Justice Merger Guidelines of 1982 and 1984 which modified barriers to entry) and innovation (especially the introduction of high-yield non-investment grade "junk" bonds, and the securitisation of intermediaries' assets) also contributed to increased corporate leverage. This trend may constitute a source of systemic weakness -- particularly in the event of high interest rates or a recession. The recent implosion of the junk bond market -- thought partly to be related to lack of transparency about implicit risks -- has to some extent vindicated these fears.

Asset price inflation in Japan and the United Kingdom have also been a source of concern. In Japan both land and equity prices rose sharply in response to easier monetary conditions over the period from the Plaza Accord to mid-1989. The price to earnings ratio has been very high in relation to the dividend ratio, suggesting that corporate profits do not explain the sharp rise in equity prices. These increases have been fuelled by a significant expansion of bank lending for the purpose of real estate and stock market acquisitions. The subsequent (necessary) tightening of monetary policy has led to sharp falls in equity prices. To the extent that stocks and land have been used as collateral for borrowing, and that banks themselves own considerable amounts of corporate stock, financial institutions may be excessively exposed to asset price risk.

In the case of the United Kingdom, house prices rose in response to easy monetary conditions, leading to sharp increases in borrowing against the collateral of the inflated value of housing stock. According to one observer: "when prices are rising rapidly, this itself feeds further speculative rises as buyers become desperate about being left behind" (47). The subsequent fall in property values appears to have been greatest in those areas that had previously experienced the largest house price inflation. Reports of growing numbers of mortgage delinquencies is in part attributable to this price collapse, and in part to the high mortgage rates in the wake of a very sharp tightening of monetary conditions. The unravelling of the full implications for the balance sheets of banks and building societies are yet to be seen, and they are likely to be unfavourable.

The current difficulties being faced by the Saving and Loan (S&L) associations in the United States have also attracted a lot of attention as an illustration of some of the above-mentioned moral hazard problems, as well as

interactions with more volatile interest rate spreads. The problems in the S&L associations are complex, so that only a few of the key factors are touched upon here. First, high market interest rates in the early 1980s strained the financial positions of these institutions, as they held largely long-term fixed rate mortgages as assets. Deposit rate deregulation alleviated the drain of funds from S&Ls, but at a cost of greater exposure to interest rate fluctuations. Loans continued to be priced inflexibly, according to custom and (in some cases) to qualify for packaging and sale as mortgage-backed securities to institutional investors. Losses associated with high money market rates continued to erode the capital base of S&Ls. Second, management was able to attract funds because of deposit insurance, while diversifying their portfolios in favour of high-risk/high-return assets, including substantial holdings of junk bonds. Third, there were cases of fraud, with some elected representatives being financially dependent on the S&Ls. Fourth, the regulatory authorities required the thrift institutions to dispose of their junk bond holdings by the end of 1994. This contributed to the collapse of junk bond prices, and further eroded the thrifts' capital base.

IV. LIBERALISATION AND THE INTERNATIONALISATION OF FINANCIAL TRANSACTIONS'

The process of globalisation of international financial markets began in the mid-1970s, with the removal of capital controls in the United States and Germany. Similar measures followed in Japan and the United Kingdom at the end of the decade. More recently, France, Italy and some other EEC countries have moved steadily towards the complete elimination of exchange controls. The rapid growth of offshore financial markets, the development of 24-hour screen-based global trading, the increased use of national currencies outside of the country of issue and innovations in internationally traded financial instruments have all contributed to the process. Arbitrage should then drive the risk-adjusted nominal rate of return on financial assets into uniformity. Moreover, domestic saving and investment balances may increasingly diverge, with world saving being allocated to countries with relatively higher expected returns. These developments may be expected to improve the allocation of savings and investment in the world economy, except to the extent that increased speculative elements in exchange markets drive real exchange rates independently of fundamentals.

Two broad propositions about international financial market integration are explored below:

    i)   that financial liberalisation has led to more integrated markets, as reflected in various interest rate parity concepts and the behaviour of national savings and investment imbalances; and

    ii) that exchange rate speculation not closely linked with the behaviour of "fundamentals" has increased.

A. The globalisation of world financial markets

Five measures, in descending order of specificity, are often used to quantify the level of international financial market integration: i) closed interest parity, ii) covered interest parity; iii) uncovered interest parity; iv) real interest parity; and v) a test based on the correlation of domestic saving and investment.

Closed interest parity implies that interest rates on comparable financial instruments denominated in the same currency, but issued in different countries, tend to converge. As an illustration, the differential between the three-month onshore (typically 90-day certificates of deposit) and offshore (Eurodeposit interbank) rates for seven OECD countries is displayed in Chart 4. The average disparities over different sub-periods are compared in Table 11. Even for assets denominated in the same currency, it appears that interest rate differentials have been very large in the past, reflecting the effects of pervasive capital controls. Such disparities have been mostly eliminated, however, at some time during the 1980s. Thus, international financial markets can be said to be virtually fully integrated by the closed interest parity criterion.

Covered interest parity (CIP) is the differential between the interest rate on domestic assets and that on a foreign currency asset after allowing for the cost of forward cover. In this case, there is no exchange rate risk involved in comparing domestic and foreign investment opportunities. Time series plots of deviations from CIP typically show a pattern of reduced disparities, reflecting the narrowing of deviations from closed parity.

Uncovered interest parity (UIP) is the equality between the nominal interest differential for two currencies and the expected change in their exchange rate over the period to maturity of the assets. If UIP holds, then international financial markets are perfectly integrated. If the failure of UIP is due to the existence of a time-varying risk premium, then comparable assets denominated in different currencies are not perfect substitutes and markets would not be perfectly integrated. Evidence based on surveys of expectations suggest that risk premia are small, which is consistent with integrated international capital markets.

Real interest parity (RIP) requires both UIP and purchasing power parity (PPP) to be valid. It therefore requires integration of both goods and financial markets. RIP is tested for three different time periods for eight OECD countries (see Table 12). The salient feature of these results is that they show increased disparities between real interest rates in the early 1980s. This contrasts with evidence presented above of dramatic reductions in closed interest disparities. Thus the rejection of RIP appears to have more to do with the absence of international commodity (as opposed to financial) market integration (48).

If capital markets are perfectly integrated, then investors tap the world savings pool to undertake investment in each country independently of domestic saving (49). A high correlation between national saving and investment would be evidence against this. Empirically, this correlation is high, although it has declined somewhat in recent years, and this has been taken to imply a low level of international capital mobility (50). Yet, the correlation may be high for a number of other reasons. If the country is "large", world capital markets cannot finance increases in its investment at prevailing world interest rates. World interest rates would have to rise, and the incentive to invest in the large country would decline to be more in line with domestic saving (even though there are no impediments to the free flow of capital). Similarly, saving and investment in the domestic economy may be affected by common factors other than real interest rates (e.g. population growth, productivity etc.) which influence both in the same direction (51).

Evidence presented in Chart 5 shows a declining correlation coefficient between savings and investment using data pooled across a number of countries. Thus while the saving-investment correlation may be relatively high for a variety of reasons, this evidence suggests that the closer integration of international capital markets increases the tolerance to external imbalances. This has implications for the process of external adjustment. External imbalances could be sustainable in the sense that they reflect savings flows to finance profitable investment opportunities in deficit countries, i.e. investments that promise a future reversal of the cumulated current account.

Two factors militate against this view on sustainable imbalances:

-- First, possible distortions on savings in different countries, and hence on the real interest rate differentials that allocate world saving flows. Excessively large budget deficits and tax distortions affecting private saving fall into this category;

-- Second, speculation driving real exchange rates away from fundamentals. In this case savings and investment decisions would respond to relative prices that are not themselves sustainable. The extent to which globalisation has been accompanied by such behaviour is taken up in the following section.

B.   Consequences for real exchange rates and external imbalances

Two particularly important "fundamental" influences on real exchange rate behaviour are i) real interest rate differentials, which lead to predictable divergences between the current and long-run equilibrium real exchange rates; and ii) cumulated external imbalances which give rise to risk premia, driving a wedge between real interest differentials and expected changes in the real exchange rate.

The market clearing real exchange rate based on expectations about these variables abstracts from speculative pressures associated with informational inefficiencies discussed in Section III (52). Cointegration methods can be used to examine how real interest differentials and cumulated current account balances affect the movement of the real exchange rate, compared to other speculative pressures. If some linear combination of broad swings in the real exchange rate and in these "fundamental" variables cancel each other out, leaving only an "equilibrium error", then the real exchange rate will return towards its expected equilibrium value (53). On the other hand, if the links with fundamentals are sufficiently tenuous, no long-run relationship exists.

The results of tests for these long-run relationships are reported in Table 13 for four major real exchange rates -- the yen/dollar (Y/$), the Deutschemark/dollar (DM/$), sterling/Deutschemark (£/DM), and French franc/Deutschemark (FF/DM) real rates (54). Three sample periods are chosen -- the full period; an early sample reflecting the presence of capital controls (obtained by examining the closed interest parity relationships presented earlier); and a recent sample reflecting the absence of controls. The speed of adjustment of the real exchange rate towards fundamentals is also estimated directly (55).

Over the full sample period the real interest differential and cumulated current account terms have the right sign and the tests appear to be consistent with reversion towards fundamentals for the Y/$, £/DM and FF/DM rates. Direct estimation of the adjustment process suggests that all four exchange rates revert to equilibrium at varying speeds. The shorter sample results are only suggestive, since tests for long-run relationships require large samples to be strictly valid. Both sets of results again appear consistent with reversion towards equilibrium. The coefficients linking the variables do appear to change somewhat over the two periods, however, with those on real interest differentials being higher in some cases and those on cumulated external imbalances being generally lower (56). This is broadly consistent with the proposition that, with integrated markets, cumulated external imbalances have less "corrective" impact on real exchange rates.

Swings in real exchange rates that were not explained by fundamentals (the unexplained residuals from the cointegration tests) for the full sample results, and for all four currencies, are shown in Chart 6. There is a distinctly different pattern between the Y/$, DM/$ and £/DM rates on the one hand, and the FF/DM rate on the other. For the first group of currencies there are systematic swings in the real exchange rate not explained by movements in real interest differentials or external imbalances which are both persistent and of considerable orders of magnitude. Thus in the first half of 1985, the period in which Krugman (1985) first identified a significant overvaluation of the dollar, the Y/$ residuals rise to around 20 per cent, and the DM/$ residuals to around 24 per cent. This suggests a considerable appreciation of the dollar against the respective currencies not attributable to real interest differentials or cumulated current account balances. These episodes are not unique. Thus the strength of the yen in 1978, 1980 and 1988, the strength of the DM in the late 1970s, early 1980s and 1988, and their respective weaknesses in 1989, exceeds that which can be explained by fundamentals. Similar comments apply to the extreme strength of sterling in 1981, with residuals of around 34 per cent, its strength in 1989, and its marked weakness in 1987.

However, the real exchange rate tends to revert back to the fundamentals. This pattern is consistent with speculative dynamics affecting nominal exchange rates identified by Cutler, Poterba and Summers and by Frankel and Froot, referred to in Section III -- i.e. their observation of positive serial correlation at short horizons and reversions over longer horizons. Given the stickiness of goods prices, it is perhaps not surprising that similar patterns are reported here for the behaviour of real exchange rates. It is also interesting that the persistence of the deviations appears to have increased, as is reflected in the size of the estimated adjustment speeds (roughly 6 to 13 quarters for the full sample compared to 3 to 4 quarters for the 1970s), as the globalisation of international capital markets has proceeded. This persistence raises questions about the appropriateness of relative prices on which savings and investment decisions over long periods of time are based.

In the case of the FF/DM rate, there are marked differences in comparison to the results for the other currencies. First the amplitude of the cycle of the residuals is typically smaller. Second the persistence of the deviations is shorter (only about three quarters). Third the chart gives a clear visual impression that the amplitude of the cycle in the residuals is

damped over time, i.e. even after closed and covered interest disparities declined in the second half of the 1980s in response to reduced capital controls. This latter evidence suggests that the observed pattern of real exchange rate behaviour is perhaps more closely related to France's participation in the EMS. This is consistent with the notion that exchange market speculation may depend on the nature of the exchange rate regime. All these results further corroborate the widely-observed tendency for real exchange rate variability and misalignments to be much greater under nominally floating exchange rate regimes than under fixed (or close-to-fixed EMS-type) regimes. They are also consistent with the view that a credible target zone for the nominal exchange rate exerts a stabilising influence on real exchange rate movements (57).

V. POLICY IMPLICATIONS

The evidence presented in this study raises policy issues in three areas: (i) the conduct of monetary policy; (ii) financial fragility; and (iii) financial price volatility. These are addressed below.

A.   The conduct of monetary policy

As liquidity constraints are eased because of financial liberalisation, monetary policy operates more through relative prices and expectations play a more important role. Also, the role of monetary aggregates and the ability to influence longer-term interest rates in a counter-cyclical fashion have been undermined.

However, financial liberalisation does not weaken the overall effectiveness of monetary policy in achieving the goal of low and stable inflation. The impact of policies that operate increasingly through expectations channels depends upon the appropriate policy "dosage". Given available information and uncertainty in markets, there will be some level of policy-determined interest rates which will influence expected wealth and private sector expenditure in the right direction. In the case of an increase in inflation pressures which quickly become reflected in financial auction prices (a steepening yield curve, rising stock market and house prices, and a depreciating exchange rate), the failure to adjust policy would see activity and (with some lag) inflation move in the direction indicated by financial prices. A tighter monetary stance will counter these trends via higher nominal and real lending rates (given the increased cost of central bank funds) and rates on short-term securities. But the full impact on private spending will depend on what the authorities' objectives are perceived to be, and how seriously they are expected to pursue them. Are the rate increases expected to be temporary? Are the authorities simply trying to stabilise inflation at a higher rate, or do they intend to reduce inflation from current levels? The answers to such questions will determine the extent to which policy needs to be tightened, i.e. the impact on the desire to borrow, the value of wealth -- including housing wealth -- and the level of the exchange rate.

Three factors influence the extent to which private expenditure will adjust in response to monetary policy in a way consistent with long-run inflation goals. First, a proper reading of the short-run indicators, a difficult task because inflation is relatively sluggish, responding only with a

lag to forces influencing aggregate demand and supply. Interpreting the behaviour of monetary aggregates has become more problematic. Interpreting financial prices is also a hazardous exercise. In some circumstances all the indicators will point unanimously in the same direction, while in others speculative pressures or special factors influencing some markets but not others can lead to confusing signals. There is therefore some need for eclecticism, with authorities considering as broad a range of indicators of inflation pressures as possible, and adjusting their interpretation of them as soon as new information is available.

A second element is the transparency of policy objectives and operating procedures. In liberalised financial markets the policy "dosage" required to influence private sector expectations and economic outcomes is related to the availability of relevant information and the degree of uncertainty prevailing in markets. A major source of uncertainty is the authorities own objectives, reasons for taking particular initiatives and for choosing particular policy instruments. Lack of transparency in this respect can only serve to loosen the links between policy and private sector expectations, thereby affecting the necessary "dosage" to achieve a particular objective. Increased transparency will add very little, however, if private agents believe the authorities will pursue their objectives with varying degrees of vigour over time or, even worse, change the objective in line with motivations deriving from short-run expediency.

Third, constraints on policy may be perceived if the amplitude and duration of interest rate increases necessary to slow demand are considered to be "too large" or "too long". For example, interest rate increases are politically unpopular, which may lead to pressure on monetary authorities to respond to inflation threats too slowly. Alternatively, policy makers themselves may be reluctant to see bankruptcy and financial fragility in circumstances where the private sector is heavily indebted.

Factors not directly in the hands of the authorities may also influence the effectiveness of policy-induced changes in interest rates. Of particular importance in this regard is the extent to which banks and other institutions impose stricter lending criteria and other forms of rationing in the absence of official regulations. This is likely to occur when large sections of the private sector are heavily exposed to debt, or when other factors give rise to prudential concerns.

B.   Coping with financial fragility

The task of maintaining the integrity and safety of the financial system, while pushing it in the direction of competition and efficiency, is not without dangers. While deregulated financial markets are in some ways better placed to cope with diversifiable risks than regulated systems, the process of change has the potential to create prudential problems through informational deficiencies and moral hazard situations.

Improving information flows is helpful. Requiring satisfactory disclosure, the provision of information, registration of practitioners and ethical business practices are important. Clear objectives for monetary policy and transparent operating procedures also help. But the general principle of self supervision reinforced by market discipline would seem to be particularly

appropriate in responding to situations of financial fragility that arise because of liberalisation -- a process intended to increase the role of markets. The authorities should not undermine the ability of institutions to respond to new risks via innovation and diversification, nor reduce market discipline, as liberalisation proceeds.

Failure to "level the playing field" is a standard channel through which the action of authorities can result in financial fragility. Attempts to maintain interest ceilings in politically sensitive areas, such as institutions specialising in home lending, disadvantage these sectors when interest rates rise. "Firewall" legislation designed to prevent banks from undertaking risky activities can, in some circumstances, increase exposure to risk as distinctions between institutions participating in the payments system break down. To have separate supervisory bodies for different financial activities is also risky. The increasing importance of inter-market issues and competitive innovation may quickly undermine any benefits to be derived from specialising. Lack of consistency can cause financial fragility or generate incentives to move financial activities to the point of least supervision -- so that highly risky activities are carried out beyond prudential oversight.

Another aspect is the need to respond to new incentives that arise for risk taking as liberalisation proceeds. Reduced profit margins create an incentive to make capital adequacy as opaque as possible to regulators, shareholders and clients -- an incentive facilitated by the increasing complexity of transactions across a wide array of risks (both on- and off-balance sheet). Such incentives can be countered by clear accounting standards and uniform well-defined capital adequacy guidelines for all intermediaries that carry out similar activities (either within the domestic economy or abroad).

Finally, it is important to assess the incentives implied by full deposit insurance and investor guarantees. Greater conditionality would strengthen market discipline. Similarly, the prior knowledge that monetary policy would not be eased to relieve financial stress, or that basically insolvent institutions would not be prevented from failing, would sharpen risk assessments more generally. Also, the lender-of-last-resort facility should apply only in the case of liquidity problems with system-wide implications, and recourse to it which endangered inflation objectives should not be permitted.

C. Coping with financial price volatility

Very large movements in prices over short periods often are perceived (rightly or wrongly) to require a policy response. This was demonstrated in the 1987 stock market break, and has arisen more frequently with exchange rate movements. Measures that attenuate unnecessary volatility would reduce the probability of policy errors, and would possibly also improve the allocation of resources.

With regard to the stock market, a number of options have been proposed. These include "circuit breakers", which are a series of predetermined temporary price limits -- when the market falls the limit amount, trading is halted for a specific period of time. It is too early to tell how successful they would be in any future circumstances comparable to October 1987. The same applies to other proposals such as information disclosure about demands for portfolio

insurance, or the use of put options on indexes of stock market prices as an alternative to dynamic hedging. All of these developments are complex responses designed to attenuate volatility which, in many cases, are being handled by industry organisations that have the required expertise -- a movement towards self supervision that should be encouraged. Proposals to increase the cost of financial transactions in the hope of reducing the volume of turnover (transactions taxes, minimum margin requirements on leveraged transactions, etc.) are of a different kind, and their effectiveness is doubtful.

In foreign exchange markets, market participants appear to speculate on very short-term exchange rate movements, basing their view on a few basic influences and what other market participants seem to think, thereby driving exchange rates away from equilibrium for sustained periods of time. Also, real interest differentials do not convey adequate information when incentives to save are distorted by financial liberalisation, excessive budget deficits or inconsistent tax arrangements.

The co-ordination of fiscal policies, financial regulations and tax policies to avoid unwarranted swings in savings/investment imbalances, and hence pressures on real interest differentials and exchange rates, would seem to be relatively uncontroversial -- whatever the attitude of authorities on the question of monetary independence. This type of co-ordination has the practical advantage of not requiring the authorities to take a view on the level of the exchange rate that is "appropriate": it simply aims to avoid pressures which, on a priori grounds, might be expected to lead to problems.

To go further than this, attempts to counter periods of speculation driving the exchange rate away from fundamentals do raise issues of monetary independence. The authorities have to form a view on the "appropriate" level of the exchange rate and to adjust monetary (or intervention) policy to achieve it. Once an objective is decided upon, this is most effective if policies are co-ordinated with other countries. However, governments may not be better than the market at choosing the "right" real exchange rate to avoid misalignments. Loss of inflation control might also arise if the situation is misjudged. It is very hard to identify episodes of misalignment as they are happening. Identifying these in retrospect, when the state of fundamentals is known with greater certainty, is difficult enough.

A comprehensive approach to avoiding misalignments is feasible by subordinating domestic monetary policy to an exchange rate objective. Such an objective provides a clear focus for market expectations, so that unexplained exchange rate movements can be reduced -- as was shown for the experience of the French franc within the EMS. Provided the currency is anchored to that of a low-inflation country, the loss of sovereignty over monetary policy may not be particularly costly. At the same time competitiveness is free to adjust through pressures on prices in goods markets -- at least in the longer run. However, the suitability of this approach for individual countries depends on whether there is an obvious anchor currency against which target parities can be set. It also depends on the nature of the economic shocks a country is likely to encounter. If large terms of trade changes or if expansions of demand unrelated to changes in the stance of monetary policy occur, exchange rate adjustments would be required. Relying on slow adjustment through goods market prices may see unnecessary fluctuations in real activity and problems with inflation control over quite long periods of time.

NOTES

1. The main deregulatory moves are summarised in OECD (1989) and in Blundell-Wignall, Browne and Manasse (1990).

2. Such attempts are thwarted by the lack of relevant data, as is discussed in Blundell-Wignall and Ishida (1990).

3. This section draws heavily on Blundell-Wignall, Browne, and Manasse (1990).

4. Examples include Flavin (1981, 1985), Delong and Summers (1986), Japelli and Pagano (1989), Campbell and Mankiw (1989) and Bayoumi and Koujianou (1989), all of which take the Hall (1978) model as their starting point. Following Hall (1978) forward-looking consumers maximise the expected value of lifetime utility subject to an intertemporal budget constraint. Under certain assumptions this formulation suggests that expected utility from consumption is conditional upon all information at time t, given a subjective discount factor and the real interest rate. Consumption thus evolves as a random walk as new (previously unpredictable) information about factors (including policy), influencing expected future wealth and relative prices, arises.

5. An instrumental variables approach is adopted, where current income terms are explained by a distribute lag on past income levels and other variables.

6. A more complete treatment can be found in Blundell-Wignall, Browne and Cavaglia (1990). The ideal consumption variable is the consumption of non-durables plus the consumption of services and the service flow from durables. This is not directly observable. The results here refer to total consumption, which is available for a wider range of countries. In the full paper the equation was also estimated for total consumption less the purchases of durables for those countries for which data was available. The results for the most part were broadly consistent with those reported here.

7. Apparent strong evidence of positive first order autocorrelation in the low Durbin Watson statistics suggests that the tests are misspecified -- possibly due to missing variables in the way that permanent income changes are allowed for (e.g. the unusually high net interest income of the household sector which itself may reduce liquidity constraints).

8. See Blundell-Wignall, Browne and Cavaglia (1990).

9. As the tests are valid asymptotically, using the longest possible run of data is desirable to ensure robust results. Where relatively small numbers of observations were available -- especially for France -- very little weight should be placed on the results. M4 is used for the United Kingdom in the table on the grounds that the acceptance of the null for M3 would be explained by the relative importance of building society deposits in the United Kingdom and switches between them. Note also that a recent study reported for Japan did succeed in rejecting the null hypothesis by excluding available data, particularly from the 1960s (see Shigehara, 1990).

10. That is, vector autoregression techniques can be used to explore such short-run relationships.

11. Broader money is selected because it is less likely to be affected by shifts between different types of bank deposits as deregulation occurs -- making it harder to reject a stable relationship.

12. The recursive nature of the test is such that rejection may occur some time after the relationship has begun to change. Thus for example this finding would be consistent with Goldfeld's result that the money demand function shifted between 1974 and 1976 (Goldfeld, 1976), after the powers deregulation allowing money market mutual funds in 1974.

13. Japan liberalised relatively later than the other countries in this group, so that further evidence of an undermining of these relationships cannot be excluded in the 1990s.

14. Control could still be exercised if non-interest bearing currency remains an important component of the money stock. However financial innovation is causing this component to fall, while reintermediation causes other components to rise.

15. This is because it is less likely to be effected by speculative bubbles than are exchange rates, stock prices or land prices, particularly since the nominal value of a long-term government bond at maturity is known with certainty.

16. See Browne and Manasse (1989).

17. No allowance is made for overlapping observations in this exercise.

18. While liberalisation reduces liquidity constraints throughout the economy generally, effective monetary policy requires the presence of a residual liquidity constraint. This derives from one regulation common to all western monetary systems -- that financial institutions or private agents must settle with the central bank in its own liabilities over which the authorities have the monopoly in supply.

19. This, of course, is consistent with the expectations theory of the term structure, since lower future inflation is associated with some future easing of policy and hence lower short rates.

20. Thus in a formal rational expectations theoretical model the fact that financial prices immediately "jump" in response to "news" is precisely the way in which the economy is able to move along the "saddle path", i.e. the one approach to equilibrium that is stable.

21. This section draws on the consultants report, Kupiec (1991). See the note to Table 7 and Schwert (1988) for more details about the index employed.

22. See for example Duffee, Kupiec and White (1990).

23. This is consistent with the findings of others, such as Frenkel and Goldstein (1988).

24. See Bennett and Kelleher (1988) and Dwyer and Hafer (1988).

25. See Neumark, Tinsley and Tossini (1988).

26. This section draws on the consultants report, Miller and Weller (1991).

27. See Shiller (1981), and LeRoy and Porter (1981).

28. This kind of problem creates more general market instability in that they are "informationless". Large trades by portfolio insurers (stop loss orders) will move prices, and if other market participants are unaware of the precise extent to which such trades are taking place, they may mistakenly conclude that they are caused by fundamentals.

29. Thus if agents are risk neutral and have forward-looking rational expectations, the rate of depreciation of the exchange rate should be equal to the forward discount plus a random error term. A small constant term may be required to capture transactions costs.

30. See Levich (1985), and Hodrick (1987) for detailed surveys of these efficiency tests.

31. Mehra and Prescott (1985) find similar results when examining the stock market.

32. See Cutler, Poterba and Summers (1990b), Holtham (1989), Frankel and Froot (1987).

33. These issues are surveyed mainly for the 1970s in International Monetary Fund (1984). Subsequent studies showing mixed evidence include Akhtar and Hilton (1984), Gotur (1985), Kenen and Rodrik (1986), Bailey, Tavlas and Ulan (1987), Cushman (1986) (1988).

34. Nickell and Wadhwani (1987) reports survey evidence that 85 per cent of managers felt that the market takes a short-term view of investment, a belief shared by many politicians.

35. See Nickell and Wadhwani (1987).

36. See Krugman (1989), who measures these in terms of the capitalised value of foregone profits stemming from the misallocation of investment resources.

37. See Shafer and Loopesko (1983).

38. Modigliani and Miller (1958) have shown that the functions performed by intermediaries are irrelevant to corporate investment plans in perfect capital markets and the value of the firm is independent of its financial structure -- i.e. its debt equity ratio. Information problems cause this result to break down.

39. See Stiglitz and Weiss (1983). The consultants report Driscoll (1991) provides a more detailed survey of this sort of literature.

40. For example, financial institutions, particularly in the United States, see options trading as an alternative to trying to solve the agency problems associated with extending credit to retail clients. More generally, securitisation of intermediaries' asset portfolios and improved design of financial instruments reduce monitoring costs and lessen the resort to credit rationing. This point has recently been made by Ross (1989).

41. Recent evidence suggests that such firms may be more heavily constrained in financing their investments than larger firms, or may have to rely more heavily on trade credit from non-credit rationed firms with whom they deal. See Hoshi, Kashyap and Shumfstein (1989).

42. Other factors such as social custom, transactions costs, fear of reducing expected returns by inducing the bankruptcy of clients, and market requirements for assets that are packaged and sold to institutional investors also make for inflexibility.

43. Thus, for example, corporate leverage backed by the current market value of equity could be inflated in times of easy monetary policy. If this is not transparent to parties involved in loan contracts, solvency risks for ultimate borrowers (and hence also intermediaries) may be underestimated.

44. Thus, for example, a long-term loan contract denominated in foreign currency but not covered in forward or swap markets is more likely to be subject to the mispricing of risk than a domestic currency loan. This is because exchange rates can become misaligned through "bandwagon" and "bubble" effects. In such cases risks of financial fragility will be exacerbated.

45. See Kaufman (1986) and Friedman (1990).

46. It is arguable, however, that debt was favoured only for some equity holders, so that tax changes do not provide a convincing explanation. See Auerbach (1989).

47. See Muellbauer et al. (1989).

48. The failure of RIP in most empirical tests has been attributed by some to sticky prices causing deviations from PPP which can, in principle, endure for a long time, perhaps forever -- i.e. the real exchange rate may follow a random walk. See Mussa (1986), Roll (1979), Frenkel (1981), Adler and Lehman (1983) and Darby (1983).

49. See Feldstein and Horioka (1980) and Feldstein (1983).

50. In a recent update of this work, Bacchetta and Feldstein (1989) report savings retention coefficients of 0.79 for the 1980-86 period, which is lower than the 0.91 and 0.86 estimates for the 1960s and 1970s respectively.

51. Allowing for these types of effects in empirical tests leads to the conclusion that it is again the failure of RIP that is mostly responsible for these high saving-investment correlations. If there is no arbitrage mechanism tying the domestic to the exogenous foreign real interest rate, then there is no reason to expect national saving and investment rates to move independently of each other, even in the currently prevailing context of negligible deviations from closed or covered interest parity. See Frankel (1989).

52. See for example Frankel (1979, 1985), and Hooper and Morton (1982). The equilibrium rate estimated here differs conceptually from the Fundamental Equilibrium Exchange Rate (FEER) of Williamson (1985). The latter corrects observed real exchange rates by what IMF trade elasticities imply would be sufficient to bring the actual current account balances into line with average historically sustainable capital flows. The point here is that globalisation reduces such constraints on external imbalances, so that Williamson's measure requires adjustment. An estimated measure of the _current_ equilibrium exchange rate using recent data (affected by globalisation) on cumulated imbalances and real interest differentials is implicit in the analysis here. It is not the long-run real exchange rate that balances the current account.

53. Tests for such relationships have been carried out before, for the real exchange rate _vis-à-vis_ each of these factors independently, but not together. Thus Meese and Rogoff (1988) test for the cointegration between real exchange rates and real interest differentials over the period 1974 to 1984, and find these variables were not cointegrated. Shafer and Loopesko (1983), Sachs (1985), Isard (1988) also found that real interest differentials and real exchange rates were only tenuously linked. Coughlin and Koedijk (1990) find no cointegration with real interest differentials and, separately, none with cumulated current account imbalances.

54. The cointegrating regression runs the real exchange rate against a constant, the real interest differential and the difference in cumulated current account imbalances as a share of GDP. All variables were tested separtely and were found to possess a unit root. The Augmented Dicky Fuller (ADF) equation is then run on the residuals of this equation. The real interest rate uses long-term rates, which have had most success in empirical applications as found also in Shafer and Loopesko (1983), Sachs (1985) and Isard (1988). The expected inflation term uses a 3-year moving average as in Danker and Hooper (1989). Bilateral rates against the DM are considered for sterling and the French franc, since balance of payments considerations underlie the inclusion of the cumulated external balance terms.

55. By checking to see whether the data generating process has an error correction form.

56. It is impossible to test for the significance of these differences, as with integrated processes of order 1 the standard errors of the coefficients cannot be interpreted.

57. See Krugman (1989).

TABLES AND CHARTS

Table 1

TESTS FOR LIQUIDITY CONSTRAINTS ON CONSUMPTION
FOR SEVEN MAJOR OECD COUNTRIES
(Quarterly seasonally adjusted data)

	1960s				1970s				1980s			
	Consumption sensitivity to current transitory income.		Current and lagged income do not help predict current consumption.		Consumption sensitivity to current transitory income.		Current and lagged income do not help predict current consumption.		Consumption sensitivity to current transitory income.		Current and lagged income do not help predict current consumption.	
	β_1	DW	10 per cent level	5 per cent level	β_1	DW	10 per cent level	5 per cent level	β_1	DW	10 per cent level	5 per cent level
United States	0.35 (0.16)	2.3	R	R	0.51 (0.11)	1.4	R	R	0.21 (0.16)	2.1	R	A
Japan	0.38 (0.19)	1.9	R	A	0.33 (0.10)	1.9	R	R	0.18 (0.08)	2.0	A	A
Germany	0.42 (0.14)	2.7	R	R	0.67 (0.21)	2.6	R	R	1.15 (0.24)	2.5	R	R
France	0.86 (0.35)	2.2	R	A	0.16 (0.14)	2.6	R	A	-0.04 (0.20)	2.6	R	R
United Kingdom	0.20 (0.20)	2.9	A	A	0.17 (0.12)	2.5	R	A	0.21 (0.11)	2.0	R	R
Italy	-0.30 (0.53)	0.6	R	R	0.17 (0.13)	0.6	R	R	-0.01 (0.01)	0.2	A	A
Canada	0.38 (0.18)	2.7	R	A	0.30 (0.17)	2.4	A	A	0.11 (0.13)	1.3	A	A

Note: The tabulated results are based on the equation:

$$\Delta c_t = \mu + \beta_1 \Delta y_t + \beta_2 \Delta y_{t-1} + \beta_3 \Delta y_{t-2} + \omega_t \qquad H_0 : \sum_i \beta_i = 0$$

R and A refer to rejection or acceptance of the hypothesis that the sum of the βs in the above equation is zero according to a likelihood ratio test. Using the changes in current income in the above equation is justified only if appropriate instruments are used. The instruments used include three lags of disposable income, unemployment, personal consumption, government expenditure and total exports, all in per capita terms, as well as contemporaneous population and a time trend. DW is the Durbin-Watson statistic and the figures in parentheses are estimated standard errors. For further details see Blundell-Wignall, Browne and Cavaglia (1990).

Table 2

MONEY-NOMINAL INCOME (GNP) COINTEGRATION
(CRDW and ADF tests)

	NARROW MONEY			BROAD MONEY		
	CRDW	ADF	ADF (const. + time)	CRDW	ADF	ADF (const. + time)
UNITED STATES (1959Q1-1989Q2)	0.024	-0.02 (1.6)	..	,0.142	-0.12*** (3.4)	..
JAPAN (1963Q1-1989Q2)	0.078	-0.05 (1.8)	..	0.079	-0.07 (2.1)	..
GERMANY (1960Q1-1989Q2) (1969Q1-1989Q2)	0.224	-0.09 (1.8)	..	0.512***	..	-0.68*** (5.8)
FRANCE (1978Q1-1989Q1)	0.295	-0.17 (1.8)	..	0.233	-0.11 (1.1)	..
ITALY (1964Q1-1989Q2)	0.017	-0.02 (1.9)	..	0.026	..	-0.04 (2.2)
UNITED KINGDOM (1969Q3-1989Q2) (1969Q1-1989Q2)	0.146	-0.08 (1.6)	..	0.037	-0.02 (1.1)	..
CANADA (1955Q1-1989Q2) (1968Q1-1989Q2)	0.136	-0.07 (2.2)	..	0.205	-0.13* (2.5)	..

Note: The cointegrating regression is:

$$m(t) = \mu + \beta\, y(t) + \epsilon(t)$$

Under the null hypothesis of no cointegration, the Cointegrating Regression Durbin Watson (CRDW) = 0. The alternative is a first order AR process. The Augmented Dickey Fuller (ADF) statistic is obtained from

$$\Delta\epsilon(t) = \gamma\epsilon(t-1) + \sum_{i=1}^{4} \delta_i\, \Delta\epsilon(t-i) + \text{Const} + \alpha\, \text{Time}$$

Under the null hypothesis of no cointegration $\gamma=0$. In general the ADF statistic is preferred because of the low power of the CRDW test against a highly autoregressive alternative. All variables are expressed in logarithms, where m is money and y is nominal GDP. All variables were pre-tested to establish that they were integrated processes of order 1. The ADF equation here was also tested for the significance of a constant term and a time trend. Constants and time trends were significant only in the case of German M3 and Italian M2. Relevant critical values for the CRDW test and ADF statistic from Engle and Granger (1987) and Phillips and Ouliaris (1988) are:

	1 per cent	5 per cent	10 per cent
CRDW	0.511	0.386	0.322
ADF	3.39	2.76	2.45
ADF (const + time)	4.36	3.80	3.52

A value greater than the critical value indicates rejection of the null hypothesis of no cointegration. A single asterisk in the table denotes rejection of the null hypothesis at the 10 per cent level, and a triple asterisk represents rejection at the 1 per cent level. Narrow money is the M1 definition for all countries except for Germany and the United Kingdom for which Central Bank Money (CBM) and M0 are used respectively. Broad money is the M2 definition for the United States, Italy, France and Canada. The M2+CD, M3 and M4 definitions are used for Japan, Germany and the United Kingdom respectively. Where two time periods for estimation are mentioned the first is for narrow and the second is for broad money.

Table 3

THE CAUSAL PATTERN BETWEEN MONEY OR CREDIT
AND NOMINAL GNP: RECURSIVE F TESTS

$$\Delta y_t = \alpha + \sum_{i=1}^{4} \alpha_i \Delta y_{t-i} + \sum_{i=1}^{4} \beta_i \Delta m_{t-i} + \sum_{i=1}^{4} \gamma_i \Delta R_{t-i} + \sum_{i=1}^{4} \delta_i \Delta e_{t-i} + \epsilon$$

$H_0 : \beta_i = 0$ (i.e. money does not "cause" income)

	Narrow Money	Broad Money	Bank Credit
	Money/credit "causes" income during the following subperiods		
United States (M1, M2, Credit)	73Q1-78Q2	73Q1-78Q1	81Q2-82Q3
Japan (M1, M2+CD, Credit)	73Q1-88Q2	73Q1-88Q2	73Q1-88Q2
Germany (CBM, M3, Credit)	84Q1-87Q1	84Q1-88Q2	80Q2-81Q3 84Q2-88Q2
France (M1, M2, Credit)	never	81Q3-88Q2	84Q2-88Q2
Italy (M1, M2, Credit)	never	85Q4-88Q2	73Q1-79Q2
United Kingdom (M0, M3, Credit)	85Q4-88Q2	77Q3-83Q3	73Q1-78Q3
Canada (M1, M2, Credit)	73Q1-84Q4	80Q1-88Q2	never

Note: Recursive F tests are conducted for joint significance of the parameters β_i at the 10 per cent level for t=1, ...T, where T = 78Q1, ..., 88Q2. In most cases the start date is 1973Q1, except where data availability did not permit (France: starts 81Q1 and United Kingdom M3 starts in 77Q3). If the relevant start date is not shown in the table, the null hypothesis is always accepted up to the time when the quarter for the lower bound of the interval shown is first included (e.g. German data accepts H_0 for CBM from 1973Q1 to 1983Q4, but rejects it for 1973Q1 to 1984Q1). Variables are y = nominal GDP; m = money or credit; R = interest rate, e = effective exchange rate. All variables but the interest rate are in logarithms.

Table 4

VAR EVIDENCE ON THE REDUCED EMPHASIS ON INTERMEDIATE MONETARY TARGETS

$$\Delta x_t = \alpha + \sum_{i=1}^{4} \beta_i \, \Delta y_{t-i} + \sum_{i=1}^{4} \gamma_i \, \Delta m_{t-i} + \sum_{i=1}^{4} \delta_i \, \Delta R_{t-i}$$

$$+ \sum_{i=1}^{4} \sigma_i \, \Delta e_{t-i} + \epsilon_t$$

X in alternative regressions is y, m, R and e

		y	m	R	e	y	m	R	e
		1973Q1–1978Q1				1973Q1–1988Q2			
United States	y	*	*	*	*	*	–	*	–
	m	*	*	*	*	*	*	*	*
	R	–	–	*	–	*	–	*	*
	e	*	*	–	*	–	–	–	*
		1973Q1–1980Q4				1973Q1–1988Q2			
Japan	y	*	*	*	*	*	*	*	–
	m	–	*	–	–	*	*	–	*
	R	–	*	*	–	*	*	*	*
	e	–	–	–	*	–	*	*	*
		1973Q1–1983Q4				1973Q1–1988Q2			
Germany	y	*	–	–	–	*	*	–	–
	m	–	*	–	–	–	*	–	–
	R	–	–	*	–	*	*	*	–
	e	–	*	–	*	*	–	–	*
		1970s				1979Q2–1988Q2			
France	y	n.a.				–	*	*	–
	m					–	–	–	–
	R					–	*	*	–
	e					–	*	–	–
		1973Q1–1985Q3				1973Q1–1988Q2			
Italy	y	*	–	–	*	*	*	–	–
	m	–	*	–	*	–	*	–	–
	R	–	–	*	*	–	–	*	–
	e	–	–	*	*	–	–	*	*
		1977Q3–1983Q3				1977Q3–1988Q2			
United Kingdom	y	*	*	*	–	*	–	–	–
	m	–	*	–	–	–	–	*	–
	R	*	*	*	*	*	*	*	*
	e	–	–	*	*	*	–	*	*
		1973Q1–1979Q4				1973Q1–1988Q2			
Canada	y	*	–	–	–	*	*	*	*
	m	*	*	*	*	*	*	–	*
	R	*	*	*	*	*	–	*	*
	e	–	–	–	*	–	*	–	*

Note: The money aggregates used are broad ones, i.e. M2 for the United States, Italy, France and Canada, M2+CD for Japan and M3 for Germany and the United Kingdom. y is nominal GNP, R a short nominal interest rate and e is the nominal effective exchange rate. An asterisk indicates rejection of the null hypothesis that the sum of the estimated coefficients on the lagged values of the relevant variable is not significantly different from zero at least at the 10 per cent level.

Table 5

THE TERM STRUCTURE AS A LEADING INDICATOR: VAR EVIDENCE

NOMINAL GDP RESULTS

$$\Delta \ln GDP_t = Const. + \sum_{i=1}^{12} \alpha_i \Delta \ln GDP_{t-i} + \sum_{i=1}^{12} \beta_i (R_{t-i} - r_{t-i})$$

	1970s sample (joint significance)		Full sample (joint significance)		Most recent sample (joint significance)	
	α_i	β_i	α_i	β_i	α_i	β_i
United States	**	--	**	*	**	**
Japan	**	--	**	**	**	--
Germany	**	--	**	**	**	**
France	**	--	**	**	**	**
Italy	**	--	**	**	**	--
United Kingdom	**	--	**	**	**	**
Canada	**	--	**	**	**	--

INFLATION RESULTS

$$\Delta \ln PGDP_t = Const. + \sum_{i=1}^{12} \alpha_i \Delta \ln PGDP_{t-i} + \sum_{i=1}^{12} \beta_i (R_{t-i} - r_{t-i})$$

United States	**	--	**	**	**	--
Japan	**	**	**	**	**	--
Germany	**	--	**	**	**	**
France	**	**	**	**	**	**
Italy	**	--	**	**	**	**
United Kingdom	**	--	**	**	**	**
Canada	**	--	**	**	**	**

Note: R is a 10 year government security rate and r a 3-month treasury bill rate.   The full sample is 1970Q-1990Q1 for the United States, Germany and Canada, 1972Q-1990Q1 for Japan, 1973Q1-1990Q1 for France, 1974Q1-1990Q1 for Italy and 1972Q1-1990Q1 for the United Kingdom.   In all cases 1980Q1 is the first observation for the recent sample.

The null hypothesis is that the parameters α_i or β_i are jointly insignificantly different from zero which is tested using an F test.

** indicates rejection of the null hypothesis at the 5 per cent level
 * indicates rejection of the null hypothesis at the 10 per cent level
-- indicates acceptance of the null hypothesis.

Table 6

LONG-TERM INTEREST RATE REGRESSIONS

$$R_L(t) = a + b\ R_S(t) + c\ R_L(\text{foreign})\ (t) + d\ R_L(t\text{-}1)$$

	b	b/(1-d)	c	d	R^2
United States					
1970Q2-1979Q4	0.14**	0.91	-	0.78**	0.93
1980Q1-1984Q4	0.25**	0.63	-	0.61**	0.85
1985Q1-1989Q2	0.01	0.06	-	0.79**	0.82
Japan					
1970Q2-1979Q4	0.35**	0.64	0.05	0.46**	0.93
1980Q1-1984Q4	0.14	0.29	0.16	0.51	0.60
1985Q1-1989Q2	0.46*	0.38	0.36*	-0.18	0.70
Germany					
1970Q2-1979Q4	0.10**	0.50	0.05	0.79**	0.91
1980Q1-1984Q4	0.23**	0.40	0.28*	0.04	0.89
1985Q1-1989Q2	0.24**	0.22	0.30**	-0.08	0.88
France					
1970Q2-1979Q4	0.29**	0.51	-0.33*	0.43**	0.68
1980Q1-1984Q4	0.19	0.36	0.48*	0.47**	0.93
1985Q1-1989Q2	0.39	1.0	-0.04	0.61**	0.81
Italy					
1971Q2-1979Q4	0.29**	0.72	-0.36**	0.60**	0.99
1980Q1-1984Q4	0.67**	1.40	0.43*	0.52**	0.97
1985Q1-1989Q2	0.38	0.52	0.63	0.27	0.87
United Kingdom					
1970Q2-1979Q4	0.30**	1.00	-0.09	0.70**	0.92
1980Q1-1984Q4	0.33**	0.39	0.91**	0.15	0.96
1985Q1-1989Q2	0.08	0.10	0.84**	0.23	0.60
Canada					
1970Q2-1979Q4	0.12**	0.19	0.56**	0.38**	0.93
1980Q1-1984Q4	0.12**	0.13	0.88**	0.09	0.95
1985Q1-1989Q2	0.09**	0.07	0.86**	-0.27	0.97

Note: OLS regressions on quarterly data are used. A single asterisk denotes significance at the 5 per cent level, while a double asterisk denotes significance at the 1 per cent level. The second column shows the long-run elasticity of long rates to short rates. For Japan, Germany and Canada the foreign rate is the US rate. For France, Italy and the United Kingdom it is the German rate.

Table 7

FINANCIAL PRICE VOLATILITY-SCHWERT INDEX

	Average monthly volatility bond yields		
	1970s	1980s	1980s Second half
United States	0.15%	0.31%	0.23%
Japan	..	..	..
Germany	0.18	0.19	0.14
France	0.54	0.36	0.38
Italy	0.32	0.49	0.58
United Kingdom	0.37	0.30	0.27
Canada	..	..	..

	Average monthly volatility of stock market index returns		
United States	3.4%	3.4%	3.6%
Japan	3.2	3.0	3.5
Germany	3.6	3.5	4.0
France	5.3	5.5	5.9
Italy	5.3	5.5	5.7
United Kingdom	4.7	4.0	4.3
Canada	4.2	4.3	3.8

	Average monthly volatility of major bilateral exchange rates		
DM/$	2.0%	2.5%	2.5%
Yen/$	2.0	2.6	2.7
Fr F/$	1.9	2.5	2.6
£/$	1.8	2.3	2.6

Notes   Volatility estimates are monthly estimates of the standard deviation of returns derived using the Schwert estimator. The Schwert volatility estimator is calculated by first, regressing monthly returns on monthly dummy variables and 12 lagged return values. Using the absolute values of the estimated residuals from this regression, these absolute values are regressed on monthly dummy variables and 12 lagged values of the transformed residuals. The predicted values from the second step scaled by a constant (1.2533 under the assumption of monthly returns normality) are estimates of the standard deviation of monthly returns. For the exchange rate the Schwert estimator is applied to the logarithmic difference of rates. The 1970s sample applies to 1974-1979 for exchange rates, and to 1970-1979 otherwise.

Table 8

FINANCIAL MARKET YIELDS: INTERNATIONAL VOLATILITY CORRELATIONS

Bond yield: 1980s compared to the 1970s

	UNITED STATES	JAPAN	GERMANY	FRANCE	ITALY	UNITED KINGDOM	CANADA
UNITED STATES	1.0						
JAPAN	(0.54*) (0.19*)	1.0					
GERMANY	(-0.02) (0.09)	..	1.0				
FRANCE	(-0.27*) (0.24)	..	(0.09) (-0.20*)	1.0			
ITALY	(0.37*) (0.14)	..	(0.22*) (0.37*)	(0.16) (-0.05)	1.0		
UNITED KINGDOM	..	..	(0.02) (0.19*)	(0.09) (0.16)	(-0.10) (0.47*)	1.0	
CANADA	..	..	..	..	..	..	1.0

Stock returns: 1980s compared to the 1970s

	UNITED STATES	JAPAN	GERMANY	FRANCE	ITALY	UNITED KINGDOM	CANADA
UNITED STATES	1.0						
JAPAN	(0.33) (0.25*)	1.0					
GERMANY	(-0.02) (0.15)	(0.29*) (0.05)	1.0				
FRANCE	(0.07) (-0.24)	(0.08) (-0.22*)	(0.23*) (-0.05)	1.0			
ITALY	(-0.02) (0.07)	(-0.06) (-0.09)	(0.03) (-0.05)	(0.26*) (-0.20)	1.0		
UNITED KINGDOM	(0.19) (-0.28*)	(-0.08) (0.14)	(0.34*) (0.18)	(0.08) (-0.21)	(0.00) (-0.01)	1.0	
CANADA	(0.28*) (0.39*)	(0.27*) (0.05)	(0.10) (0.32*)	(0.18) (-0.13)	(-0.08) (0.06)	(0.06) (0.13)	1.0

Stock returns: Second compared to first half of 1980s

	UNITED STATES	JAPAN	GERMANY	FRANCE	ITALY	UNITED KINGDOM	CANADA
UNITED STATES	1.0						
JAPAN	(0.42*) (0.19)	1.0					
GERMANY	(-0.05) (-0.09)	(0.36*) (-0.13)	1.0				
FRANCE	(0.22) (-0.11)	(0.21) (-0.20)	(0.41*) (-0.11)	1.0			
ITALY	..	..	..	..	1.0		
UNITED KINGDOM	(0.42*) (0.06)	(0.31*) (0.02)	(0.33*) (0.22)	(0.23) (-0.24)	..	1.0	
CANADA	..	..	..	..	..	..	1.0

Note: The first term in parenthesis is the correlation for the later period and the second is that for the earlier period. All volatility estimates are based on the Schwert estimator explained in Table 7. An asterisk indicates that the correlation is significantly different from zero at the 5 per cent level.

Table 9

THE IMPACT OF STOCK PRICE AND EXCHANGE-RATE VOLATILITY ON REAL ACTIVITY

Stock price volatility and industrial production

$$\ln IP_t = const + \sum_{i=1}^{12} \alpha_i \ln IP_{t-i} + \sum_{i=1}^{12} \beta_i \, SPV(Schwert)_{t-i}$$

DOES STOCK MARKET PRICE VOLATILITY AFFECT INDUSTRIAL PRODUCTION?

	Jan. 1970-Dec. 1979	Jan. 1980-Dec. 1989
United States	YES	NO
Japan	YES	NO
Germany	NO	NO
France	NO	NO
United Kingdom	YES	NO

Exchange rate volatility and exports

$$\ln X_t = const + \sum_{i=1}^{12} \alpha_i \ln X_{t-i} + \sum_{i=1}^{12} \beta_i \, XV(Schwert)_{t-i}$$

DOES EXCHANGE RATE VOLATILITY AFFECT THE VOLUME OF EXPORTS?

	Jan. 1970-Dec. 1979	Jan. 1980-Dec. 1989
Japan	NO	YES
Germany	NO	NO
France	NO	NO
United Kingdom	NO	NO

Note: Where IP is industrial production; SPV(Schwert) is Schwert volatility index for stock prices; X is exports; and XV(Schwert) is Schwert volatility index for the relevant bilateral exchange rates against the dollar. Tests are based on an F-test of the null hypothesis that the β_i are jointly zero. 5 per cent significance levels are used.

Table 10

RATIOS OF GROSS DEBT TO TOTAL ASSETS (a)
for the non-financial corporate sector

Countries	1970	1975	1980	1985	1986	1987	1988
United States	0.45	0.45	0.44	0.48	0.50	0.51	-
	(0.45)	(0.52)	(0.50)	(0.50)	(0.49)	(0.51)	-
Japan	0.85	0.85	0.84	0.81	0.81	-	-
	(0.86)	(0.83)	(0.84)	(0.73)	(0.63)	(0.59)	:-
Germany	0.65	0.65	0.66	0.63	0.62	0.60	-
	(0.72)	(0.76)	(0.81)	(0.71)	(0.70)	(0.77)	-
France	0.66	0.70	0.69	0.71	0.67	-	-
	-	-	-	-	-	-	-
United Kingdom	0.53	0.54	0.53	0.53	0.53	-	-
	(0.51)	(0.64)	(0.63)	(0.52)	(0.48)	(0.48)	-
Italy	0.66	0.68	0.65	0.68	-	-	-
	-	-	-	-	-	-	-
Canada	0.54	0.61	0.59	0.58	0.57	0.57	-
	(0.50)	(0.58)	(0.54)	(0.47)	(0.45)	(0.45)	-

a)   Figures not in parentheses are book values and figures in parentheses
are market values.

Sources: OECD Financial Statistics and BIS.

Table 11

NARROWING OF CLOSED INTEREST RATE DISPARITIES
(measured in basis points)

	Early period			Later period		
	Mean	Standard deviation	Coefficient of variation	Mean	Standard deviation	Coefficient of variation
United States	82	60	73	49	30	61
Japan	63	90	143	5	4	80
Germany	98	150	153	15	10	67
France	205	230	112	14	10	71
United Kingdom	103	110	107	3	5	167
Switzerland	112	110	98	64	20	31
Netherlands	27	28	104	3	2	67

Notes: The "early period" and "later period" intervals are not the same for each country. They are as follows:

United States: July 1963 - December 1979 and January 1980 - January 1990
Japan: June 1978 - June 1984 and July 1984 - January 1990
Germany: July 1963 - December 1981 and January 1982 - January 1990
France: January 1973 - April 1987 and May 1987 - January 1990
United Kingdom: January 1975 - June 1981 and July 1981 - January 1990
Switzerland: June 1963 - December 1981 and January 1982 - January 1990
Netherlands: January 1962 - December 1983 and January 1984 - January 1990.

Table 12

REAL INTEREST RATE LINKAGES WITH THE UNITED STATES:
THREE-MONTH TREASURY BILL RATES AND CONSUMER PRICES

(Absolute t values in parentheses)
(The data are monthly)

	FIRST PERIOD		SECOND PERIOD		THIRD PERIOD	
	α	γ	α	γ	α	γ
JAPAN	0.595	0.316	0.659	0.291	0.357	0.634
	(10.17)	(4.48)	(8.14)	(2.93)	(2.04)	(6.36)
GERMANY	0.219	0.199	0.900	0.022	0.548	0.595
	(4.12)	(1.15)	(25.77)	(0.60)	(7.24)	(5.64)
FRANCE	-0.16	0.566	0.54	0.424	1.27	ʼ 0.007
	(1.34)	(3.50)	(4.46)	(3.31)	(17.72)	(0.09)
ITALY	-0.40	0.944	1.77	-0.500	1.65	-0.261
	(2.78)	(7.20)	(28.95)	(5.26)	(25.18)	(2.48)
UNITED KINGDOM	-0.54	1.920	0.425	0.730	0.824	0.757
	(1.55)	(3.01)	(4.11)	(8.00)	(10.68)	(7.41)
CANADA	0.480	1.374	0.860	0.397	0.874	0.524
	(5.54)	(14.75)	(8.99)	(3.40)	(6.49)	(2.63)
NETHERLANDS	-0.046	0.937	1.004	-0.064	1.155	0.189
	(0.27)	(2.69)	(9.52)	(0.58)	(6.14)	(0.79)
SWITZERLAND	0.406	1.024	0.408	0.059	0.175	0.739
	(2.91)	(3.51)	(7.15)	(0.89)	(1.48)	(5.3)

Note: The linkage between bilateral ex ante real rates is examined using the following equation:

$$E\ (r_{mt}) = \alpha + \gamma\ E(r^{*}_{mt}) + e_{mt}$$

where $E(r_{mt})$ and $E(r^{*}_{mt})$ are the expected or ex ante domestic and foreign real rates on assets of maturity m at time t. e_{mt} is a random error term. Replacing those ex ante rates by their ex post equivalents yields:

$$r_{mt} = \alpha + \gamma\ r^{*}_{mt} + [u_{mt} - \gamma\ u^{*}_{mt} + e_{mt}]$$

where u_{mt} and u^{*}_{mt} are expectational errors. The estimation of this last equation gives rise to special econometric difficulties which are explained in a technical appendix to Blundell-Wignall and Browne (1990). The hypothesis that foreign and domestic ex ante real rates move together and thus that the domestic and foreign markets are completely integrated implies $\gamma = 1$. $\gamma = 0$ implies complete disintegration. The first, second and third periods are August 1974 to October 1979, November 1979 to February 1990 and January 1986 to February 1990 respectively.

Table 13

COINTEGRATION AND ERROR CORRECTION REGRESSIONS
FOR BILATERAL REAL EXCHANGE RATES

	Full sample	1970s	1980s
(Yen/dollar real exchange rate)			
Real interest differential	-0.03	-0.04	-0.05
	(-3.7)	(-3.3)	(-4.8)
Cumulative current account	-0.35	-1.29	-0.38
	(-11.5)	(-4.6)	(-11.3)
Standard error of estimates	0.106	0.093	0.099
Durbin-Watson	0.407	0.506	0.519
ADF statistics	-3.7***	-3.4***	-3.0**
Error correction coefficient	-0.22	-0.34	-0.35
	(-4.0)***	(-2.1)***	(-4.8)***
(Deutschemark/dollar real exchange rate)			
Real interest differential	-0.06	-0.02	-0.11
	(-9.4)	(-3.0)	(-10.5)
Cumulative current account	-0.21	-1.35	-0.12
	(-5.4)	(-12.5)	(-3.6)
Standard error of estimates	0.121	0.058	0.092
Durbin-Watson	0.256	0.692	0.897
ADF statistic	-2.2	-2.5	-3.1**
Error correction coefficient	-0.18	-0.38	-0.40
	(-3.7)***	(-2.4)***	(-4.5)***
(Pound sterling/Deutschemark real exchange rate)			
Real interest differential	-0.03	-0.00	-0.01
	(-6.3)	(-0.1)	(-1.2)
Cumulative current account	-0.09	-0.35	-0.17
	(-1.5)	(-4.4)	(-2.6)
Standard error of estimates	0.130	0.080	0.106
Durbin-Watson	0.249	0.319	0.264
ADF statistic	-2.9**	-2.7*	-2.7*
Error correction coefficient	-0.08	-0.26	-0.22
	(-1.8)**	(-2.5)***	(-3.3)***
(French franc/Deutschemark real exchange rate)			
Real interest differential	-0.01	-0.01	
	(-3.8)	(-2.7)	
Cumulative current account	-0.08	-0.21	
	(-2.7)	(-2.0)	
Standard error of estimates	0.043	0.050	n.a.
Durbin-Watson	0.329	0.332	
ADF statistic	-4.9***	-3.7***	
Error correction coefficient	-0.34	-0.37	
	(-4.9)***	(-4.0)***	

Note: Real interest differential and cumulated current account balances refer to coefficients in the co-integrating regression of the log of the real exchange rate against a constant and the long-term real interest rate differential and the differential between the cumulated current account balances as a share of GDP. Significance levels for the ADF statistic are:

Number of explanatory variables	Significance level		
	5%	10%	15%
n = 2	-3.26	-2.98	-2.79
n = 3	-3.73	-3.44	-3.26

Source: Phillips and Ouliaris (1988).

3 asterisks indicates significance at the 5 per cent level, 2 asterisks indicates significance at the 10 per cent level, and 1 asterisk indicates significance at the 15 per cent level. The error correction coefficient is based on a standard t test.

Specification and testing for co-integration and error correction are set out in Appendix 3 to Blundell-Wignall and Browne (1990). Sample periods are: Y/$, 1971Q2-1990Q1; DM/$, 1971Q2-1989Q4; £/DM, 1971Q2-1989Q4; FF/DM 1973Q2-1989Q4. Break points are 1980Q1 for Y/$ and DM/$ rates, 1979Q1 for £/DM rate and 1984Q1 for FF/DM rate. Given this latter break point there are not enough observations available to do a cointegration test for the period following the break point.
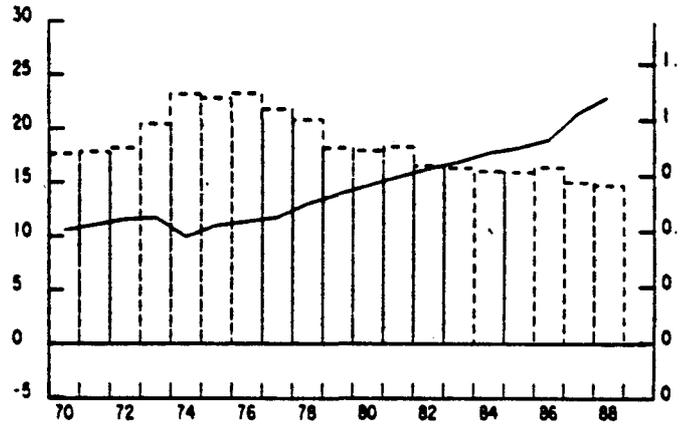
Chart 1

HOUSEHOLD DEBT AND SAVING AS PERCENTAGES OF DISPOSABLE INCOME

——————— Ratio of financial liabilities to income (right hand scale)
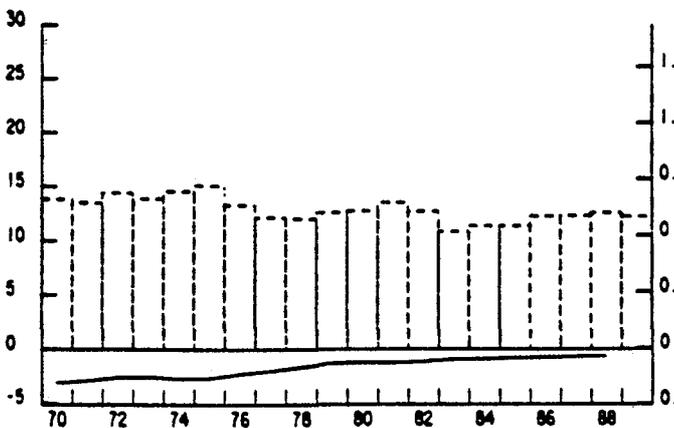
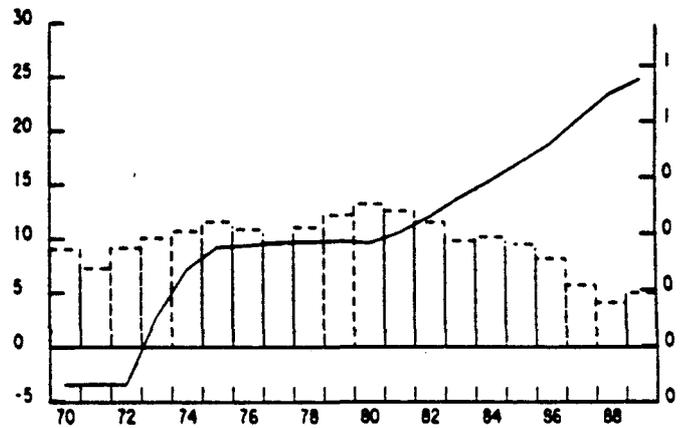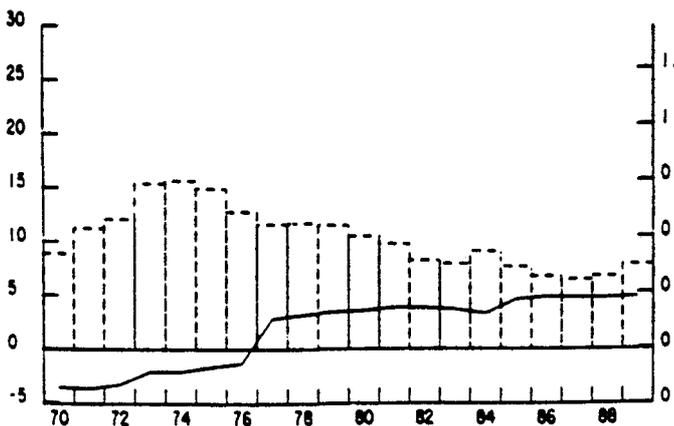- - - - - - - Saving ratio (left hand scale)
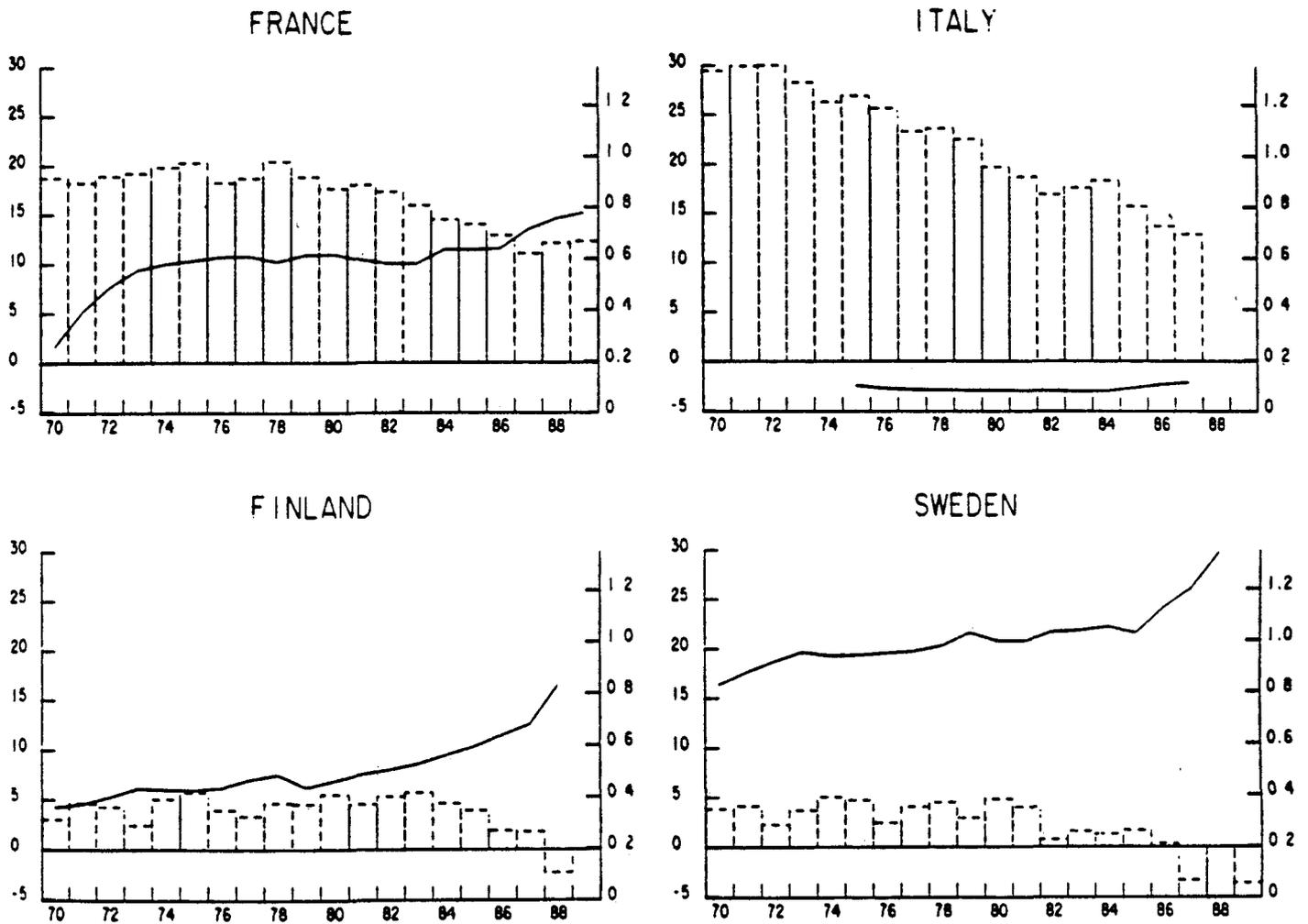

UNITED STATES
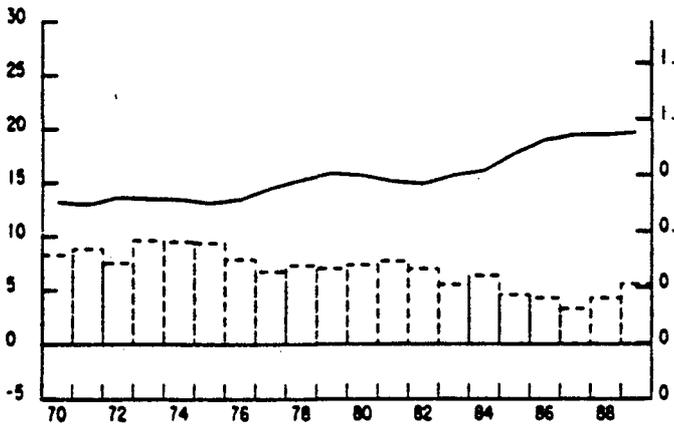
JAPAN

GERMANY

UNITED KINGDOM

AUSTRALIA

CANADA

Chart 1 (continued)

_____ Ratio of financial liabilities to income (right hand scale)
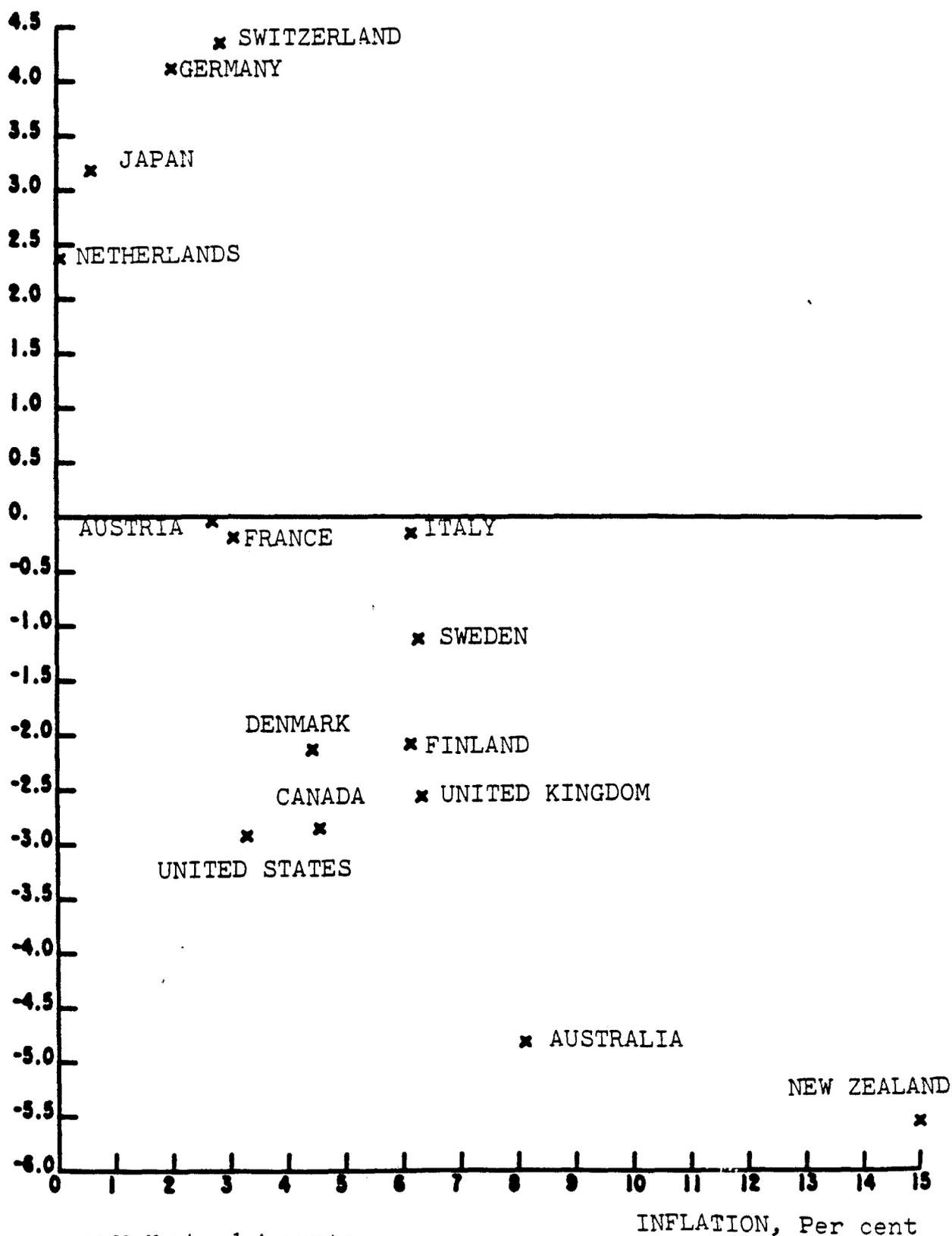
········ Saving ratio (left hand scale)

FRANCE

ITALY

FINLAND

SWEDEN

Source: OECD Economic Outlook data, and OECD Financial Statistics. For most countries debt refers to that for both households and unincorporated enterprises. Household debt is taken from various issues of Statistiska Meddelanden for Sweden and the Reserve Bank Bulletin for Australia.

Chart 2

**AVERAGE INFLATION AND CURRENT ACCOUNT POSITIONS
IN THE SECOND HALF OF THE 1980s**

Current Account
Per cent of GDP

```
 4.5 —
                    ✘ SWITZERLAND
 4.0 —        ✘GERMANY

 3.5 —
         ✘ JAPAN
 3.0 —

 2.5 —
     ✘NETHERLANDS
 2.0 —

 1.5 —

 1.0 —

 0.5 —

 0. ——————————————————————————————————————
     AUSTRIA ✘  ✘FRANCE        ✘ ITALY
-0.5 —

-1.0 —
                           ✘ SWEDEN
-1.5 —

-2.0 —      DENMARK        ✘ FINLAND
               ✘
-2.5 —      CANADA       ✘ UNITED KINGDOM
                  ✘
-3.0 —      ✘
     UNITED STATES
-3.5 —

-4.0 —

-4.5 —
                         ✘ AUSTRALIA
-5.0 —
                                    NEW ZEALAND
-5.5 —
                                            ✘
-6.0 —————————————————————————————————————————
    0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
```

INFLATION, Per cent

Chart 3

THREE-MONTH FORWARD PREMIUM (-)/DISCOUNT (+) AND
ACTUAL THREE-MONTHLY CHANGE IN THE SPOT EXCHANGE RATE FOR
SELECTED CURRENCIES AGAINST THE U.S. DOLLAR

————— Change in spot   ········· Forward Premium (-)/Discount (+)
        exchange rate

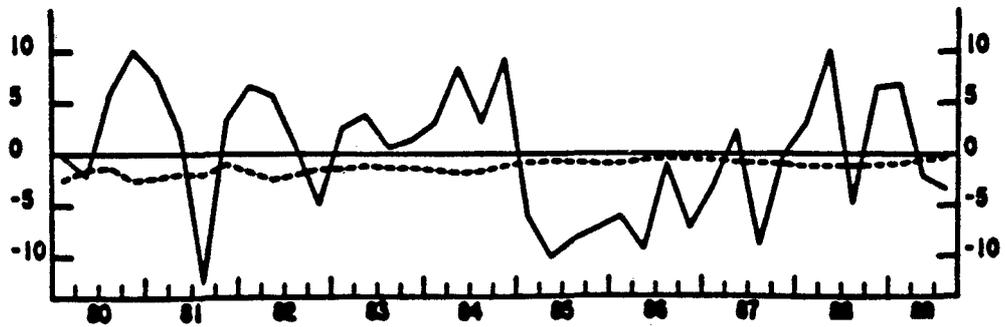DEUTSCHMARK
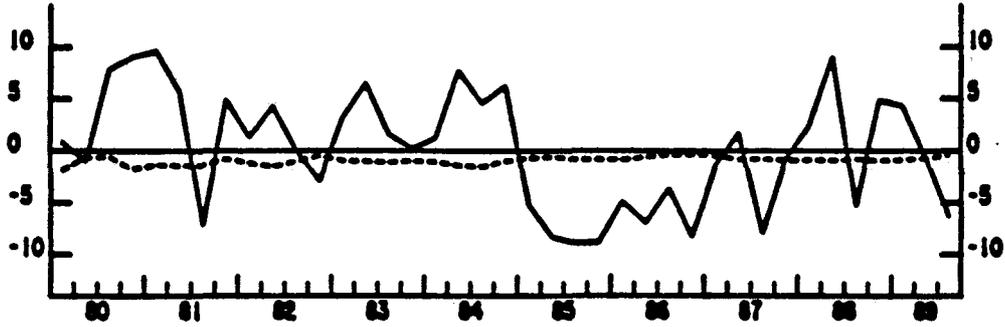
YEN
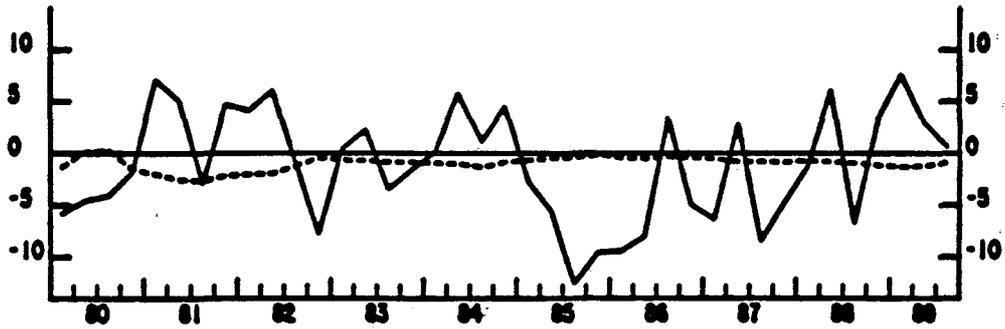
POUND STERLING

SWISS FRANC

51
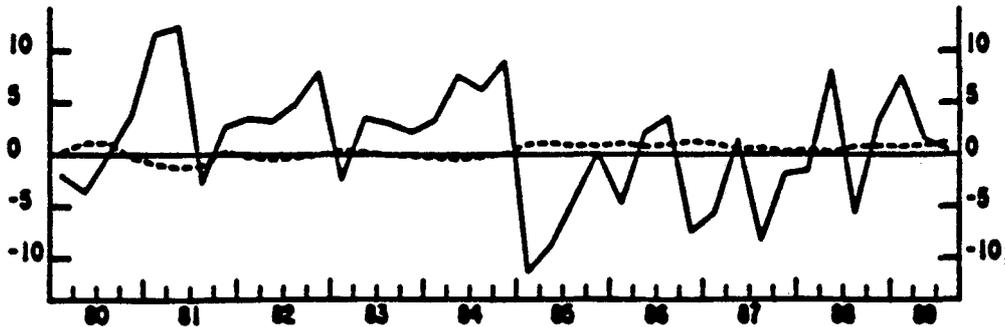
Chart 4

3-MONTH INTEREST RATES DIFFERENTIALS
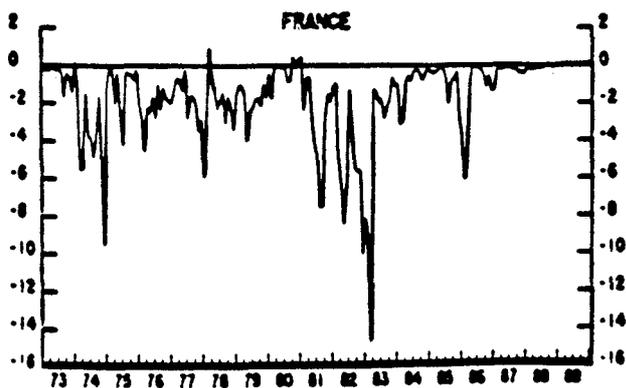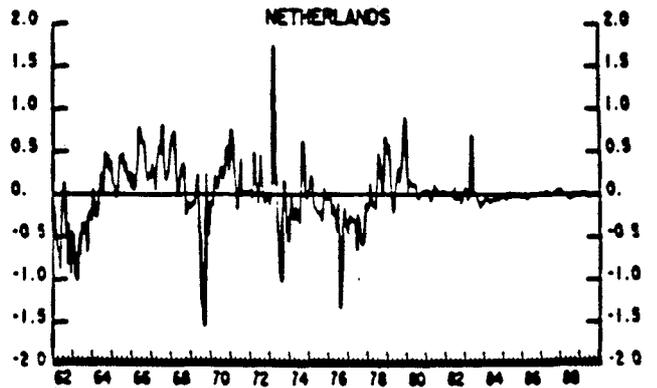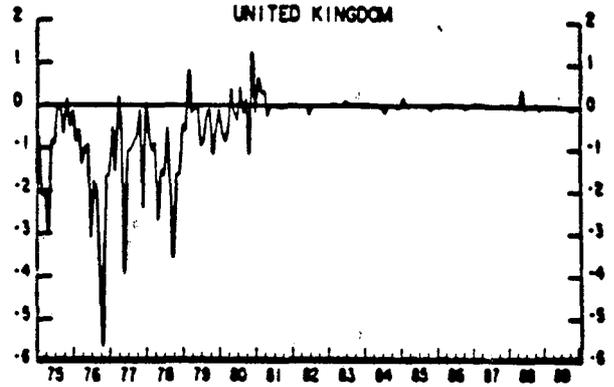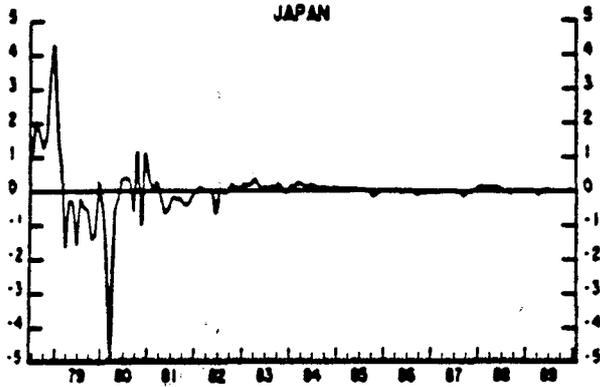-- on-shore deposits minus off-shore deposits --
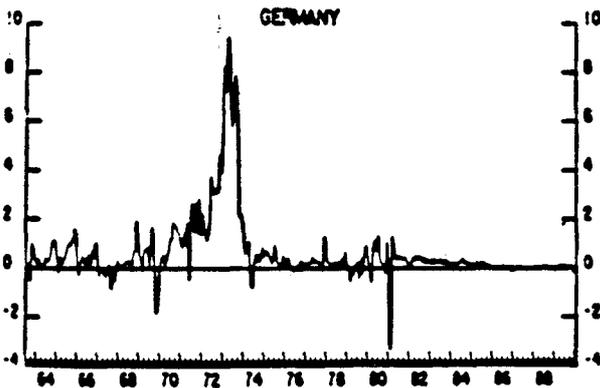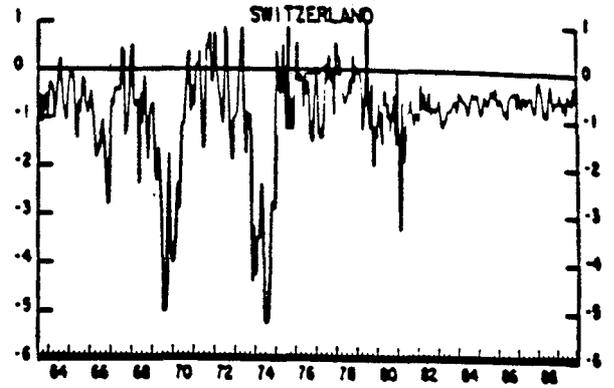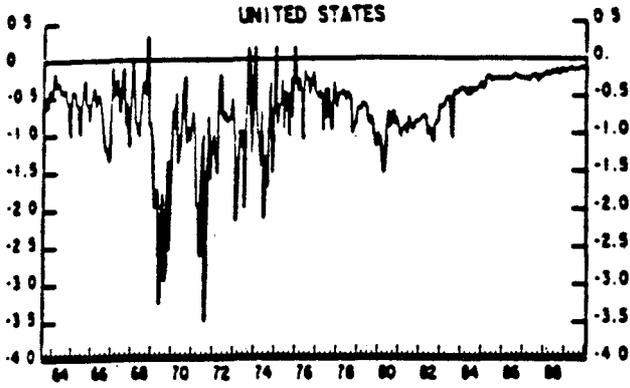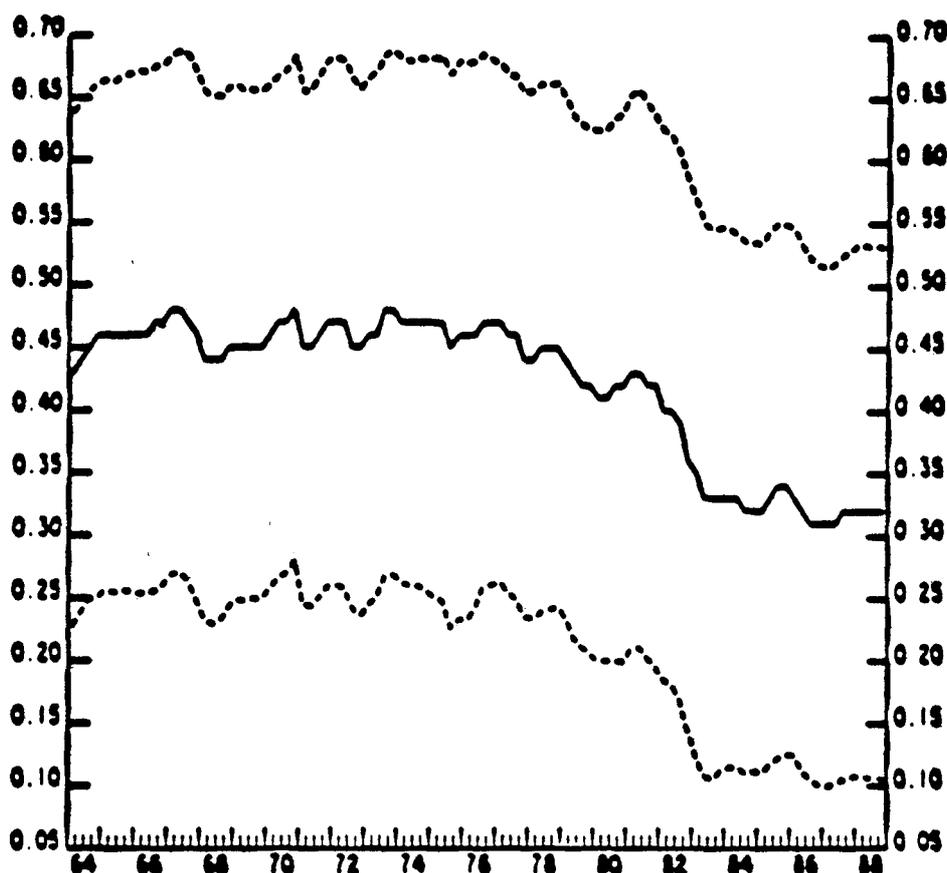
Chart 5

ESTIMATED SAVINGS-INVESTMENT CORRELATIONS BASED ON POOLED DATA

Note: The solid line refers to the time-varying parameter estimate of Φ in the equation:
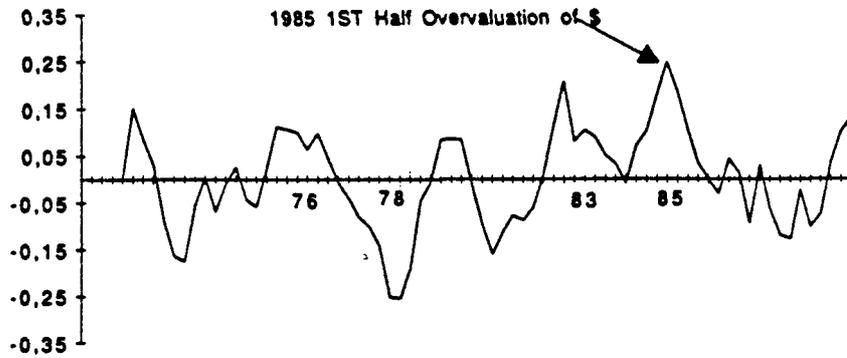
$$\Delta(I/Y)_t = \alpha + \Phi \, \Delta(S/Y)_t = e_t$$

where I is total non-government investment, Y is GNP/GDP, S is equal to S^T-$(1-\hat{a}_1)S^G$ when S^T is total savings, S^G is government saving and $\hat{a}_1$ is an estimated Ricardian effect. Estimating this equation using only cross-section data on the countries in the sample, the United States. Japan, Germany, France, Italy, the United Kingdom, Canada, Australia and Switzerland does not yield a sufficient number of observations to provide reliable estimates of Φ. Thus pooled time-series-cross-section data are employed. A constant inventory of 40 observations (10 countries by 4 quarters) were maintained in the sample with quarter t's estimate of Φ, $\hat{\Phi}_t$, obtained by adding that quarter's values of the relevant variables for all the countries and deleting those for quarter t-4. The discontinuous lines represent two standard error estimates for the $\hat{\Phi}_t$.

Chart 6

UNEXPLAINED REAL EXCHANGE RATE MOVEMENTS
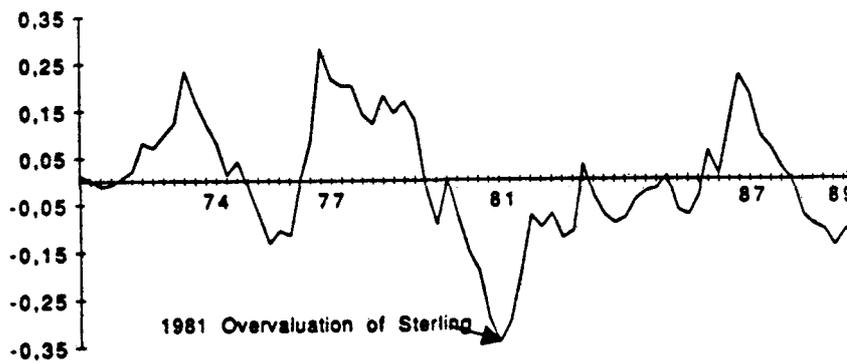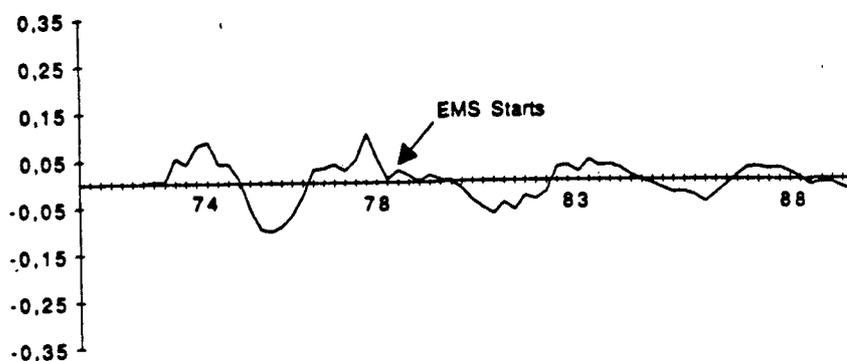
YEN/$ UNEXPLAINED RESIDUALS

1985 1ST Half Overvaluation of $

DM/$ UNEXPLAINED RESIDUALS

1ST Half 1985 Overvaluation $

£/DM UNEXPLAINED RESIDUALS

1981 Overvaluation of Sterling
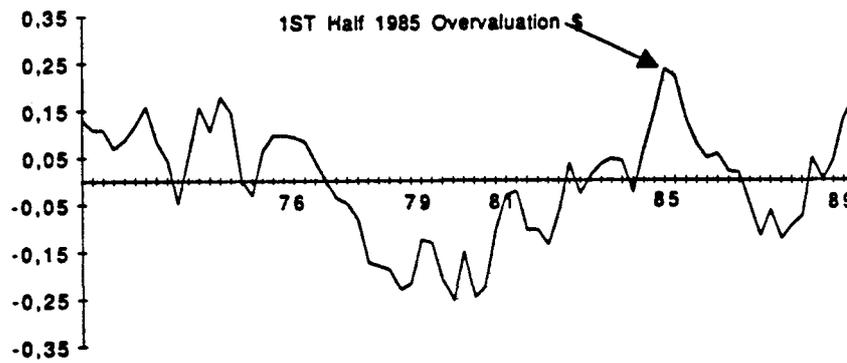
FF/DM UNEXPLAINED RESIDUALS

EMS Starts

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