



OECD Economics Department Working Papers No. 77

Monetary Policy in the Wake
of Financial Liberalisation

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<https://dx.doi.org/10.1787/451534710622>

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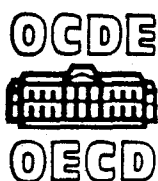
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FINANCIAL LIBERALISATION

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Monetary and Fiscal Policy Division
Balance of Payments Division

April 1990



ECONOMICS AND STATISTICS DEPARTMENT

WORKING PAPERS

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The paper examines evidence concerning the impact of financial liberalisation and innovation on monetary policy. The indicator value of monetary aggregates and the role of liquidity constraints in the transmission mechanism affecting aggregate demand are examined. Countries where financial liberalisation has led to problems with the role of monetary aggregates in general also display evidence of a reduced role for liquidity constraints in aggregate demand behaviour. The ability of the authorities to influence market-determined interest rates, a key aspect of monetary transmission in markets where liquidity constraints are not binding, is also examined.

Le présent document met en évidence les implications de la libéralisation et de l'innovation financières pour la politique monétaire. Les indicateurs d'agrégats monétaires et le rôle des contraintes de liquidité dans les mécanismes de transmission affectant la demande globale y sont examinés. En général, dans les pays où le processus de libéralisation financière a soulevé le problème du rôle des agrégats monétaires, des signes révélateurs d'une réduction de l'influence des contraintes de liquidité sur la demande globale sont également perceptibles. La capacité des autorités à influencer les taux de marché, qui représente un aspect majeur du mécanisme de transmission sur des marchés d'où les contraintes de liquidité peuvent être exclues, est également analysée.

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I. INTRODUCTION

Financial liberalisation and innovation has progressed in most major OECD countries during the 1970s and 1980s. While the extent of change differs between countries, these developments have been associated with improved efficiency, and there is now a much greater range of financial services. At the macroeconomic level, however, there has also been an increasing concern in recent years about the implications of these new trends for the efficacy of monetary policy.

In the course of the 1980s, monetary policy in a number of major countries has been conducted against the background of growing uncertainty about the nature and stability of financial relationships. One result of this has been a more eclectic approach to policy formulation and implementation than in the 1970s. While objectives for money and/or credit have often continued to be specified, their role in the formulation of monetary policy has been downgraded, with more direct attention being paid to aggregate demand and inflation and interest rates regaining some ground as a short-run focus of policy. At the same time, since underlying inflation trends are relatively inert, responding only with a long lag to forces influencing aggregate demand and supply, authorities have had to look at a broader range of indicators to enable policy decisions to be taken in a timely manner. An important issue for the 1990s concerns whether these characteristics will become a permanent feature of countries already operating this way, and whether a broader range of countries will be forced to follow as financial liberalisation and innovation becomes more widespread.

One factor often cited for the reduced role of monetary aggregates is the impact of financial liberalisation and innovation. In the extreme example of an economy with exchange controls, interest rate or credit ceilings and "powers" regulations (e.g. prohibiting short-term money market instruments that can serve as "near monies"), banks dominate the process of financial intermediation and borrowers in the credit market would be quantity constrained. In order to lend, banks would be obliged to attract deposits under conditions that could be controlled closely by the authorities. For example, authorities could push interest rates on government securities above the regulated deposit rate, so that banks could not attract the deposits to lend. Alternatively, a credit ceiling would reduce any incentive for banks to bid for deposits in the first place. In such an economy, circumstances would frequently arise when the demand for and supply of credit would not clear at the market price, and spending would tend to be quantity constrained. This situation would be systematically undermined by financial liberalisation. "Powers" deregulation, for example, could see the rapid growth of near monies (e.g., money market mutual funds, short-term bills, etc.) render existing definitions of money meaningless. The removal of rate/quantity regulations on banks would further enhance the process of innovation and change. Liabilities management, whereby "deposits" are purchased on wholesale markets at home and abroad by a variety of financial intermediaries, would ensure that credit demands are always satisfied at the market-clearing interest rate. Since banks and other intermediaries no longer expand lending passively in-line with the growth of deposits (money), there is no reason for the latter to maintain its previous relationship with nominal spending.

Major instabilities could of course be a temporary phenomenon, as previously "pent-up" credit demands are satisfied. Monetary aggregates might

be disturbed in important ways immediately following the removal of regulations, but might settle down again some time later to some stable, albeit new, relationship with nominal income. In the longer run, this interpretation would be consistent with a return to monetary targeting. On the other hand, the increased competitiveness of financial markets could see financial institutions generating an ever shifting array of new instruments for both borrowers and lenders, so that it would always be futile to focus on the control of any particularly sub-category of these. On this interpretation, the dynamic and on-going nature of financial liberalisation and innovation would be likely to lead to a permanently changed monetary policy regime. Moreover, the globalisation of international financial markets could see liberalisation trends become more widespread, as domestic markets become more contestable, so there may be some international convergence toward the more eclectic approach to policy.

These issues have implications for much more than the convenience value of monetary aggregates as indicators or simple intermediate targets for monetary policy. If financial liberalisation has caused a breakdown in the relationship between money and nominal income, then this could be linked with the undermining of the old transmission mechanisms of monetary policy through liquidity constraints. Household and business spending decisions are no longer closely constrained by the availability of credit. Only changes in interest rates, by influencing permanent income and causing intertemporal substitution in credit demands will affect aggregate demand. Since private sector expectations about future income and interest rates are fundamental in these channels of influence, the degree of control of the monetary authorities over aggregate demand may be considerably less precise (2).

If the role of liquidity constraints in monetary policy transmission is reduced by financial liberalisation, the authorities would have to rely increasingly on their ability to influence financial prices. Liberalisation may, however, also influence the linkages between policy-determined short rates and longer-term interest rates which give rise to wealth effects and intertemporal substitution. Two potentially important issues are relevant. First, market interest rates are strongly influenced by expectations about future rates and hence anticipated economic policies, activity and inflation. This may reduce the linkages between official short-term interest rates and market-determined rates. Second, the globalisation of financial markets too may cause domestic longer-term interest rates to be increasingly influenced by rates in other countries. This could also serve to weaken the links between domestic monetary policy and those interest rates most likely to induce changes in private spending behaviour.

The aim of this paper is to examine whether there are any systematic patterns over time and between countries in relation to the impact of liberalisation on:

- the relationship between money and nominal income;
- changes in the relative importance of liquidity constraints in the transmission of monetary policy; and
- effects on the ability of authorities to influence key market interest rates.

Section II first summarises some of the main features of financial change in the major OECD countries. There are considerable cross-country differences, knowledge of which is a useful starting point for interpreting the various issues and empirical results. Evidence concerning the links between monetary aggregates and nominal income, both in the short and long run, is discussed in Section III. Section IV then examines some of the possible implications of financial liberalisation and innovation for changing liquidity constraints, and the likely relative importance of different transmission mechanisms in the more "eclectic" approach to policy. Particular emphasis is given to factors bearing on consumption expenditure. Section V looks at the pricing of financial instruments in more liberalised markets and its implications for the ability of the authorities to influence key interest rates. Finally, in Section VI, some remarks are offered on possible implications of the evidence presented for the formulation and implementation of monetary policy as financial systems continue to evolve.

II. FINANCIAL LIBERALISATION AND INNOVATION IN MAJOR COUNTRIES

Financial regulations generally fall into two broad categories: a) "rate/quantity" regulations on bank deposits and loans, which include ceilings on bank deposits and quantitative measures that have similar effects (credit ceilings, capital controls, etc.); and b) "powers" regulations, which govern the extensiveness of the activities of individual financial institutions (who is authorised to carry out various borrowing and lending functions, securities underwriting, equities, insurance, etc.). The nature of financial regulations in individual countries and the speed with which they have been undermined and removed are documented in other OECD studies (3). A broad picture of developments in the major OECD countries is shown in Table 1. In general terms, there are considerable differences in emphasis between countries in the extent to which "rate/quantity" regulations have been removed and/or "powers" regulations still apply. A perspective on these differences is important for interpreting empirical results in subsequent sections.

In the United States regulation Q was removed in the early 1980s. This was preceded by "powers" deregulation with the authorisation of Money Market Mutual Funds (MMMFs) in 1974, which led to important disintermediation: banks' balance sheets were affected, as non-bank financial institutions gained increasing access to non-regulated sources of funds. The continued expansion of the secondary mortgage market also distanced the ultimate holders of mortgage loans from deposit-based thrifts and savings banks. In the 1970s a series of new types of savings instruments appeared, subsequently culminating in NOWs, Super NOWs, Money Market Deposit Accounts (MMDAs) and the removal of most interest rate restrictions. US thrifts were also given extended powers to compete with banks on the assets side of their balance sheets in the early 1980s. This process of innovation and deregulation improved the capacity of banks and thrift institutions to compete for funds. While commencing somewhat later, considerable progress has also been made in Japan during the 1980s. Foreign exchange controls were removed at the beginning of the decade, and subsequently new money market instruments have been gradually introduced. In recent years rate regulations on bank deposits have to a much larger extent been removed. While some still remain, the proportion of funds with market-determined rates such as money market certificates (MMCs), CDs and large

denomination time deposits in Japanese city banks, was around 70 per cent in 1989.

In Germany, banks have not been constrained by rate ceilings or credit controls in the 1970s and 1980s. Nevertheless, interest rates on some categories of deposits have remained inflexible (Chart 1), compared to market rates. This has some of the characteristics of cartel-like behaviour in setting rates. While Germany has had no "rate/quantity" regulations, the lack of "powers" deregulation has been an important phenomenon. At the time of writing there had been no significant development of retail money market instruments to compete with banks for funds. Indeed, Germany is a good illustration of a more general rule that official interest rate deregulation per se may not result in strong competition for deposits when the structure of the financial system is not conducive to it.

In Italy and France, there has also been relatively less innovative financial change. Direct control on bank lending operated until 1983 in Italy, reducing the incentive for price competition for deposits. Foreign exchange controls have operated through all of the 1970s and 1980s, although some relaxation has occurred in recent years. Treasury bills (since 1975) and large CDs (since 1983) constitute the most important negotiable money market instruments. The household sector in Italy holds very large quantities of highly liquid treasury bills. Similarly, "rate/quantity" regulations have been maintained into the late 1980s in France and only by the time of writing were foreign exchange controls finally phased out. Negotiable money market instruments (CDs, commercial paper, treasury bills) have been authorised only from the middle of the 1980s.

In the United Kingdom, restrictions on interest bearing eligible liabilities of banks (the "corset") operated through much of the 1970s, so there was no incentive to compete for deposits (even though the bank's interest rate cartel was broken with Competition and Credit Control in 1971). At the same time, the main "near-bank" savings institutions, building societies, maintained an interest rate cartel and were heavily regulated in terms of asset powers. The "corset" was finally removed in 1980. Bank gains at the expense of building societies created pressures which eventually saw the latter given the ability to raise funds through CDs and large time deposits in 1983. Powers deregulation on the asset side followed with the 1986 Building Society Act. Foreign exchange controls were also removed in 1979, opening up foreign avenues to finance bank lending and increasing the contestibility of domestic financial markets.

Finally, Canada has been perhaps one of the most deregulated economies over a long period of time. Deposit rates have moved flexibly with market rates, and credit ceilings and capital controls were not used in the 1970s or 1980s. Negotiable money market instruments were available as early as the 1960s.

Aside from "rate/quantity" deregulation affecting the balance sheets of financial intermediaries, there has also been a process of innovation affecting financing techniques for both households and companies. These credit market developments, which have attracted considerable interest in recent years (4), include:

- innovations to increase the elasticity of supply of loanable funds to the non-financial private sector (the securitisation of existing debt, note issuance facilities, junk bonds, retail money market developments, etc.);
- innovations to enhance the liquidity of existing wealth (home equity loans, credit lines from brokers accounts, etc.); and
- innovations which facilitate the management of exposure to interest rate and exchange risks (floating rate loans, swaps, etc.)

Many of these developments have been "off-balance-sheet". They have been facilitated by "powers" deregulation (authorisation of the activity), but the intensity of development in individual countries has been largely a function of other factors. To some extent they have been spurred on by the incentive for financial institutions to avoid taxes, reserve requirements and existing regulations. Contagion effects within and between countries have also played an important role. This arises within individual countries because some institutions do not have "powers" to compete effectively with newly-deregulated sectors, so that pressures mount to "level the playing field". At the international level, contagion arises because the availability of alternative markets and institutions increases the contestibility of the domestic market for financial services. Finally, the process of innovation itself appears to be inherently dynamic, and therefore likely to remain on-going, because deregulation increases competition between institutions. This requires a stronger capacity to adapt to changing market needs, i.e., requires them to be more innovative. Technological advances such as ATMs, point of sale electronic funds transfer, etc., also facilitate this process. But it is also generally recognised that market structure, concentration, contestibility of markets, customer preferences and general financial habits, may explain the unevenness of financial innovation between countries.

III. SOME IMPLICATIONS OF FINANCIAL LIBERALISATION FOR THE ROLE OF MONETARY AGGREGATES

The main approach to monetary policy popular in the 1970s and early 1980s distinguished between: instruments; intermediate targets for money or credit; and ultimate objectives for inflation. Broad success with this framework for the conduct of monetary policy required that a) money and credit provide early warning of inflation problems to guide the directional changes of policy instruments; b) that the instruments have a predictable and rapid influence on the intermediate targets for money; and c) that achieving these targets will not cause its relationship with nominal demand or inflation to break down in the longer run. It has been argued, however, that financial liberalisation and innovation may significantly interfere with all three requirements (5). It has also been recognised by the authorities in some countries that policy in liberalised markets may, at least for a time, have to be more directly focused on the ultimate objectives of policy (nominal income or inflation), without much assistance from quantitative intermediate targets such as money or credit aggregates (6).

This section focuses on the extent to which financial liberalisation and innovation has undermined the three requirements for the successful use of monetary aggregates as intermediate objectives mentioned above:

- i) has financial innovation reduced the short-run indicator value of monetary aggregates in relation to nominal income?
- ii) has the freeing up of interest rates on bank deposits led to more flexible deposit pricing, so that authorities have more difficulty in controlling aggregates? and
- iii) is the evidence consistent with a long-run relationship between money and nominal income, so that controlling the aggregates will ultimately influence the growth of nominal GDP and (given supply-side constraints) inflation?

Each of these questions is examined in turn, using country-specific empirical evidence.

A. The short-run indicator value of money and credit aggregates

One use of money and credit aggregates as a guide to monetary policy is as early warning of excessive nominal demand and inflation pressures. This concerns the short-run role of monetary aggregates as leading indicators. The evidence about the relationship between money, nominal income and key financial prices can be summarised with vector autoregression techniques (VARs) (7). To this end, four key aggregative variables are examined: nominal income, a monetary aggregate, the interest rate and the exchange rate. Nominal income is deliberately chosen in preference to the inclusion of prices and output separately, mainly because controlling monetary aggregates has its main influence on overall nominal demand. This also has the advantage of reducing the number of variables in the system. Three definitions of the financial aggregate are used for each country -- narrow money, broad money and bank credit.

The analysis is conducted in two stages. First, the VAR for changes in nominal income against past changes in itself, money, the interest rate and the exchange rate is estimated recursively -- commencing with some minimal sample and increasing the number of observations one at a time. An F-test is used to test the null hypothesis that the money parameters are jointly insignificantly different from zero for each successive sample period. Table 2 shows those periods for which the null hypothesis is rejected -- i.e., periods during which money appeared to lead income significantly. For most countries a significant break in the relationship can be found. This information is then used to run the VARs for two separate sample periods -- that before and after the break in the relationship. This second set of results is shown for broad money aggregates in Table 3 (8). All of the reverse relationships are also presented in that table.

For the United States the recursive tests (Table 2) suggest that both M1 and M2 broke down as predictors of nominal GDP at least by 1978 (9). This occurred after the introduction of MMMFs in 1974, but preceded the removal of regulation Q in 1980, and the bunching of new accounts in the early 1980s. But there has been no tendency for the leading relationship to be re-established in recent years. In checking the subperiods (Table 3), it is clear that even before 1978 there was some ambiguity for M2 -- it leads nominal income but reverse causation is also present. After 1978 nominal income predicts money, while the reverse is no longer true.

The results for Japan contrast with those for the United States, in that both M1 and M2+CD remain useful short-run predictors of income through the 1970s and 1980s. However, in checking the arbitrary sub-periods between the 1970s and 1980s (before and after 1980Q4) it is clear that M2+CD is exogenous in the 1970s, unambiguously leading income. In the 1980s the reverse relationship (income to money) is also at work.

For Germany the recursive tests suggest some difference between central bank money (CBM) and M3. Overall significance for CBM in leading nominal income did not appear to emerge until 1983. When observations from 1984 to 1987 are included CBM significantly leads income, but this relationship breaks down again after 1987. M3 also became a more important leading indicator in 1984 and, subsequently, there has been no tendency for its relationship with income to break down. It is interesting to note that this finding corresponds with the Bundesbank's switch to M3 targeting in recent years. The absence of rate regulations, the dominance of universal banks in providing options for savers, and the absence of liquid retail money market instruments are such that financial liberalisation and innovation has thus far been less of an issue. The breakdown of the previously targeted CBM is thought to have been related to changes in currency holdings by foreigners, particularly in Eastern Europe.

In Italy bank credit expansion led nominal income until the first half of 1979, but subsequently broke down, possibly as a result of moves towards direct financing resulting from the extensive use of credit ceilings until 1983. However, the earlier relationship was not re-established after 1983. While a relationship was not present in earlier periods, M2 began to lead nominal income in the mid-1980s. This corresponds with a period of greater exchange rate stability within the EMS, when Italian monetary growth should have become more closely associated with nominal income (10). At the same time, since foreign exchange reserve constraints are binding, Italian monetary growth should have become more exogenously determined by German policy. Thus, while money leads income in the second period, the reverse relationship from income to money does not appear to be present.

The results for France suggest that over the period for which data is available (the 1980s) M2 has led nominal income. France's participation within the EMS appears to have contributed to this relationship, with growth of M2 being more exogenously determined by German monetary policy.

In the United Kingdom the role of changes in sterling M3 as a predictor of future fluctuations in income broke down in 1983. This is likely to have been associated with the removal of the "corset" in 1980, which led to a process of reintermediation towards banks, while near banks (building societies) remained more heavily regulated at first. Further instabilities followed as building societies achieved similar status to banks after 1986. The removal of foreign exchange controls in 1979 was also a factor in the breakdown of the M3 relation. However, from the middle of the 1980s M0 improved as an indicator, and this coincides with authorities' greater emphasis on this aggregate in recent years.

The role of M1 as a leading indicator of income in Canada broke down in 1984, even though financial markets were relatively liberalised in both the 1970s and 1980s, and therefore not affected to the same extent as other

countries by disintermediation and reintermediation processes. M2, on the other hand, became a significant indicator of income for all of the 1980s (but not before). However, in checking the sub-periods for M2 (Table 3), the reverse relationship from income to money is also significant in both the 1970s and the 1980s -- reducing its usefulness as a leading indicator.

In summary, at least some definition of money has led nominal income and subsequently broken down in the United States, Germany, Italy, the United Kingdom and Canada. Once this has occurred, there is thus far no evidence to suggest that old relationships tend to re-establish themselves. In some cases previously non-existent relationships have emerged for new aggregates (M2 in Italy and Canada, M3 in Germany and M0 for the United Kingdom).

It would be going too far, however, to conclude from this evidence that there are no links between money supply changes and nominal income in the short run. VAR methodology has a number of well-known shortcomings, amongst the more important of which is that it relies heavily on the temporal sequencing of events in establishing a leading relationship, which may have little to do with establishing causality (11). Thus no allowance is made for any change in the money supply process, and more anticipatory policies on the part of the authorities -- an optimal monetary policy from the standpoint of nominal income stabilisation may well produce no lead relationship at all in the data. It is worth noting, however, that if the generally less significant lead relationship observed in more recent years is to be explained by the pursuit of more optimal monetary policies, these have been policies that have given less weight than before to monetary indicators. So even this interpretation of the results would not suggest returning to policies which give monetary aggregates greater weight in the short-run conduct of policy. A further shortcoming is that the technique does not consider the possibility of a contemporaneous relationship, which might be of some indicator value given that money is observed with a much shorter lag than income. Other work has not found a strong contemporaneous link, however.

B. Interest rate spreads and the controllability of monetary aggregates

A second use of monetary aggregates in the conduct of policy is as intermediate targets. This requires that the authorities be able to control monetary aggregates in a predictable way, through variations in short-term interest rates. Goodhart (1986), amongst others, has pointed out that financial liberalisation and innovation may reduce the extent to which portfolio substitution between "money" and "non-money" assets is induced by changes in the level of interest rates, thus reducing control over monetary aggregates through this channel. Since the pricing of bank deposits is governed increasingly by market forces, rising interest rates on "non-money" financial assets may lead to parallel increases in rates paid on bank deposits. Monetary policy is much better at influencing levels of nominal interest rates rather than the spread between nominal rates on money and non-money assets, which is the net nominal opportunity cost of holding money (12). Evidence concerning these issues may be derived from the VAR results presented in Table 3. But to understand and further develop some of these results, it is also helpful to examine the precise behaviour of key short-term market interest rates, deposit rates, the implicit opportunity cost of money (the difference between them) and the income velocity of broad money, which are shown in Chart 1.

For the United States, the VAR results shown in Table 3 suggest that interest rates have led money, both in the 1970s and in the 1980s. This is consistent with the presumed role of the opportunity cost of holding money, as shown in Chart 1 -- changes in short-term market interest rates clearly influence the net opportunity cost variable, and there is a striking visual correlation with developments in velocity. Rate deregulation *per se* does not guarantee that banks will price deposits in a flexible way. Rates on NOW (interest-bearing consumer cheque) accounts and savings accounts adjust very sluggishly, and many consumers still have non-interest bearing accounts. Even rates on MMDAs lag market rates, given the maturity structure of their assets. The deposit pricing behaviour of banks is such that changes in market interest rates still influence the net opportunity cost of holding money in the short run, even if by much less than earlier.

In the case of Japan there is no significant impact of interest rate changes on subsequent monetary growth in either the 1970s or the 1980s, despite the fact that changes in market interest rates have a significant impact on the net opportunity cost of holding money (Chart 1). This finding is consistent with limited substitutability between "money" and "non-money" financial assets. However, this situation is likely to change as financial liberalisation and innovation improves the array of financial instruments and increases their substitutability. But as it does, interest rates on bank deposits could well become much more flexible -- as has already occurred to some extent in recent years -- so that control over monetary aggregates through variations in interest rates may not be greatly improved (13).

The VAR results for Germany suggest that the growth of M3 is for the most part invariant to changes in short rates -- interest rates do not lead money in either the 1970s or the 1980s. However, the patterns in Chart 1 suggest the authorities have no apparent difficulty in influencing the net opportunity cost of holding money through changes in short-term interest rates. The rate on savings deposits in Germany adjust only at discrete intervals, and there is a clear link between the short-term interest rate and the net opportunity cost. This could be related to the dominance of banks in providing options to savers mentioned in Section II -- given the absence of retail money market instruments and the relatively illiquid nature of Euro-bonds as a form of holding wealth. In other words, low substitutability between money and non-money assets is the most likely explanation of the results shown in Table 3.

In Italy and France, the impact of interest rates on the net opportunity cost of holding money also remains strong -- in spite of the removal of direct controls on lending -- but there is no apparent influence of variations in Italian interest rates on subsequent monetary growth. The most likely explanation here is the strong use of credit ceilings, interest rate controls and the lack of powers deregulation in both countries.

In the United Kingdom the VAR results suggest that variations in interest rates did not lead changes in monetary growth in the 1970s. This finding probably reflects the artificial control over M3 exercised by the "corset" in this period. In the more liberalised 1980s, however, interest rate changes do significantly lead changes in monetary growth. This finding appears despite the fact that deposit rates, shown in Chart 1, have followed market

short rates rather closely during the 1980s. While there is clearly some impact of very sharp rises in interest rates (1981, 1985, 1988) on the net opportunity cost variable, this influence quickly evaporates as deposit rates catch up. Finally, in Canada, the VAR results suggest that the influence of interest rates on monetary growth has been reduced and is statistically insignificant in the 1980s. Consistent with this, the patterns in Chart 1 suggest that deposit rates have closely followed market rates during the 1980s.

The above analysis suggests that few generalisations can be made about the controllability of monetary aggregates through changes in short-term interest rates, either before or after "rate/quantity" deregulation. But the empirical observations made do raise some questions about the ability of authorities to control monetary aggregates as the process of financial liberalisation and innovation continues:

- i) where interest rate changes influence the opportunity cost for only a temporary period (United States, Italy, United Kingdom, Canada), the leverage over monetary growth may only be of short duration. A tightening of policy would cause monetary growth to slow at first and then to reaccelerate later on as deposit rates catch up; and
- ii) the sluggishness of deposit rate pricing is a phenomenon that could not be relied upon to continue in the event of more active policies to influence monetary growth. Attempting to use the phenomenon as leverage for monetary policy could result in yet further innovation, or more flexible pricing, in the absence of regulations or cartels.

C. Money-income relationships in the longer run

The evidence discussed thus far relates to short-run issues about the usefulness of money and credit aggregates as indicators and as targets in the conduct of monetary policy. Regardless of these, there could also be an important role for monetary aggregates as a long-run guide for policy which, if achieved on average, might ensure that inflation was contained. On this view, financial innovation would be seen as creating "noise", reducing the importance of money in taking short-run policy decisions. But provided financial change did not undermine the long-run relationship between money and nominal income, broad objectives for the monetary aggregates could nevertheless be important guides for the success of long-run inflation policies, given the inertia of prices.

Cointegration techniques can be used to test whether there is any long-run tendency towards an equilibrium relationship between money and nominal income. If cointegration can be established amongst time series, then any deviations from an equilibrium relationship can be expected to be reversed (it is a stationary mean-reverting process) (14). These tests have been applied to the money-nominal income relationship (ignoring other variables) in a number of studies using US data (e.g., Engle and Granger (1987) and Ouliaris, Park and Phillips (1989)). Results for cointegration tests between money and nominal income for all of the major OECD countries are shown in Table 4. The cointegrating regression Durbin Watson test (CRDW) and the augmented Dickey-Fuller test (ADF) are used to test the null hypothesis of no cointegration between money and nominal income.

For the United States, consistent with earlier findings of Engle and Granger, the null hypothesis of no cointegration is rejected in the case of M2, even at the 1 per cent level. But there appears to be no evidence of any long-run relationship between M1 and nominal income. Similarly, for Germany, the null hypothesis of no cointegration is rejected in the case of M3 (where both the constant and time trend were found to be significant in the ADF equation), but not for CBM. For all other countries the null hypothesis of no cointegration cannot be rejected, implying that there is no inherent tendency for nominal income and money to revert towards some long-run equilibrium relationship with each other (15).

D. Summary

It is of course impossible to determine with econometric techniques whether some of the above difficulties with monetary aggregates are likely to be temporary or will extend well into the future. But the following observations consistent with our econometric results and the discussion in Section II are worth noting:

- i) in countries where liberalisation occurred relatively early (certainly Canada, but also the United States and the United Kingdom), the evidence is not consistent thus far with a tendency for old relationships to be restored once they have broken down. As the most liberalised country for the longest time, Canada has seen innovations changing relationships without any deregulatory moves;
- ii) Japan has been relatively unique in its gradual process of "powers" and rate/quantity deregulation through the 1980s, and has avoided sudden disruptions to short-run money-income relationships. Money has nevertheless already become a more ambiguous indicator over this period; and
- iii) countries in which financial liberalisation has been less of an issue are also those in which money has been an unambiguous short-run leading indicator during the 1980s (Germany, Italy and France). Powers deregulation, which gives rise to greater competition between different types of financial intermediaries and/or the growth of "near monies", has been particularly lacking in this group.

Since globalisation and greater international competition, given time, increased the contestability of markets, this latter group could be subject to greater pressures for change on the financial landscape during the 1990s, in ways that could affect the usefulness of money as a guide to policy.

IV. THE CHANGING NATURE OF LIQUIDITY CONSTRAINTS AND MONETARY POLICY TRANSMISSION CHANNELS

Thus far the discussion has been presented in terms of the implications of financial liberalisation and innovation for the role of monetary aggregates in the formulation of monetary policy. It has been concerned with the

usefulness of broad relationships at the policy decision making level, and not with transmission mechanisms as such. However, underlying the difficulties in using monetary aggregates in the ways once envisaged, is the closely-related issue of how financial change influences the way that liquidity constraints operate in the economy. The presence of quantitative credit rationing in less liberalised markets is a well-known phenomenon. Thus, for example, pushing interest rates close to or above inflexible deposit rates would quickly cause credit to be quantity constrained, as banks' ability to attract deposits in order to fund lending would be reduced. Similarly, the profitability of existing loans would fall as the cost of obtaining borrowed and non-borrowed reserves rose, encouraging banks to contract balance sheets. The use of credit ceilings or restrictions on the quantity of deposits had similar effects, at times, in constraining liquidity in the non-bank private sector. Such constraints gave rise to a reasonably prompt impact of monetary policy on spending, and inflation typically responded, albeit with a somewhat longer lag. This underlying transmission mechanism may have had much to do with the observed close relationship between monetary aggregates and inflation in earlier periods.

But an increasing number of commentators have recognised that the ability of financial institutions in more liberalised environments to fund their loan books in wholesale markets at home and abroad and to restructure asset portfolios (e.g. towards more floating rate instruments), implies that these credit availability effects may become significantly less binding -- credit is nearly always available at a price. Moreover, households and businesses will expect it to be available. Hence they will be less inclined to restructure their spending in line with their holdings of liquid or precautionary balances.

If liquidity constraints are systematically being eased, then the ability of the monetary authorities to influence the economy by altering the liquidity position of the non-financial private sector through the balance sheets of banks is likely to be undermined. The main channels of influence of monetary policy to the economy will become increasingly dependent upon wealth effects (which may also be weaker in a less liquidity constrained environment) and intertemporal substitution in credit demand, both caused by variations in interest rates (which would be controllable as long as there was some residual liquidity scarcity for banks, etc.). Evidence concerning the changing nature of liquidity constraints is examined in relation to consumption expenditure.

A. Permanent income versus liquidity constrained influences on consumption

Monetary policy has its main impacts upon consumption behaviour through three broad channels:

- i) the availability of liquidity itself may be altered when central bank operations induce changes in the balance sheets of financial institutions, impacting directly on private expenditure. Reinforcing this, monetary policy may also influence household income directly (via the effects of changes in household net interest payments), and indirectly, as initial effects on spending feed through into household income (dividends, wage rates, unemployment), which will influence current consumption if spending is liquidity constrained;

- ii) by influencing perceptions of permanent income -- that generated by consumers' stock of human and non-human wealth in the longer run (17). A rise in interest rates reduces wealth, and hence permanent income, insofar as a higher discount rate is applied to future labour and non-labour income (reflecting its relative illiquidity); and
- iii) changes in real interest rates may lead to intertemporal substitution in consumption decisions -- the bringing forward or delaying of consumption depending on the real cost of credit.

If financial liberalisation and innovation eases liquidity constraints, this would serve to weaken the effectiveness of monetary policy in influencing consumption via current income/liquidity constraint transmission channels. Only permanent income and intertemporal substitution effects would be of relevance.

Most studies that attempt to test for the relative importance of transitory versus permanent income in consumption behaviour find evidence of the sensitivity of current consumption to transitory income, at least for some households, rejecting the pure permanent income hypothesis. Few studies have attempted to examine whether permanent income has become more important relative to current income over time, via reduced liquidity constraints, as financial liberalisation has proceeded (18). To explore this question, which bears directly on the issue of how financial liberalisation may be altering monetary transmission mechanisms, such tests were conducted for a number of OECD countries.

A procedure for evaluating these issues is to postulate a general model within which both the extreme Keynesian model (emphasising current income) and the permanent income hypothesis (PIH) are nested as special cases. Examples of such an approach in the literature include Flavin (1981,1985), DeLong and Summer (1986), Jappeli and Pagano (1988), Campbell and Mankiw (1989) and Bayoumi and Koujianou (1989) all of which take the Hall (1978) model as their starting point. The Hall model suggests that under certain assumptions, including rational expectations and access to perfect capital markets, lifetime utility maximisation implicit in the PIH implies that consumption follows a random walk -- the present level of consumption is the optimal forecast of the future level or, alternatively, changes in consumption are unforecastable (19). The inclusion of transitory changes in income from the Keynesian model should provide no useful information for forecasting consumption. Significance of such terms, therefore, would constitute evidence that the joint null hypothesis of the permanent income consumption function and rational expectations is rejected by the data.

To test these alternative hypotheses, an equation for innovations in consumption is estimated as a function of changes in current and two lagged changes in transitory income and an independent and identically distributed random error term (see Table 5 for details). If consumption follows a random walk, information contained in these transitory income movements should not be useful for explaining its behaviour. An instrumental variables technique is used to estimate this model to control for the possibility that changes in current income might signal changes in permanent income (correlation between

changes in current income and changes in permanent income hypothesised to be included in the error term of the test equation).

The tests were conducted for the 1960s, the 1970s and the 1980s to examine how the permanent income hypothesis fares over time -- the presumption being that financial liberalisation has reduced liquidity constraints, thereby increasing the relative importance of permanent income factors in each successive decade. The results of these tests are presented in Table 5 (20). Since the principle focus is on sensitivity to transitory income, some weight is attached to the size and significance of the coefficient β_1 on income in the current quarter. If β_1 on current transitory income, or the income terms jointly, are significant in explaining innovations in consumption this could reflect either: a) myopic behaviour of households; or b) the impact of liquidity constraints. Testing the proposition over different time periods helps to distinguish between these explanations, since there would seem to be no reason for myopia, if it is a characteristic of consumer behaviour, to have become less important over time. If transitory income effects are becoming less important over time, this could be more plausibly linked to financial liberalisation and innovation. This can also be corroborated by looking at other less formal indicators of reduced liquidity constraints, e.g. the indebtedness of the household sector, and other related factors.

B. Empirical results

The results of the econometric tests are summarised on a country-by-country basis. Overall patterns for β_1 are given in Chart 2. The group of countries (United States, Japan, United Kingdom and Canada) for which evidence of important effects of financial liberalisation and innovation on money/income relationships were identified in Section III are discussed first. These may be summarised as follows:

- United States: excess sensitivity to current transitory income is highly significant in the 1960s and 1970s, but is much smaller and insignificant in the 1980s. Similarly, the restriction that the current and two lagged values of income are jointly zero is rejected by the data, according to a Chi-square test at the 10 per cent level, in both the 1960s and the 1970s. During the 1980s the restriction is accepted at the 5 per cent level. These results are consistent with a pattern of declining liquidity constraints in the 1980s.
- Japan: excess sensitivity to transitory income is highly significant in the 1960s, the 1970s and the 1980s. Nevertheless, there is some evidence to suggest that liquidity constraints have fallen in the 1980s. First, the size of the coefficient on transitory income, while significant, falls in value almost by half (to 0.18 from values of 0.36 and 0.33 in the 1960s and 1970s). Second, the restriction that both current and lagged values of income are zero is rejected by the data in the 1960s and 1970s, but is accepted in the 1980s.
- United Kingdom: the size of the coefficient on current transitory income is relatively stable over time, at around 0.2 in the 1960s, 1970s and 1980s. However, in the 1980s, the significance of this coefficient increases, so that the permanent income hypothesis is rejected by the data. This is also confirmed by the clear rejection

of the restrictions that the current and lagged income terms are jointly zero.

- Canada: excess sensitivity to current transitory income has fallen in both size and significance over time. In the 1980s it is small and insignificantly different from zero, suggesting that liquidity constraints have been reduced. Consistent with the view that liberalisation occurred earlier in Canada than in most other countries, the restriction that the current and lagged values of disposable income are jointly zero is rejected in the 1960s, but accepted for both the 1970s and 1980s.

It is interesting to note that this first group of countries all have in common relatively high levels of gross indebtedness as a ratio to household income in the late 1980s, compared to the other countries shown in Table 6. The value of housing wealth as a ratio to income (the main cause of divergence between net total and net financial wealth) is substantial, and the share of stock market holdings in household wealth is particularly high in these countries.

In the United States, net total (and financial) wealth has been a relatively stable share of household income over the 1970s and 1980s, whereas liabilities only began to grow more rapidly during the latter period. It is in the 1980s that most of the "rate/quantity" and "powers" deregulation discussed in Section II took hold. This eliminated quantitative constraints on the supply side, and the markets for different types of loans became more integrated. Home equity lines of credit have helped consumers to increase the liquidity of their housing wealth for consumption purposes -- these grew modestly at first, but recently have become more popular (21). These developments are consistent with the econometric finding of reduced sensitivity to transitory income in the 1980s.

The figures in Table 6 also suggest that interest bearing assets in the United States have exceeded liabilities by around 30 per cent in recent years. Even allowing for income distribution and different pass-through effects of interest rate changes on various types of assets and liabilities, a rise in rates is likely to add to aggregate household nominal income in both the short and the long run (22). While monetary policy may induce fluctuations in current income through other channels (dividends, wages, unemployment), the evidence for reduced liquidity constraints suggest these are unlikely to have a large effect on consumption decisions, which can be more easily "smoothed" through time. Only to the extent that monetary policy reduces permanent income, or induces intertemporal substitution by altering real interest rates, is it likely to bear down on consumption.

In Japan, net total and net financial wealth have both risen quickly during the 1980s. This has reflected increased value of stockmarket shares held by the personal sector, and rising land and house prices. The mortgage market itself is not particularly indicative of reduced liquidity constraints -- house prices are extremely high, particularly in Tokyo, while downpayments of 40 per cent are required to obtain a loan (23). However, total liabilities of the personal sector have risen by some 26 percentage points of total household income between 1980 and 1987. While new innovations in consumer credit are not as apparent as elsewhere (24), Japanese households appear to

have used credit markets increasingly as their wealth has risen. Consumer loans in particular have been rising quickly in the second half of the 1980s. This picture is consistent with the econometric finding that transitory income may have become relatively less important in explaining consumption during the 1980s. As with the United States, a rise in interest rates is more likely to add to rather than subtract from household cash flow in the aggregate -- interest bearing assets have exceeded liabilities by around 80 per cent in the 1980s. Wealth effects and intertemporal substitution are likely therefore to become increasingly important in the transmission of monetary policy -- compared to liquidity constraint channels -- as financial liberalisation proceeds in Japan.

In the United Kingdom, net wealth of the personal sector has risen by a very large 117 percentage points of income between 1980 and 1987. This mainly reflects increased value of housing. It has been suggested that easier access to credit associated with financial liberalisation has in fact contributed to driving house prices higher (25). Total household liabilities have risen by more than any other major OECD country -- by some 49 percentage points of household income between 1980 and 1988. At the same time, innovations have been important, with equity withdrawal from housing wealth (borrowing against the increased value of houses) for consumption purposes being particularly striking. Since 1983 equity withdrawal has exceeded 50 per cent of new lending for "housing", and in 1988 alone was estimated to be 25 billion pounds (26). This picture, at first sight, does not appear consistent with the finding that sensitivity to transitory income in the 1980s has increased.

In explaining these apparently perverse results, it is worth noting that the arbitrary sample periods may be problematic for the United Kingdom. Thus estimating over the full sample period yields $\beta_1 = 0.34$ which is significant at the 5 per cent level. This compares with a value of 0.21 (significant at the 10 per cent level) when estimation is confined to the 1980s. Nevertheless, the reported results require some explanation, given the impressive extent of liberalisation in the 1980s. The seventies and eighties results could be rationalised as follows: official deregulation in the 1970s (Competition and Credit Control) and the growing importance of London as an international financial centre may have effectively removed liquidity constraints on consumption in that decade. But as the demand for credit continued to grow, particularly in the latter half of the eighties following greater "powers" deregulation, the rationing constraints encountered may have been those arising from the private banking system itself, largely unconstrained by official regulations, i.e., equilibrium credit rationing may have emerged (27).

In Canada, personal liabilities were already a very high proportion of household income during the 1970s -- which contrasts with other countries, and possibly reflects the early liberalisation of financial markets in that country. This is consistent with the econometric evidence favouring reduced liquidity constraints in both the 1970s and the 1980s.

In Germany, France and Italy there are some important differences in the econometric results shown in Table 5, compared to the above countries. These are summarised as follows:

- Germany: excess sensitivity to current income is very evident and highly significant in all of the periods considered. Similarly, the

restriction that the current and lagged income variables are jointly zero is rejected by the data in the 1960s, the 1970s, and the 1980s. There is no evidence to suggest that liquidity constraints have been reduced over time. If anything the data is consistent with more binding constraints.

- France: excess sensitivity to transitory income is large and highly significant in the 1960s. In the 1970s and 1980s, the sensitivity to transitory income in the current quarter falls in size and significance. But the overall tests on current and lagged values of income suggest that the permanent income hypothesis is nevertheless rejected by the data in all periods.
- Italy: the coefficient on transitory income in the current quarter is always both small and insignificantly different from zero. The standard test suggests there is evidence that information from current and lagged values of income is useful in explaining innovations in consumption in both the 1960s and 1970s. The data appear to accept the restriction that the income terms are zero for the 1980s. However, the apparent strong evidence of positive first order autocorrelation in the low Durbin Watson statistics suggests that the tests are misspecified in the case of Italy, possibly as a consequence of missing variables.

Germany, France and Italy have had strikingly low debt-to-income ratios in the 1970s and 1980s, though less so in France, which is consistent with relatively little use of the credit markets. The relative unimportance of credit in Germany is consistent with the finding of excess sensitivity to current income in the econometric tests -- credit does not seem to play much of a role in decoupling consumption from current income flows. While holdings of interest-bearing financial assets are very high, it has already been noted that these are relatively illiquid. While the results for Italy may not be comparable, it is worth noting that contenders for "missing variables" consistent with a rejection of the permanent income hypothesis would be precautionary savings behaviour related to the size of the budget deficit and the explosive growth of public sector debt. In the case of France, there has been at least some growth in debt, and more liquid interest-bearing assets for households have been introduced in the second half of the 1980s. This is consistent with some fall in sensitivity to current income in the 1980s noted in the above results, even though the overall test rejects the permanent income hypothesis. That interest-bearing assets are larger than liabilities in all of these countries implies that higher interest rates add to net household cash flow, which has a positive impact on spending through this channel (particularly in Italy). But leverage of monetary policy through other current income effects (e.g. employment, wages) for given liquidity constraints, or by changing the extent to which these constraints are binding, would nevertheless be more powerful in this group, than in the other countries considered.

C. Summary

In summary, the evidence is broadly consistent with the declining relative importance of transitory income factors in explaining consumption behaviour in a number of the countries during the 1980s. These countries are more or less the same as those which have seen the sharpest decline in the

usefulness of monetary aggregates as indicators for monetary policy, a phenomenon which was also linked to the process of financial liberalisation and innovation. It is likely that interest rate policies of the authorities in these countries are more likely to operate through wealth effects and intertemporal substitution in consumption demand than through transitory income effects and liquidity constraints. It remains to be seen whether further liberalisation will shift the relative importance of different transmission mechanisms in the other countries considered in the future. But, as underlined by the results for the United Kingdom, it cannot be excluded that liquidity constraints can be binding even in liberalised and highly innovative financial systems. Such constraints may be imposed by the financial system itself in the absence of official regulations.

V. FINANCIAL LIBERALISATION AND LONG-TERM INTEREST RATE DETERMINATION

Some of the evidence in Sections III and IV was consistent with the view that financial liberalisation gives rise to some tendency for a) monetary aggregates to be less important as a guide to policy, and b) for the importance of liquidity constraints in the transmission mechanism to be reduced. These findings provide support for the more eclectic approach to policy referred to above -- the need to focus more directly on the inflation (or nominal income) objective, and to attempt to achieve it through the impact of interest rate changes on aggregate demand via wealth and intertemporal substitution effects. This, of course, relies heavily on the ability of the authorities to influence key interest rates. However, if private sector expectations play a greater role in liberalised financial markets, linkages between policy-determined short rates and longer-term interest rates could become somewhat looser.

It is unlikely that financial liberalisation will greatly affect the ability of authorities to influence key interest rates in short-term money markets (28). These have flow-on effects for other key interest rates. The costs of raising funds by financial intermediaries is increased, leading to an ex ante fall in profit margins. This typically results in a predictable rise in lending rates. Similar comments apply to variable mortgage rates. Since inflation is relatively inert, authorities are able to push up real interest rates on virtually all new bank loans, and mortgages. These interest rates, in turn, influence intertemporal decisions about when to borrow, and the value of housing wealth. Arbitrage possibilities also ensure that monetary authorities have a sizeable impact on the market price of short-term securities.

However, there is some doubt that authorities can influence long-term bond rates in more liberalised financial markets. Financial liberalisation and innovation is supposed to increase the efficiency of financial markets. The efficient markets hypothesis, as it applies to interest rates on financial instruments of different maturities within the same market, states that the expected holding period returns on all maturities are identical, or differ only by a constant risk premium. Arbitrage across the term structure is the mechanism for maintaining this condition, which implies a long-run equilibrium relationship between long and short rates. There is increasing evidence in the 1980s that the expectations theory of the term structure is finding stronger support in the data (29).

Paradoxically, the presence of inefficiencies such as segmented markets or preferred habitats would give the authorities considerable leverage over long-term interest rates. Market operations at the long end, for example, could move long rates relative to short rates without the policy being "undone" by arbitrage. That efficiency has improved over the 1980s is likely to mean that the authorities' ability to influence long rates has become much more uncertain. This is because there are two offsetting influences on long rates, consequent upon a change in short rates, in efficient markets. A rise in current short rates induces substitution toward the short end of the market which, *ex ante*, pushes long rates upward. But a change in short rates will be expected to influence the future course of economic activity and inflation over long horizons. Expectations about the impact of monetary policy on subsequent activity and inflation will influence the expected future profile of short-term interest rates. A tightening of policy, for example, reduces future activity and inflation so that expected future short rates will fall. Lower expected future short rates may offset the impact of the rise in current short rates, with the net result that long rates will either rise, fall or remain unchanged (32). The direction of the effect turns much more on the credibility of monetary policy changes, as perceived by financial market participants, in terms of its likely future impact on inflation.

The practical relevance of this considerable ambiguity of the impact of short rates on long rates can be seen from the simple ad hoc regression results presented in Table 7. Long rates are regressed against current short rates and foreign long rates, with some allowance for partial (lagged) adjustment, over a number of different sample periods. In the United States, for example, the long-run elasticity over the 1970s is 0.9. In the first half of the 1980s it is 0.6, while in the second half of the 1980s it is less than 0.1 and insignificant. Similar downward adjustments of elasticities through the 1980s can be seen in the cases of Japan, Germany, Italy, the United Kingdom and Canada. In parallel with the United States, the latter two countries have also seen the elasticity virtually disappear in the second half of the 1980s.

The results in Table 7 are also interesting in that they suggest an increased correlation of foreign long-term bond rates with domestic bond rates in most countries -- a correlation that was not present in less liberalised markets of the 1970s. This correlation, which reinforces the decoupling of long rates from domestic short rates, may be linked with financial liberalisation in two important ways. First, the removal of foreign exchange controls and portfolio constraints on holdings of foreign assets by institutional investors (e.g. pension funds in Japan), together with improved technology and a range of new instruments (particularly swap facilities) have contributed to the globalisation of capital markets. This opens up new arbitrage opportunities. Long rates may be more correlated in this environment because institutional investors holding bonds to maturity are less concerned with exchange risk (deviations from interest rate parity, etc., are likely to average out over the long run), and they have been able to take advantage of the new opportunities. Second, globalisation greatly increases the size and sensitivity of capital flows to perceived arbitrage and speculative opportunities, which can cause greater exchange rate volatility (31). This increases the incentive for authorities to coordinate monetary and fiscal policies, as well as exchange market intervention. In these circumstances there may be less risk associated with moving into higher long rates in another country, even if the foreign bonds are not to be held to maturity.

These results raise doubts about the ability of national monetary authorities to influence long-term bond rates in a predictable manner. This has both advantages and disadvantages. On the one hand, direct links between monetary policy and business investment are weakened. Operations at the short end that tilt the yield curve may impact on corporate cash flow to the extent that borrowing occurs at the short end, but such cash flow pressures can be minimised through "financial engineering" (e.g. swapping into long debt if the yield curve inverts). The effect of monetary policy on longer-run considerations affecting investment may also have changed substantially compared to earlier decades. A credible tightening of monetary policy (i.e., which is expected to reduce future inflation and short rates) may leave long rates unchanged. At the same time, the lower inflation outlook may actually improve the environment for investment, i.e., shift the investment demand schedule. This contrasts strongly with the late 1970s and early 1980s when monetary tightening drove up long-term interest rates in most countries, with adverse consequences for investment. In general terms, the nature of these developments is probably advantageous. On the other hand, the ability to slow investment booms that are considered inflationary, or for that matter to induce wealth effects via holders of long-term government bonds, may be reduced.

The continued ability of the authorities to influence consumer lending and mortgage interest rates suggests that monetary tightening in liberalised financial environments should fall more directly on consumption and housing expenditure, rather than on investment. The latter, of course, would still be affected less directly via accelerator or expected profitability channels. That the authorities can always influence the level of interest rates on short-term securities in the domestic economy, and hence the yield differential with similar rates abroad, means that the exchange rate too remains an important transmission channel for monetary policy in liberalised financial markets.

VI. CONCLUDING REMARKS

"Rate/quantity" and "powers" deregulation have promoted more liberal financial markets, accelerating the process of innovation in reducing problems of incomplete markets and various types of risk. This process of change has important implications for monetary policy. The broad acceptance of the view that monetary policy should focus on nominal variables in achieving inflation objectives would be fulfilled by a policy of monetary targeting. However, the preliminary evidence presented in this paper is that financial innovation can and has undermined these requirements in some countries:

- i) the short-run role of money as a leading indicator has been affected by the process of financial liberalisation and innovation in some countries, and the dynamic nature of this process is such that continuing effects of a similar nature cannot be ruled out in the future;
- ii) "rate/quantity" deregulation has made deposit pricing more flexible in some countries, which reduces the reliability of control over monetary aggregates through portfolio allocation channels; and

- iii) a surprising feature of the results was the difficulty of identifying any long-run equilibrium relationship between money and nominal income. Such relationships were not found for any narrow aggregate, and for broad aggregates there were exceptions for only two countries.

These findings lend support to the increasingly more widespread view that monetary policy should focus directly on the ultimate objective of inflation, and that a wide range of indicators (including money) should be used in anticipating developments over time. The evidence is consistent with the fact that a number of major countries already operate broadly along these lines.

In considering the closely related issue of the transmission mechanisms of monetary policy to aggregate demand, the evidence suggests that the process of financial change may alter the way that liquidity constraints operate in the economy. Financial liberalisation appears to reduce the extent to which credit availability is a constraint on spending decisions, and hence the authorities' ability to use this hitherto powerful channel of influence. Wealth and intertemporal substitution effects are therefore likely to be relatively more important transmission channels for influencing consumption and housing demand in more liberalised financial environments.

These channels of influence rely heavily on the ability of authorities to influence key interest rates. Authorities should, in principle, have little difficulty in influencing short-term interest rates and lending rates relevant for consumption and housing expenditure. There is considerable doubt, however, that authorities would always be able to have a predictable influence on long-term bond rates. In very broad terms, therefore, monetary policy transmission in liberalised markets may well fall more heavily on consumption and housing demand rather than on business investment, at least as far as direct first round effects are concerned. This is interpreted as a broadly favourable development. The exchange rate too might become relatively more important in the transmission of monetary policy.

Finally, a related issue (not developed in the paper) is that private sector expectations about whether interest changes are likely to be temporary or sustained may also be an important consideration in determining the leverage of monetary policy through wealth and intertemporal substitution effects. The way in which monetary policy decisions are presented may, therefore, be increasingly important in the new financial environment. A weak commitment to stable prices, and market perceptions that increases in interest rates are temporary, would have less impact on demand than a credible commitment to low inflation and the assurance that interest rates will remain high for as long as necessary to achieve this.

NOTES

1. See Goodhart (1986) (1989), Friedman (1989), Freedman (1989), Akhtar (1983).
2. A number of researchers have begun to explore the ways in which this can occur, and the implications that changes might have for the conduct of monetary policy in the new environment. See Akhtar (1983), Friedman (1989), Bosworth (1989) for analyses at a broad and aggregative level. More detailed references are provided in Section IV.
3. See OECD (1989).
4. See Akhtar (1983), BIS (1986), Goodhart (1987).
5. See Freedman (1989), Friedman (1989), Goodhart (1989) and Shafer (1987).
6. For smaller countries not likely to be subject individually to important real shocks, an alternative is to fix their nominal exchange rate to the currency of a larger country guaranteeing a nominal anchor or inflation target. In liberalised financial markets this would, in the limit, imply total surrender of sovereignty over monetary policy.
7. Recent examples include Suzuki (1989) in the case of Japan, and Friedman (1989) in the case of the United States.
8. Broader aggregates are chosen for these more comprehensive tests because they are the least likely to be adversely affected by shifts between different types of bank accounts resulting from deregulation. For this reason they have often been the main focus of monetary targets in some countries.
9. The recursive nature of the test is such that overall rejection may occur only some time after the relationship has begun to change. For example, the acceptance of the null hypothesis from 1978 would be consistent with Goldfeld's finding that the money demand function shifted between 1974 and 1976 (Goldfeld 1976). Similarly, there may be a useful distinction between an innovation occurring and its more widespread dispersion within the financial system when it begins to affect the stability of relationships.
10. Under fixed or stable exchange rates monetary approach to the balance of payments mechanisms ensure that money supply and demand (dominated by nominal income) are equated.
11. VAR tests of "causality" rely on the temporal sequencing of events. By definition it excludes situations in which the future can cause the present. Forward-looking expectations of nominal income, either by private agents or policymakers, could "cause" contemporaneous money. In standard "causality" tests this would show up as money causing income. Therefore great care and judgement should be exercised in interpreting these results.

12. 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 the other components to rise.
13. This has been predicted in Suzuki (1989).
14. Cointegrated systems permit individual time series to be integrated of order one, but require certain linear combinations of the series to be stationary, or integrated of order zero. Money and income are both integrated processes of order one. But long-run equilibrium relationships may connect integrated processes, and any deviations from equilibrium in a cointegrated system can be thought of as a stationary mean reverting process. Phillips and Durlauf (1986), show that stationary measurement error will not affect the validity of the tests used here. Details concerning the tests are given in the note to Table 4.
15. As the tests are valid asymptotically, longer periods of data than those used here would help to verify the robustness of the results. Given the relatively small number of observations the results should be interpreted with caution. For the case of France, the sample period is so short that the results are barely worth reporting. Note that in the case of the United Kingdom M4 is used in the cointegration tests, on the grounds that the previously targeted aggregate M3 has been affected by switches of deposits between banks and building societies. M4 might be expected to have a better long-run relationship.
16. This is not inconsistent with the lack of interest sensitivity of M3. This is because control of M3 work less through portfolio substitution in the non-bank sector and more via the costs of central bank credit to the banks. Over much of the sample period this has been a longer-run control mechanism, extending beyond the one year horizon of the VARs employed here.
17. Human wealth is the present value of expected lifetime labour earnings. Non-human wealth is valued as the present value of the net flow of services from tangible assets plus the discounted present value of interest and dividends.
18. An exception is Bayoumi (1981) who finds some evidence that this is in fact the case.
19. 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 available at time t , given a subjective discount factor and the real interest rate. Consumption should evolve as a random walk -- it should not be predictable. Unexpected changes in real interest rates, etc., would induce wealth effects and intertemporal substitutions effects that are unpredictable in the current period.

20. 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. The equation was also estimated for total consumption less the purchases of durables for some of the countries for which data was available. These results are broadly consistent with those for total consumption, and are reported in more detail in Blundell-Wignall, Browne and Cavaglia (1990). See note to Table 5.
21. See Goodman, Lockett and Wilcox (1988). The elimination of the interest deductibility of consumer credit is being phased in. Home equity loans which remain tax deductible have begun to accelerate as an alternative source of consumer credit.
22. See Goodman, Lockett and Wilcox (1988).
23. See Hayashi, Ito and Slemrod (1987). The proportion of the population under 29 years of age owning their own homes is only 17 per cent (compared to 47 per cent in the United States and 46 per cent in the United Kingdom).
24. For example, "credit" cards until recently have really been "convenience" cards, and no lending has been involved.
25. See Franklin, Keating, Muellbauer and Murphy (1989).
26. See Miles (1989).
27. See for example Stiglitz and Weiss (1981).
28. Provided, of course, that central bank money continues to be made appropriately scarce in the settlement process between financial institutions and the public, and finance institutions and the government and/or central bank.
29. See, for example, Hardouvelis (1988). While the results are not reported in this paper, tests were conducted for the major OECD countries using cointegration techniques and monthly data from 1960 to 1989, to observe how the efficient markets hypothesis fares over time. The results showed a) that during the 1960s and 1970s, the data is not consistent with the efficient market hypothesis in all major countries, with the exception of Germany; and b) that when monthly data for the 1980s is included, the data is consistent with the efficient markets hypothesis for the United States, Germany, Italy, France and Canada.
30. Evidence that the yield curve is a predictor of future GDP and inflation is provided in, Mishkin (1988), Browne and Manasse (1989).
31. However, as the number of participants and the volume of transactions in markets increase, financial markets become deeper. This means that more funds are committed to the market -- which increases the market's overall tolerance to risk.

Table 1

FINANCIAL LIBERALISATION IN THE 1970s AND 1980s

	Rate/Quantity Deregulation of Intermediaries	Powers Deregulation Enhancing Competition Between Intermediaries	Foreign Exchange Deregulation
UNITED STATES	Mainly in the late 1970s and early 1980s.	From the mid-1970s important.	Always deregulated in 1970s and 1980s.
JAPAN	Carried out gradually through the 1980s.	Gradual introduction of new instruments, mainly in 1980s.	For all the 1980s (not 1970s).
GERMANY	Always deregulated in 1970s and 1980s.	Strongly controlled and little deregulation in 1970s or 1980s. Cartel-like behaviour evident.	Always deregulated in 1970s and 1980s.
ITALY	Credit ceilings used until 1983.	Ready availability of short Treasury Bills since 1975, but strong regulation of intermediaries. Cartel-like behaviour evident.	Highly regulated in 1970s and most of the 1980s - some recent easing.
FRANCE	Controls widely used in 1970s and 1980s.	Being gradually carried out mainly from the mid-1980s. Cartel-like behaviour evident.	Controls widely used and only in late 1980s phasing out begins.
UNITED KINGDOM	Controls widely used until 1980.	Bank cartel broken in 1971, but most deregulation from mid-1980s, especially for building societies.	Removed controls in 1979.
CANADA	Always deregulated in 1970s and 1980s.	Always deregulated in 1970s and 1980s.	Always deregulated in 1970s and 1980s.

Table 2

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

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

$$H_0 : \beta_i = 0$$

(Reject H_0 for $t=1, \dots, T$; $T=78Q_1, \dots, 88Q_2$)

	Narrow Money	Broad Money	Bank Credit
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: A recursive F test is conducted for joint significance of the parameter β at the 10 per cent level for $t=1, \dots, T$, where $T = 78Q_1, \dots, 88Q_2$. 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 start date is not shown in the table, the null hypothesis is always accepted until the quarter shown is 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. Lower case denotes logarithms.

Table 3
VAR EVIDENCE ON THE REDUCED EMPHASIS ON INTERMEDIATE MONETARY TARGETS

$$\Delta \bar{x} = \bar{c} + \sum_{i=1}^4 \beta_i \Delta \bar{x}_{t-i} + \bar{\epsilon} \quad H_0: \beta_1 = 0$$

INDEPENDENT VARIABLES

		Y	M	R	e	Y	M	R	e
		1973Q1-1978Q1				1973Q1-1988Q2			
United States (M2)	Y	*	*	*	*	*	-	*	-
	M	*	*	*	*	*	*	*	*
	R	-	-	*	-	*	-	*	*
	e	*	*	-	*	-	-	-	*
		1973Q1-1980Q4				1973Q1-1988Q2			
Japan (M2+CD)	Y	*	*	*	*	*	*	*	-
	M	-	*	*	-	*	*	-	*
	R	-	*	*	-	*	*	*	*
	e	-	-	-	*	-	*	*	*
		1973Q1-1983Q4				1973Q1-1988Q2			
Germany (M3)	Y	*	-	-	-	*	*	-	-
	M	-	*	-	-	-	*	-	-
	R	-	-	*	-	*	*	*	-
	e	-	*	-	*	*	-	-	*
		1973Q1-1985Q3				1973Q1-1988Q2			
Italy (M2)	Y	*	-	-	*	*	*	-	-
	M	-	*	-	*	-	*	-	-
	R	-	-	*	*	-	-	*	-
	e	-	-	*	*	-	-	*	*
		1970s				1979Q2-1989Q2			
France (M2)	Y					-	*	*	-
	M					-	-	-	-
	R					-	*	*	-
	e					-	*	-	-
		1977Q3-1983Q3				1977Q3-1988Q2			
United Kingdom (M3)	Y	*	*	*	-	*	-	-	-
	M	-	*	-	-	-	*	*	-
	R	*	*	*	*	*	*	*	*
	e	-	-	*	*	*	-	*	*
		1973Q1-1979Q4				1973Q1-1988Q2			
Canada (M2)	Y	*	-	-	-	*	*	*	*
	M	*	*	*	*	*	*	-	*
	R	*	*	*	*	*	-	*	*
	e	-	-	-	*	-	*	-	*

Note: Variable definitions as for Table 2. An asterisk indicates significance of the rejection of the null hypothesis at least at the 10 per cent level.

Table 4

MONEY-NOMINAL GDP COINTEGRATION
(CRDW AND ADF TESTS)

United States 1959Q1-1989Q2	M1	M2	$\Delta \epsilon(M1)$	$\Delta \epsilon(M2)$
y	0.72 (81.2)	1.00 (267.9)	-	-
$\epsilon(t-1)$	-	-	-0.02 (1.6)	-0.12 (3.4)*
$\Delta \epsilon(t-1)$	-	-	0.39 (4.1)	0.29 (3.2)
$\Delta \epsilon(t-2)$	-	-	-0.03 (0.3)	0.11 (1.2)
$\Delta \epsilon(t-3)$	-	-	0.20 (2.0)	-0.01 (0.1)
$\Delta \epsilon(t-4)$	-	-	0.06 (0.6)	0.11 (1.3)
Const.	6.14 (24.6)	-0.41 (3.97)	-	-
Time	-	-	-	-
σ	0.0731	0.0364	0.0102	0.0107
DW	0.0243	0.1423	1.9559	1.9362

Japan 1963Q1-1989Q2	M1	M2+CD	$\Delta \epsilon(M1)$	$\Delta \epsilon(M2+CD)$
y	1.06 (139.4)	1.20 (122.8)	-	-
$\epsilon(t-1)$	-	-	-0.05 (1.8)	-0.07 (2.1)
$\Delta \epsilon(t-1)$	-	-	0.09 (0.9)	0.04 (0.4)
$\Delta \epsilon(t-2)$	-	-	0.22 (2.2)	0.39 (3.6)
$\Delta \epsilon(t-3)$	-	-	-0.00 (0.0)	0.11 (1.0)
$\Delta \epsilon(t-4)$	-	-	-0.01 (0.0)	0.16 (1.4)
Const.	-3.24 (13.1)	-6.919 (21.5)	-	-
Time	-	-	-	-
σ	0.0666	0.0605	0.0184	0.0156
DW	0.0779	0.0789	2.0002	1.9553

Germany 1960Q1-1989Q2	M1	M3(69.Q1-89.Q2)	$\Delta \epsilon(M1)$	$\Delta \epsilon(M3)$
y	1.05 (210.2)	1.19 (174.5)	-	-
$\epsilon(t-1)$	-	-	-0.09 (1.8)	-0.68 (5.8)*
$\Delta \epsilon(t-1)$	-	-	-0.17 (1.7)	0.08 (0.7)
$\Delta \epsilon(t-2)$	-	-	-0.05 (0.5)	0.09 (0.9)
$\Delta \epsilon(t-3)$	-	-	0.13 (1.3)	0.23 (2.3)
$\Delta \epsilon(t-4)$	-	-	0.26 (2.7)	0.21 (2.2)
Const.	-3.54 (25.8)	-6.225 (32.6)	-	-0.01 (3.1)
Time	-	-	-	0.00 (2.9)
σ	0.0334	0.0235	0.0150	0.0133
DW	0.2236	0.5119* 1.9099	1.7771	

Italy 1964Q1-1989Q2	M1	M2	$\Delta \epsilon(M1)$	$\Delta \epsilon(M2)$
y	1.01 (70.2)	0.98 (102.7)	-	-
$\epsilon(t-1)$	-	-	-0.02 (1.9)	-0.04 (2.2)
$\Delta \epsilon(t-1)$	-	-	0.26 (2.6)	0.28 (2.8)
$\Delta \epsilon(t-2)$	-	-	0.22 (2.1)	0.13 (1.2)
$\Delta \epsilon(t-3)$	-	-	0.11 (1.1)	-0.02 (0.1)
$\Delta \epsilon(t-4)$	-	-	0.02 (0.2)	-0.14 (1.4)
Const.	-1.41 (3.0)	0.10 (0.3)	-	0.01 (2.3)
Time	-	-	-	-0.00 (2.2)
σ	0.1656	0.1103	0.0186	0.0157
DW	0.0171	0.0258	2.0037	1.9846

France 1978Q1-1989Q1	M1	M2	$\Delta \epsilon(M1)$	$\Delta \epsilon(M2)$
y	0.92 (93.7)	0.95 (100.3)	-	-
$\epsilon(t-1)$	-	-	-0.17 (1.8)	-0.11 (1.1)
$\Delta \epsilon(t-1)$	-	-	0.12 (0.7)	0.20 (1.1)
$\Delta \epsilon(t-2)$	-	-	0.13 (0.8)	0.12 (0.7)
$\Delta \epsilon(t-3)$	-	-	0.07 (0.4)	0.09 (0.5)
$\Delta \epsilon(t-4)$	-	-	-0.02 (0.1)	-0.05 (0.3)
Const.	0.94 (3.3)	0.66 (2.4)	-	-
Time	-	-	-	-
σ	0.0206	0.0199	0.0106	0.0094
DW	0.2952	0.2328	1.9456	1.8742

Continued

Table 4 (continued)

United Kingdom 1969Q1-1989Q2		M0 (69Q3-89Q2)	M4	$\Delta \ln M0$		$\Delta \ln M4$	
y	0.65 (116.7)	1.10 (99.9)	-	-	-	-	-
$\epsilon(t-1)$	-	-	-0.08	(1.6)	-0.02	(1.1)	-
$\Delta \epsilon(t-1)$	-	-	-0.04	(0.3)	0.31	(3.1)	-
$\Delta \epsilon(t-2)$	-	-	0.09	(0.7)	0.09	(0.8)	-
$\Delta \epsilon(t-3)$	-	-	0.08	(0.7)	0.27	(2.7)	-
$\Delta \epsilon(t-4)$	-	-	-0.02	(0.2)	-0.07	(0.7)	-
Const.	0.61 (42.8)	-0.31 (11.1)	-	-	-	-	-
Time	-	-	-	-	-	-	-
σ	0.0363	0.1030	0.0141	0.0181	-	-	-
DW	0.1455	0.0371	1.9944	1.9305	-	-	-

Canada 1955Q1-1989Q2		M1	M2 (68Q1-89Q2)	$\Delta \ln M1$		$\Delta \ln M2$	
y	0.72 (169.2)	1.07 (255.0)	-	-	-	-	-
$\epsilon(t-1)$	-	-	-0.07	(2.2)	-0.13	(2.5)	-
$\Delta \epsilon(t-1)$	-	-	0.28	(3.5)	0.43	(4.2)	-
$\Delta \epsilon(t-2)$	-	-	-0.08	(1.1)	-0.05	(0.4)	-
$\Delta \epsilon(t-3)$	-	-	0.28	(3.5)	0.27	(2.5)	-
$\Delta \epsilon(t-4)$	-	-	-0.32	(3.9)	-0.29	(2.7)	-
Const.	0.49 (45.0)	-3.12 (28.3)	-	-	-	-	-
Time	-	-	-	-	-	-	-
σ	0.0491	0.0264	0.0159	0.0103	-	-	-
DW	0.1357	0.2054	1.9943	2.0432	-	-	-

Note: The cointegrating regression is:

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

Under the null hypothesis of no cointegration $DW = 0$. 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 Cointegrating regression Durbin Watson (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 (or better).

Table 5

CONSUMPTION EQUATIONS FOR 10 OECD COUNTRIES
FOR DIFFERENT TIME PERIODS
(Quarterly seasonally adjusted data)

		1960s	1970s	1980s
United States	β_1	0.35 (0.16)	0.51 (0.11)	0.21 (0.16)
	LRT	R(10) R(5)	R(10) R(5)	R(10) A(5)
	DW	2.3	1.4	2.1
Japan	β_1	0.38 (0.19)	0.33 (0.10)	0.18 (0.08)
	LRT	R(10) A(5)	R(10) R(5)	A(10) A(5)
	DW	1.9	1.9	2.0
Germany	β_1	0.42 (0.14)	0.67 (0.21)	1.15 (0.24)
	LRT	R(10) R(5)	R(10) R(5)	R(10) R(5)
	DW	2.7	2.6	2.5
France	β_1	0.86 (0.35)	0.16 (0.14)	-0.04 (0.20)
	LRT	R(10) A(5)	R(10) A(5)	R(10) R(5)
	DW	2.2	2.6	2.6
United Kingdom	β_1	0.20 (0.20)	0.17 (0.12)	0.21 (0.11)
	LRT	A(10) A(5)	R(10) A(5)	R(10) R(5)
	DW	2.9	2.5	2.0
Italy	β_1	-0.30 (0.53)	0.17 (0.13)	-0.01 (0.01)
	LRT	R(10) R(5)	R(10) R(5)	A(10) A(5)
	DW	0.6	0.6	0.2
Canada	β_1	0.38 (0.18)	0.30 (0.17)	0.11 (0.13)
	LRT	R(10) A(5)	A(10) A(5)	A(10) A(5)
	DW	2.7	2.4	1.3

NOTES TO TABLE 5

The tabulated results are based on the equation:

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

Where c is real per capita consumption, y household per capita disposable income, and variables are expressed in logarithms. The LRT tests are likelihood ratios tests for the relevant exclusion restriction. A(10) and A(5) indicate acceptance of the exclusion restriction at the 10 and 5 per cent significance levels for the χ^2 distribution with the number of degrees of freedom of the test equal to the number of restrictions. R(10) and R(5) indicate rejection of the restriction at the same significance levels. An instrumental variables procedure was used. The instruments employed 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. For further details see Blundell-Wignall, Browne and Cavaglia, 1990.

Table 6

PERSONAL WEALTH AND DEBT/INCOME RATIOS (a)

	1970	1975	1980	1985	1986	1987	1988
United States							
Net wealth/income (b)	4.53	4.25	4.78	4.58	4.66	4.62	4.58
Net financial wealth/income	2.86	2.46	2.71	2.70	2.74	2.65	2.64
Stock market shares/income	1.04	0.57	0.62	0.69	0.75	0.68	0.66
Total liabilities/income	0.71	0.70	0.80	0.88	0.92	0.94	0.94
Interest bearing assets/liabilities (c)	1.38	1.42	1.29	1.41	1.31	1.30	1.29
Japan							
Net wealth/income (b)	3.98	4.14	5.04	5.74	6.48	7.80	
Net financial wealth/income	0.97	0.99	1.24	1.66	1.85	2.17	
Stock market shares/income	0.24	0.20	0.24	0.30	0.43	0.67	
Total liabilities/income	0.60	0.62	0.76	0.90	0.93	1.02	
Interest bearing assets/liabilities (c)	1.47	1.57	1.70	1.85	1.82	1.74	
Germany							
Net financial wealth/income	1.08	1.23	1.37	1.62	1.66	1.69	1.73
Stock market shares/income	.06	.04	.03	.04	.05	.05	.05
Total liabilities/income	.08	.09	.15	.16	.17	.17	.17
Interest bearing assets/liabilities (c)	9.38	9.33	6.83	7.28	7.33	7.32	7.01
France							
Net financial wealth/income	.97	.80	.84	.98	1.15	1.03	1.14
Stock market shares/income	.50	.31	.21	.43	.62	.53	.67
Total liabilities/income	.58	.59	.62	.63	.67	.74	.76
Interest bearing assets/liabilities (c)		1.58	1.62	1.49	1.43	1.33	1.30
Italy							
Net financial wealth/income		.98	.97	1.29	1.45	1.48	1.56
Stock market shares/income		.05	.06	.11	.19	.13	.13
Total liabilities/income		.09	.07	.08	.10	.10	.11
Interest bearing assets/liabilities (c)		7.94	10.16	12.45	10.65	10.78	10.64

Table 6 (continued)

	1970	1975	1980	1985	1986	1987	1988
United Kingdom							
Net wealth/income (b)		4.07	3.91	4.48	4.88	5.10	
Net financial wealth/income		1.39	1.19	1.65	1.84	1.82	1.79
Stock market shares/income		.30	.21	.26	.33	.41	.41
Total liabilities/income		.64	.51	.80	.87	.93	.99
Interest bearing assets/liabilities (c)				1.03	.96	.90	.85
Canada							
Net wealth/income (b)	3.92	3.72	4.06	3.84	3.96	4.06	4.14
Net financial wealth/income	1.58	1.31	1.52	1.65	1.68	1.67	1.68
Stock market shares/income	.64	.47	.58	.55	.57	.57	.56
Total liabilities/income	.82	.81	.87	.73	.78	.84	.90
Interest bearing assets/liabilities (c)				1.33	1.29	1.27	1.27

(a) Income is household nominal disposable income. Wealth and debt variables are year-end nominal values. Stockmarket shares exclude shares held by pension funds and are at market values.

(b) Including housing.

(c) Excludes insurance, pensions and other assets where interest is not available as discretionary income.

Sources: United States: Federal Reserve, Balance Sheet for the U.S. Economy 1949-89, 1989.
 Japan: Economic Planning Agency, Annual Report on National Accounts, 1989.
 Germany: Deutsche Bundesbank, Zahlenberichten und methodische Erläuterungen zur Gesamtwirtschaftlichen Finanzierungsrechnung, 1989.
 France: Banque de France, Tableau d'Equilibre des Relations Financières, 1989.
 United Kingdom: Central Statistical Office, Financial Statistics, 1982, National Accounts various years.
 Italy: Banca d'Italia, Economic Bulletin, 1986; Annual Report, 1989.
 Canada: Statistics Canada, National Balance Sheet, 1989.

Table 7

LONG-TERM INTEREST RATE REGRESSIONS

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

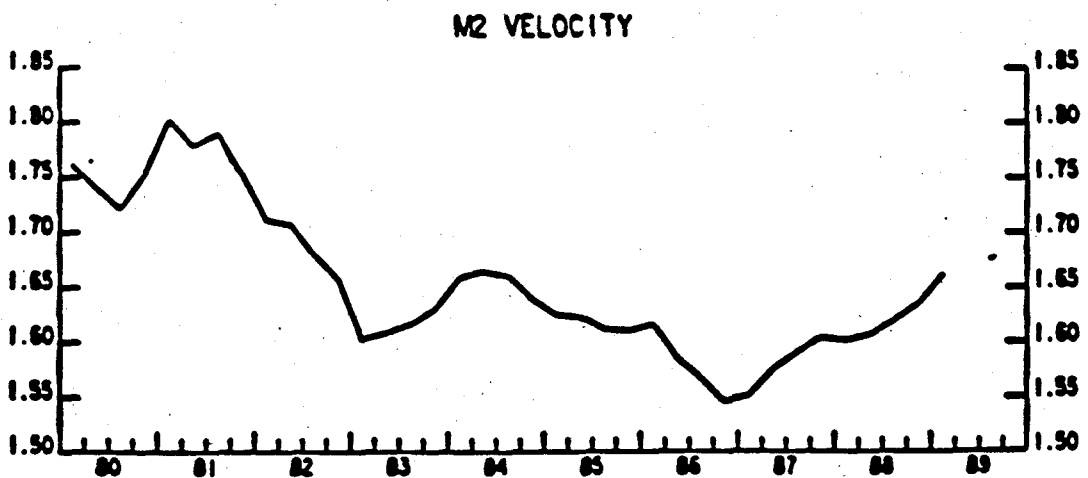
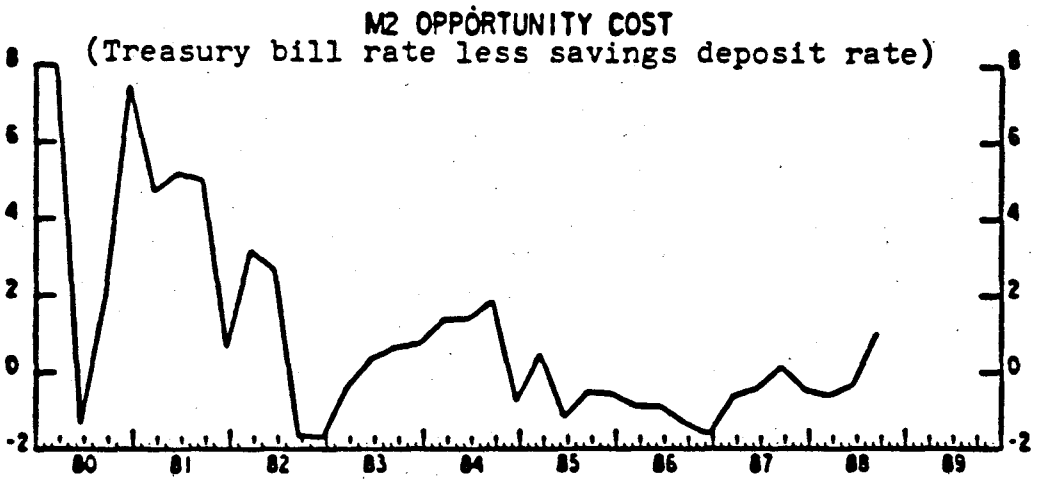
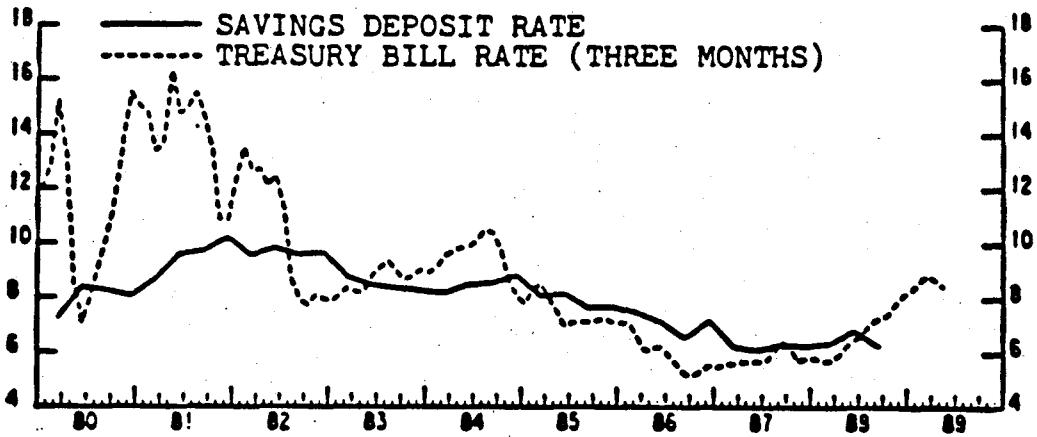
	b	b/(1-d)	c	d	R ₂
<u>United States</u>					
1970Q2-1979Q4	0.14**	0.91	-	0.78**	0.93
1980Q1-1984Q4	0.25**	0.63	-	0.61**	0.85
1985Q1-1989Q2	0.01	0.06	-	0.79**	0.82
<u>Japan</u>					
1970Q2-1979Q4	0.35**	0.64	0.05	0.46**	0.93
1980Q1-1984Q4	0.14	0.29	0.16	0.51	0.60
1985Q1-1989Q2	0.46*	0.38	0.36*	-0.18	0.70
<u>Germany</u>					
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
<u>France</u>					
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
<u>Italy</u>					
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
<u>United Kingdom</u>					
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
<u>Canada</u>					
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.

Chart 1

COMPONENTS OF NET OPPORTUNITY COST
OF HOLDING MONEY AND CHANGES IN VELOCITY

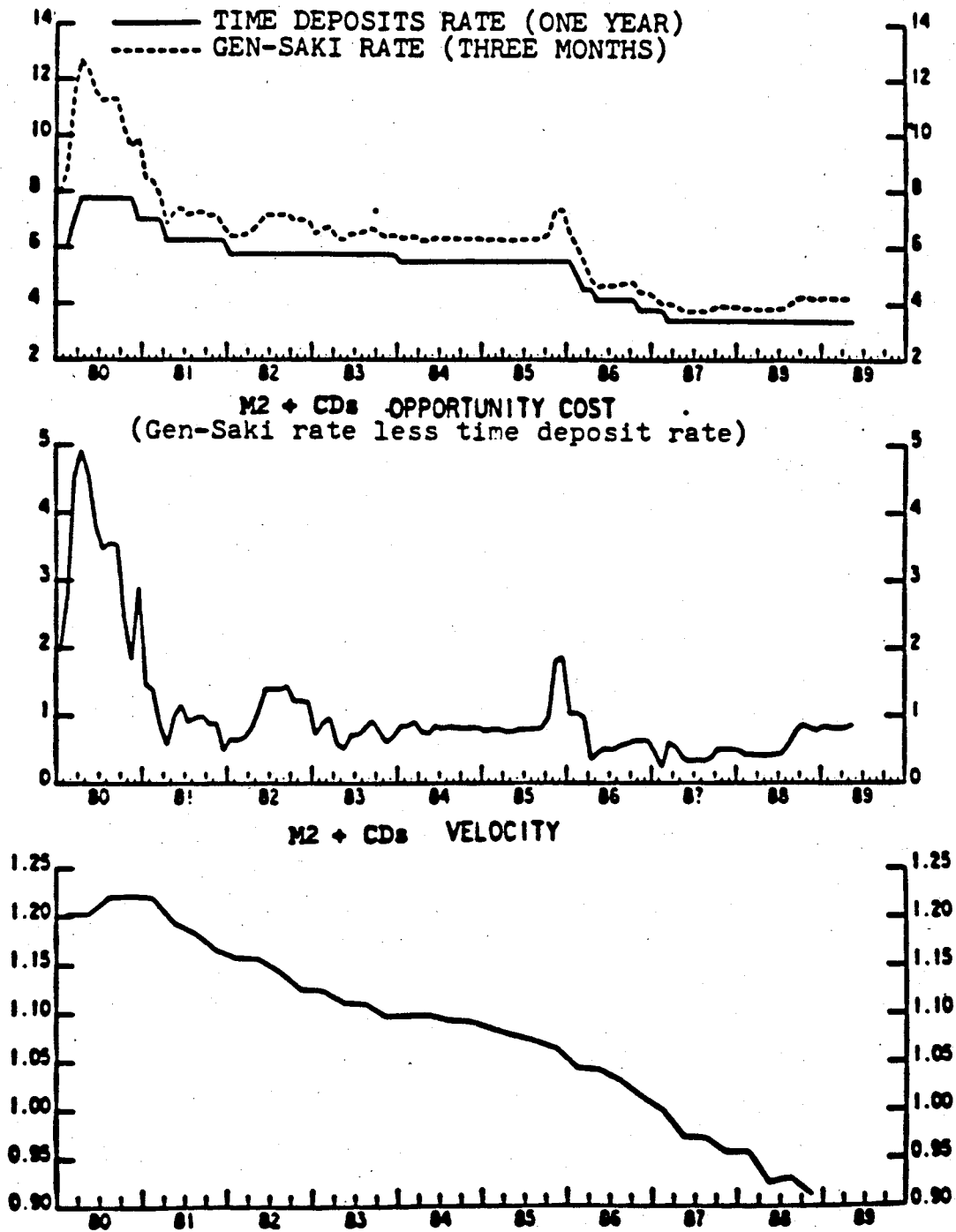
UNITED STATES



Savings deposits amounted to approximately 14% of M2 in 1988.

Source: OECD Financial Statistics

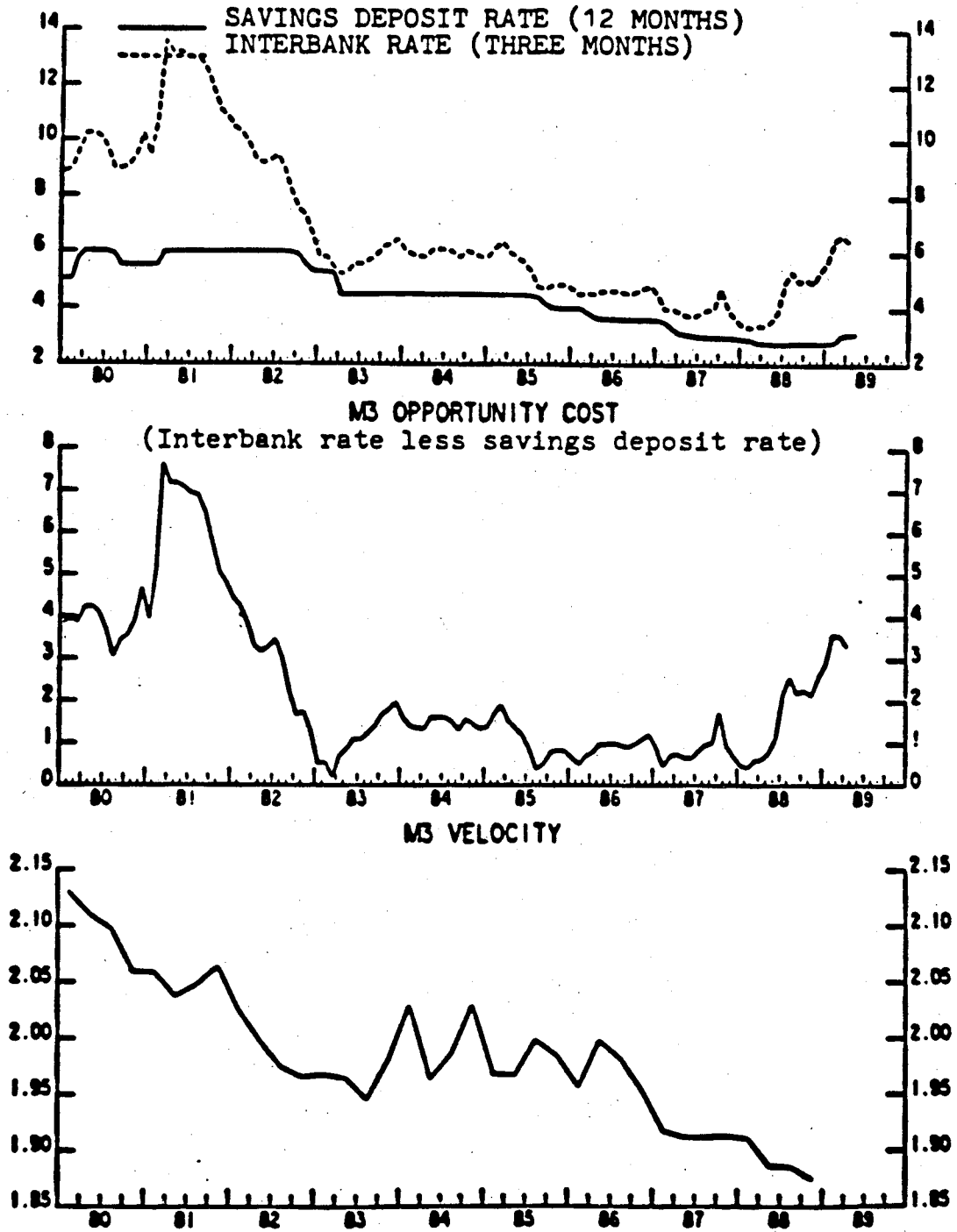
Chart 1 (continued)

JAPAN

Time deposits amounted to approximately 48% of M2+CDs in 1988

Source: OECD Financial Statistics

Chart 1 (continued)

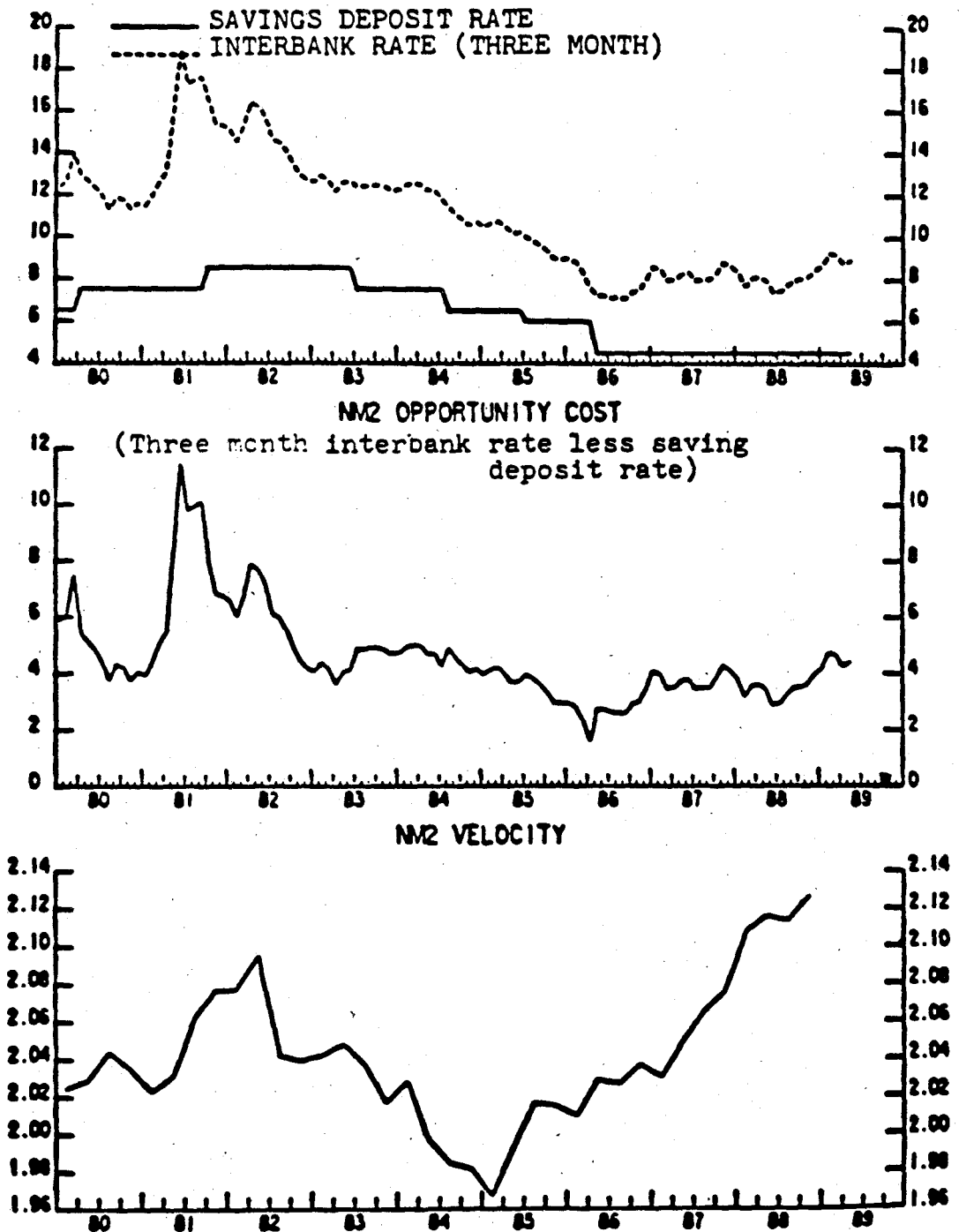
GERMANY

Domestic non-bank saving deposits and statutory notice amounted to approximately 42% of M3 in 1988.

Source: OECD Financial Statistics

Chart 1 (continued)

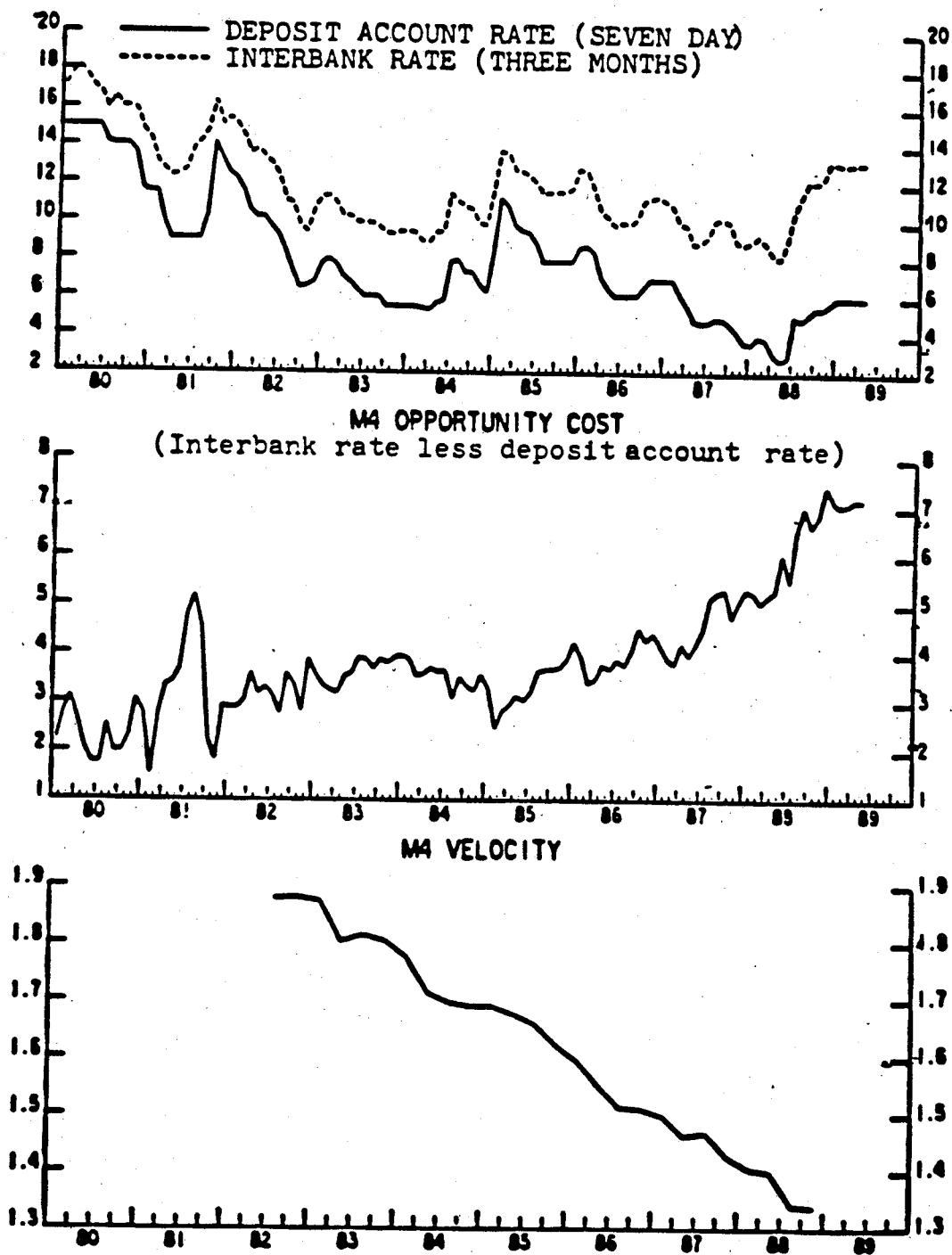
FRANCE



Passbook savings accounts amounted to approximately 46% of M2 in 1988.

Source: OECD Financial Statistics

Chart 1 (continued)

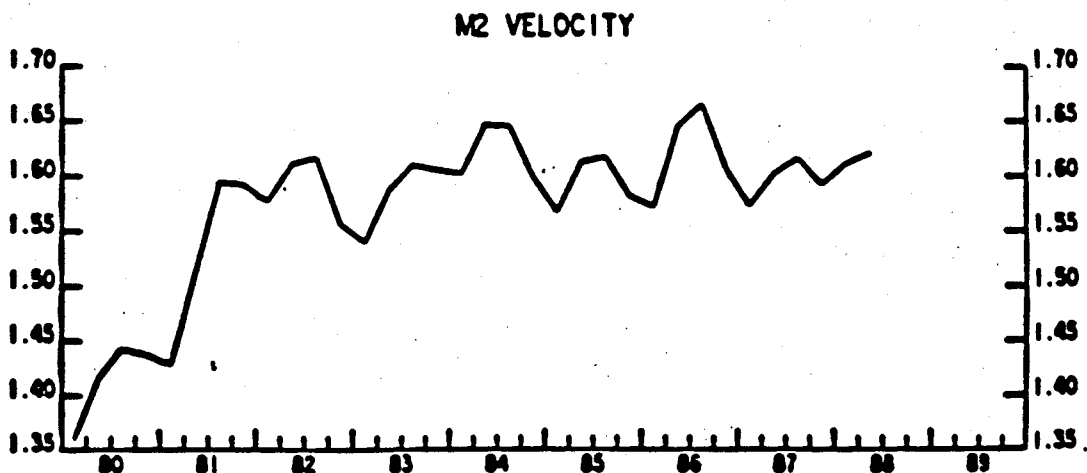
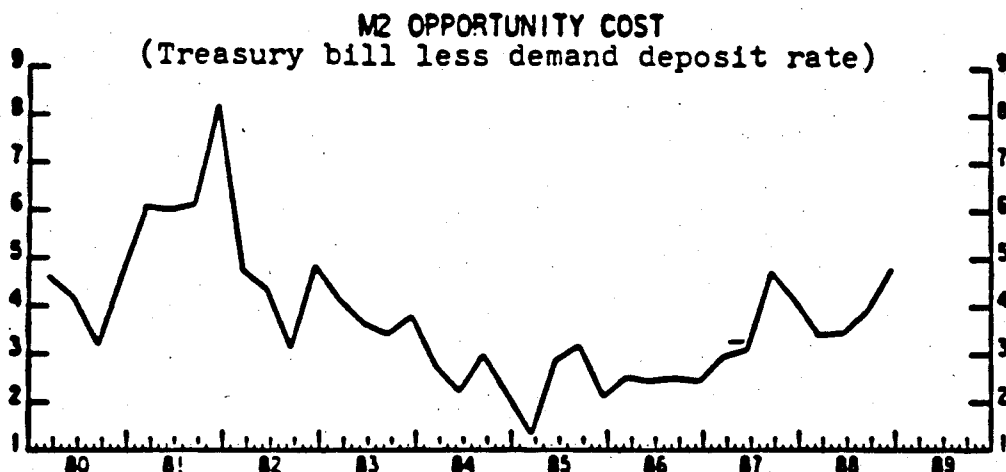
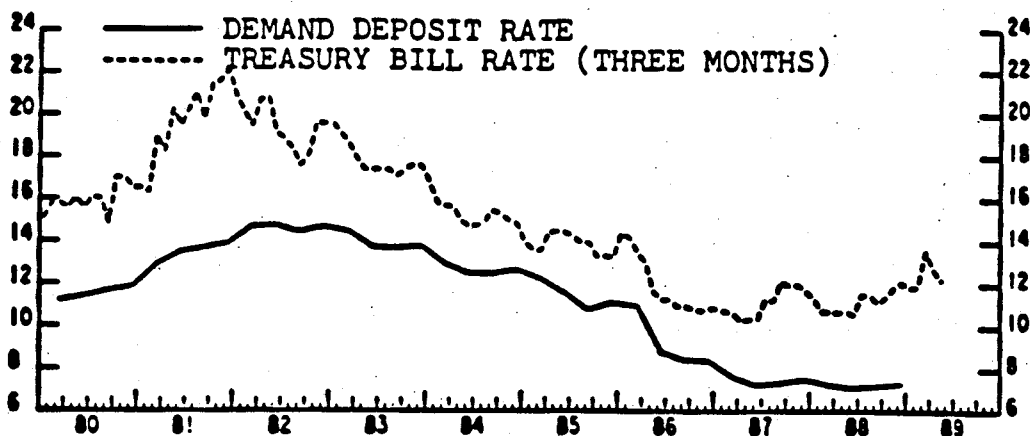
UNITED KINGDOM

U.K. private sector sterling time deposits amounted to approximately 31% of M4 in 1988.

Source: OECD Financial Statistics.

Chart 1 (continued)

ITALY

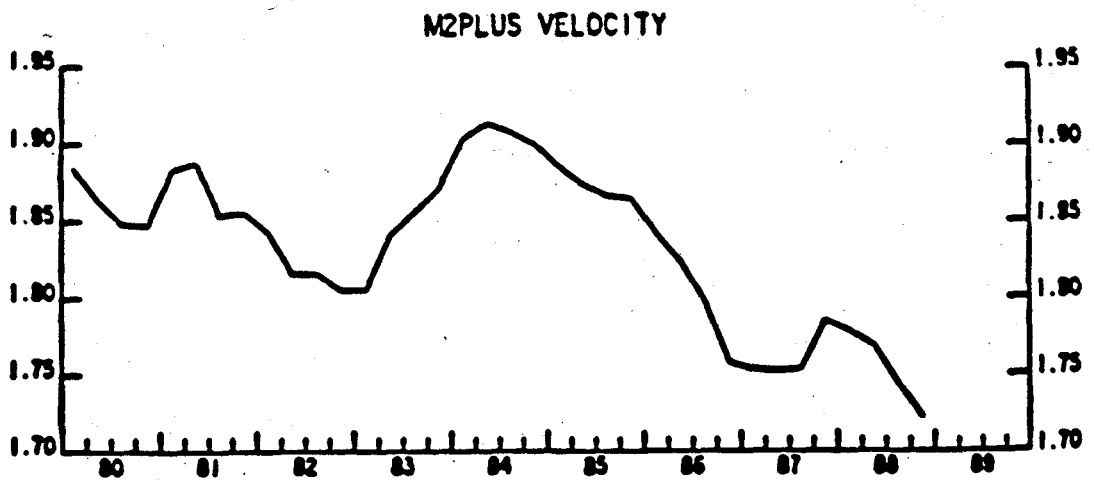
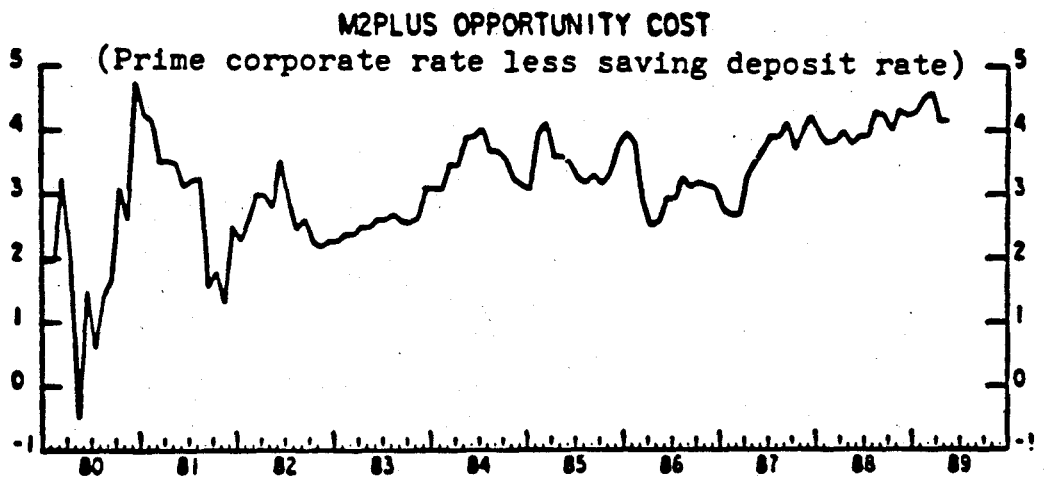
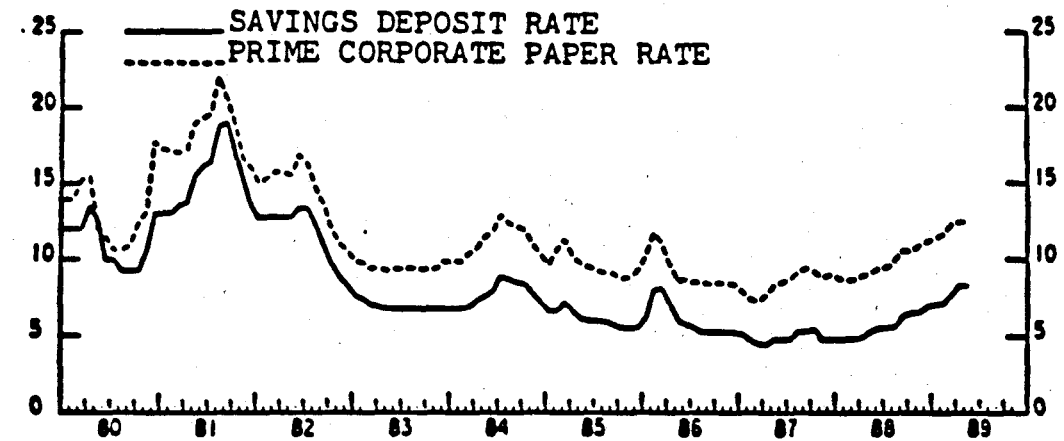


Savings deposits amounted to approximately 27% of M2 in 1988.

Source: OECD Financial Statistics.

Chart 1 (continued)

CANADA

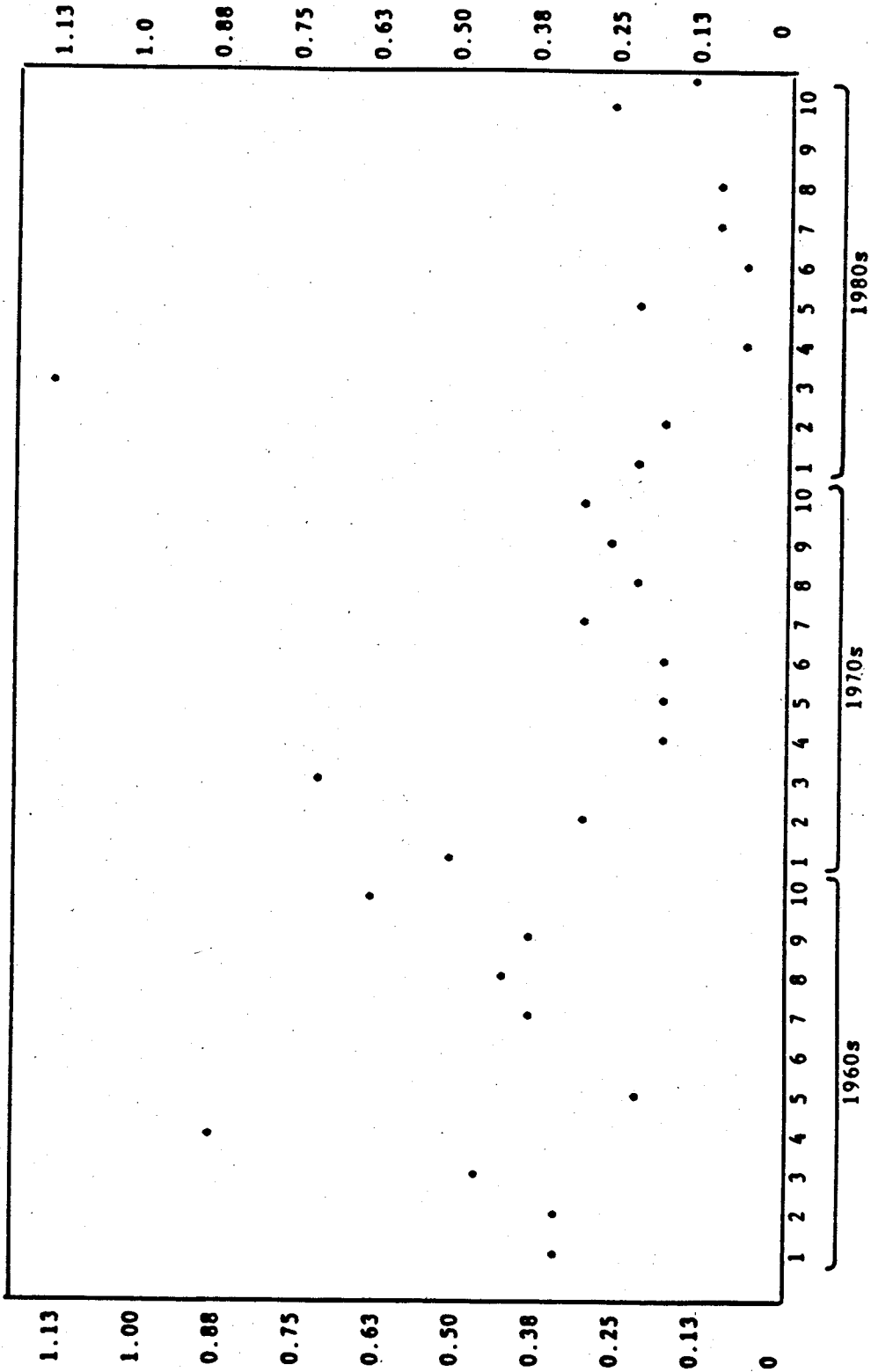


Personal savings deposits and non-personal notice deposits amounted to approximately 47% of M2+ in 1988.

Source: OECD Financial Statistics.

CHART 2

FALLING LIQUIDITY CONSTRAINTS ON PRIVATE CONSUMPTION
 (Scatter plot of the effect of current disposable income on
 current consumption over time for 10 OECD countries)



Note: The numbers 1 to 10 for the 1960s, 1970s and 1980s represent the countries in the sample. These are (1) United States, (2) Japan, (3) Germany, (4) France, (5) United Kingdom, (6) Italy, (7) Canada, (8) Sweden, (9) Australia and (10) Switzerland.

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