

Committee of Governors of the
Central Banks of the Member States
of the European Economic Community

Economic Unit

**The Impact of Changes in Official Rates on Private Domestic
Expenditure in EC Countries: Some Evidence**

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Introduction

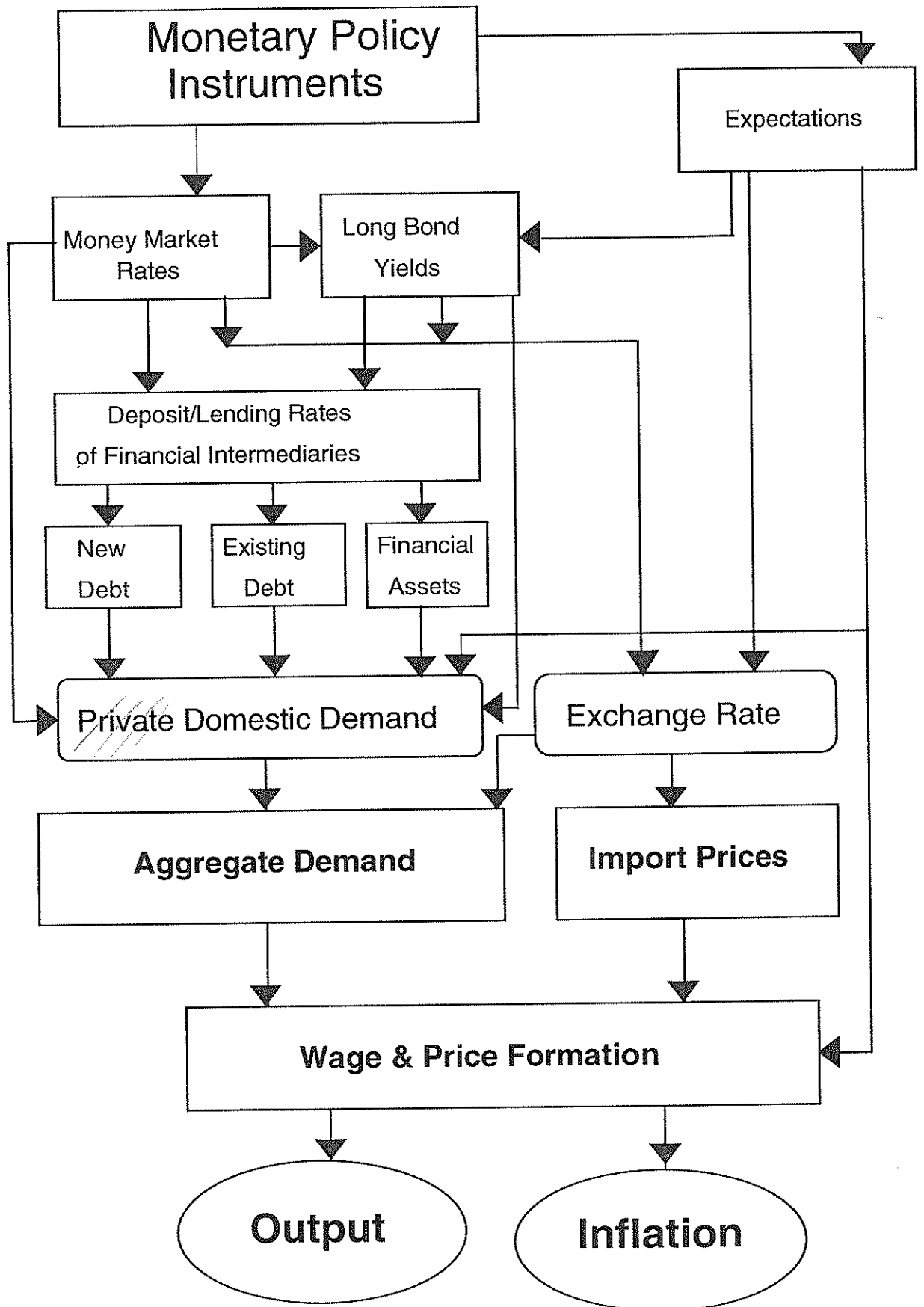
This paper provides some evidence on the impact of changes in official interest rates on private domestic expenditure. This topic is naturally of concern for EC central banks. In the case of countries where the objective of price stability is pursued by controlling domestic monetary conditions, the responsiveness of domestic demand to interest rate changes, along with the effect on the exchange rate,¹ is an important determinant of the effectiveness of monetary policy. For other Community countries where the control of inflation is pursued by stabilising the external value of the currency, the impact on domestic activity of changes in official rates designed to defend existing parities may be of considerable importance.

In practice, there is a wide spectrum of interest rates which may affect economic activity, differing in respect of the maturities and categories of assets. While different interest rates in the economy are clearly not independent, there are marked observable differences in both the levels and evolution over time of these rates. Moreover, the rates affecting private expenditure decisions are typically different from the narrow subset of rates directly controlled by central banks. Recognition of this fact leads, as in the models of Bernanke and Blinder (1988) and Dale and Haldane (1992), to a much richer and more complicated picture of the transmission of official interest rate changes onto aggregate expenditures than is presented in textbook models. In this extended framework, central banks are not able to deterministically control the levels of all the different interest rates in the economy and the response of private expenditure to changes in official rates is heavily influenced by forces determining actual rates affecting non-financial agents, such as expectations and the behaviour of financial intermediaries, in addition to the interest elasticity of expenditures.

As in Chart 1, this extended transmission process can be considered as consisting of three stages. First, there is the transmission of changes in official rates to market rates on traded assets of different maturities, such as money-market deposits at the shorter end and longer term rates such as the yield on Government bonds. While some agents in the non-financial sectors of the

¹ While empirical evidence suggests that this is an important channel in transmission of changes in official rates to aggregate demand (see, for example, Chouraqui et. al., 1988), it will not be considered further in this paper since our focus is on the effects of interest rate changes on private domestic expenditure.

Chart 1: Interest Rate Transmission Mechanism



economy have direct access to capital markets as a source of finance - e.g. via the issue of commercial paper and corporate bonds - the bulk of external financing for households and non-financial corporates is channelled via financial intermediaries such as banks and building societies. This leads to the second link in the transmission process, namely the response of interest rates charged by financial intermediaries to changes in market interest rates. Finally, in the third stage of the transmission process, changes in market interest rates and in the rates charged by financial intermediaries give rise - via the usual substitution, income and wealth effects - to changes in private domestic expenditure. The magnitude and direction of these responses depend, by definition, on the interest elasticities of the components of private expenditure.²

The approach adopted in this paper follows the structure of the transmission mechanism outlined above. In Section I, we examine some theoretical and empirical evidence on the response of market rates across the maturity spectrum to changes in official rates. In the second section, the linkages between market rates and bank lending rates in EC countries is explored using information supplied by national central banks.³ The third section examines some empirical evidence on the interest elasticity of private domestic expenditures to changes in interest rates. This is followed by the conclusions.

It should be stressed that the present paper is preliminary in nature and does not purport to provide a comprehensive survey of all aspects of the transmission mechanism. In particular, the present paper focuses on the 'price effects' of interest rate changes, ignoring potentially important 'quantity' aspects such as the impact on the willingness of financial intermediaries to supply credit and the associated issues of equilibrium and disequilibrium credit rationing, surveyed, for example, in Jaffee and Stiglitz (1990).

Section I. Central Bank Interest Rates and Market Rates

The relationship between official rates and market rates throughout the maturity spectrum is an important link in the transmission of monetary policy to aggregate demand. If market rates throughout the maturity spectrum are highly responsive to changes in official rates then, *ceteris paribus*, the impact of policy actions on aggregate demand will be strengthened while a weak degree of responsiveness will result in a dilution of the policy impact. It is generally accepted that central banks, as monopoly suppliers of base money, have the power to exert a strong influence over the levels of short-term money market interest rates. However, considerable uncertainty attaches to the response of longer term rates to monetary policy actions. In this section we examine the theoretical and empirical evidence on the issue of how changes in official rates impact on market rates along the maturity spectrum.

² In the transmission process outlined above and in Chart 1, the causation runs from official rates to market rates to rates of financial intermediaries and hence to private expenditure. Of course, it should be noted that the causation also runs in the opposite direction. For example, changes in economic conditions could lead to changes in demand for credit and therefore to changes in both market rates and rates charged by financial intermediaries.

³ Responses to the questionnaires of 23rd October 1992, and 10th March 1993 sent to the members of the Monetary Policy Sub-Committee.

1. Theoretical Background: Expectations Theory of the Term-Structure

According to the expectations theory of the term structure, the yield on a long bond with maturity n , (R_t), is equal to an average of current and (E) expected future short rates (r_{t+i}) plus a term premium (p_n), usually assumed constant over time:⁴

$$R_t = (r_t + E_t [r_{t+1} + r_{t+2} + \dots + r_{t+n-1}]) / n + p_n \quad (1)$$

or, more simply,

$$R_t = r_t/n + E_t [r^*] + p_n$$

where $E_t [r^*]$ is approximately the average expected future short rate over the maturity on the bond. This equation holds whether one is considering nominal or real interest rates.

Differentiating (1) with respect to r_t shows that the response of bond yields to changes in the short rate consists of two components: (i) the direct effect ($1/n$); and (ii) the indirect effect of the change in the current short rate on the expected average future short rate.

One can consider a number of special cases of the response of the bond yield to a change of one percentage point in the short rate:

- The market expects the change to be temporary and reversed in future periods. In this case the change in the long yield will be approximately equal to $1/n$ since expected future average rates are unchanged. In this case, as the maturity (n) increases the response of the yield will decline. In the case of a one-period bond (e.g., a Treasury bill) the yield will change one-for-one with the short rate whereas for a ten-period bond the change will amount to one-tenth of the change in the short rate in this case.
- The market expects that the change is permanent and will not be reversed in the future. In this case the expected future average interest rate changes one-for-one with the current rate and, as a result, the yield moves one-for-one with the change in the short rate.
- The market expects that the change in the short rate will give rise to opposite movements in future short rates. This could arise, for example, from the effect of current short rates on expectations of future inflation. For example, increases in current short rates could give rise to expectations of lower inflation, and therefore, lower short rates in the future. Alternatively, in the case of real rates, a rise in the current short real rate could give rise - via expectations of the effect on future economic conditions - to expectations of lower real short interest rates in the future. In either case it is impossible to determine a-priori the response of the bond-yield to a

⁴ This expression is an approximation for a pure discount bond derived by taking a linear expansion around the point ($r=0$). In the case of coupon bond, the expression will be more complex, implying that the long rate is a weighted average of current and expected future short rates, as against the simple average implied here, with the weights depending on the pattern of coupon payments over the life of the bond. However, (1) suffices for our purposes.

change in current short rates. As a result, an increase in current short rates, for example, could give rise to an increase, a decline or no change in the bond yield.

To summarise the implication of the theory, firstly, the degree of linkage between short market rates and bond yields depends on the maturity of the bond; for bonds of short maturity there should be a close correspondence whereas for long bonds the linkage may be weak. Second, for bonds of longer maturities, expectations of future short rates play a crucial role. As a result, there is no reason to expect to observe a close correspondence between actual short market rates and the yields on bonds of longer maturities and the two can move in different directions and by different magnitudes.

While the simple expectations theory outlined above provides valuable insights into the relationship between market interest rates on assets of different maturities, it is important to exercise some caution in the use of the theory in practice. This arises because the large body of empirical work concerned with statistical testing of this hypothesis provides evidence against the theory (Shiller, 1990, provides a survey of these studies). These studies have generally tested the joint hypotheses of the expectations theory and rational expectations formation - which implies that the changes in future short rates implied by the expectations theory are unbiased predictors of changes in actual future short rates⁵ - using a range of techniques including regression analysis and variance bounds techniques. In the vast majority of cases, the results obtained suggest rejection of the restrictions implied by the theory. The failure has been attributed to time-varying term-premia (p_n , in our notation above, not being constant) and/or to the possibility that actual expectations are not consistent with the rational expectations hypothesis. Studies which attempt to disentangle the relative importance of these two factors (e.g. Froot, 1987 and Evans & Lewis, 1990) have found evidence that both factors are important. In evaluating the empirical evidence regarding the rejection of the expectations theory, however, it is important to draw a distinction between statistical and economic significance. According to Campbell and Shiller (1987) the theory, although not strictly valid statistically, still appears to have considerable explanatory power for bond yields.

2. Empirical Evidence on the Impact of Changes in Central Bank Rates on Market Rates of Different Maturities

The response of market interest rates at different points along the maturity spectrum to official interest rate changes has been studied by a number of authors. Using US data for 1974 to 1979, Cook and Hahn (1989) examined the response of eight market rates - T-bill rates at 3, 6 and 12 months and yields on bonds of 3, 5, 7, 10 and 20 year maturities - to changes in the Federal Funds target rate. The results obtained suggest that on the days of changes in the Fed Funds rate, the T-bill rates change by amounts equivalent to half the change in the official rate. At higher maturities, the responsiveness declines monotonically to about one-tenth of the change in the official rate in the case of 20 year bond yields. In addition, for T-bill rates there was some evidence

⁵ An equivalent representation, often used in empirical work, is the requirement that excess holding period returns on bonds should be unpredictable.

of markets anticipating the change in the Fed Funds rates in the two days prior to announcements and also evidence of some delayed adjustment in the following two days. Taken together, therefore, the total response amounted, on average, to over 90 percent of the changes in the official rates in the case of T-bills of 3 to 12 months maturity. Of course, it should be stressed that these results refer to 'average' responses which would not be expected to apply in all cases. Indeed, the low correlations reported in the above study suggest that the actual pattern of response varies significantly over different episodes, particularly in regard to longer term market rates.

Dale (1992) provides an analysis of the link between the key Bank of England operational rate (i.e. the stop rate on Band 1 and Band 2 bills) and market rates of different maturities in the UK, over the period 1987 to 1991. This study examines the behaviour of the market rates on the day of, and the days preceding and following, changes in the official rate. The results obtained show that there are quite marked variations in the response of market rates in general over different episodes with the response of rates at longer maturities being particularly variable. The estimated mean responses of the market rates to official rates are reported in Table 1. It should be stressed, that the results reported here represent average responses of market to official rates and that the actual pattern of response varies markedly, in both magnitude and direction, over the sample, particularly in the case of longer market rates.

Table 1. Average Response of Market Interest Rates to 1 Percentage Point Increase in Official Rates in the UK

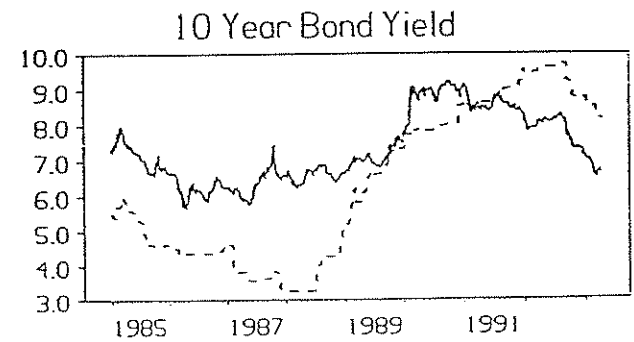
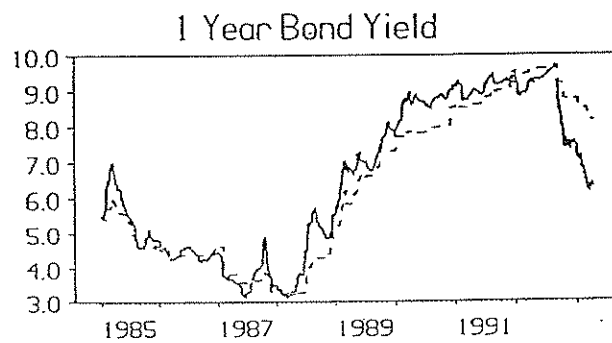
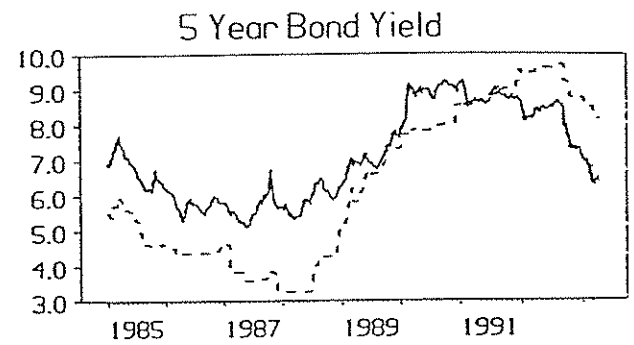
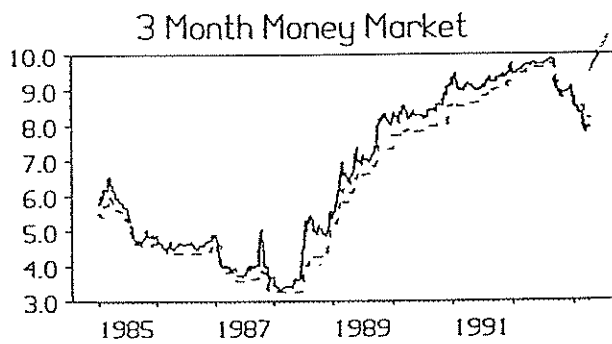
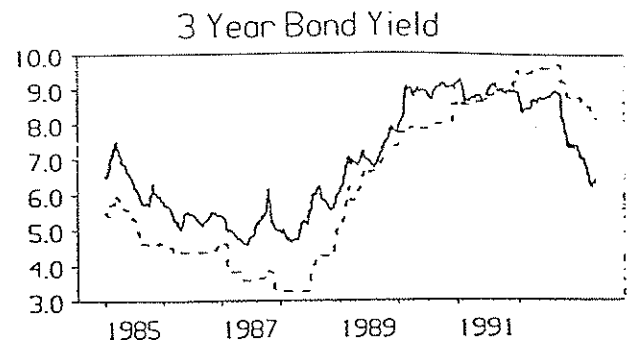
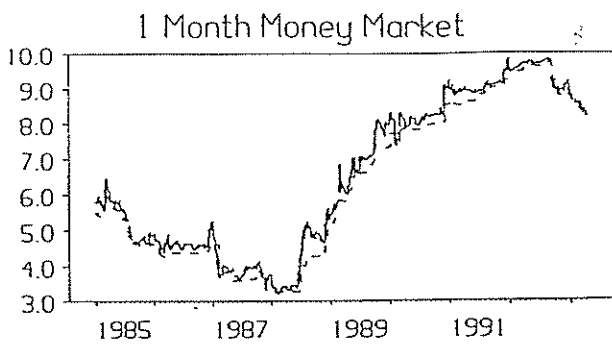
	1 Month	3 Months	6 Months	12 Months	5 Years	10 Years	20 Years
Day of Change	0.54	0.39	0.33	0.31	0.15	0.07	0.04
Total Response ¹	0.79	0.65	0.64	0.56	0.15	0.07	0.04

¹ The cumulative effect from two days before to one day after the change. Source: Dale (1992)

The evidence reported by Dale also suggested that the response of market rates to changes in official rates was stronger when the change represented a 'turning point' in policy - e.g. a shift from a policy of reducing rates to increasing rates - which is attributed to a market perception that the probability of such changes being reversed in a given time horizon is less.

The relationship between official rates and market rates of differing maturities in Cook and Hahn and Dale is also evident in the case of other Community countries. For example, Chart 2 shows daily data on the Repo rate in German rates and market rates of varying maturity ranging from a one month money market rate to the yield on 10 year bonds. The data covers the period January 1985 to April 1993. The short-term market rates are clearly closely linked to official rates while as the maturity increases the degree of relationship declines monotonically. In the case of the 10 year bond yield, for example, this series displays significantly different behaviour than the official rates, often moving in opposite directions.

Chart 2. Germany Repo Rate and Market Rates of Different Maturities



Market Rate	—
Repo Rate	- - -

Section II. The Transmission of Market Rates to Rates on Personal & Corporate Sector Debt

A second crucial link in the transmission of changes in official rates to domestic demand is the linkage between market rates and the rates paid by personal and non-financial corporate customers on new and existing debt. The implications of this link in the transmission mechanism have been examined theoretically by, for example, Bernanke and Blinder (1988) and Dale and Haldane (1992) who show that the portfolio behaviour of financial intermediaries is an important influence in the transmission of monetary policy to aggregate demand. In these models, the connection between official rates and the lending rates facing consumers and investors depends on the behaviour of banks and other lenders and, as a result, the link between monetary policy and demand becomes more complex and also more unpredictable. In this section, we provide some evidence of the transmission of market interest rates to the lending rates facing the non-financial private sector.

One important direct effect of changes in market rates on rates influencing the behaviour of the non-financial sector is via the effect on yields on corporate bonds and commercial paper issued by firms in capital markets. These rates themselves are, of course, market rates and are usually linked to rates on money market and Government debt instruments of corresponding maturities. In practice, the rate on corporate paper is equal to the corresponding rate in the money market or on Government bonds plus a spread, which depends on the default risk of the corporate instrument, reflected for example in the judgements of rating agencies. Since, default risk varies over time, the spread is not constant and thus, rates on corporate paper are not mechanically linked to money or Government bond market rates. Empirical analysis of the determinants of the spread between corporate and Government paper (see, for example, Davis, 1991) has shown that this variable depends on a number of factors which impact on default risk such as the cyclical position of the economy, corporate debt ratios, and indicators of profitability.

It is worth noting, however, that direct access to capital markets for borrowed funds is a relatively unimportant source of external corporate finance in EC countries, as is shown in Table 2. In Community countries bank debt constitutes the most important source of external finance while direct access to capital markets via bond and commercial paper issue is relatively unimportant. Given the importance of bank lending in the financing of corporate investment, the response of bank lending rates to changes in market rates is an important element in the transmission of monetary policy.

Table 2. Non-financial corporate sector: sources of funds for physical and financial investment (average percentage of total sources of funds 1987-1990)

	<u>France</u>	<u>Germany</u>	<u>UK</u>
Internal sources	43	81	40
External sources of which:			
Bank/other loans	23	14	36
Short term securities	3	0	-1
Bonds	3	1 }	
Equities	15	2	16
Other	13	3	1
Total external sources	57	19	53

Source: OECD Financial Statistics, Part 2.

In assessing the impact of changes in money market rates on bank lending rates it is important to draw a distinction between the effects on rates charged on new lending and the effect on rates on outstanding loans. Changes in the rates charged on new borrowings will mainly operate through the so-called substitution effect - impacting on decisions in relation to new expenditures. If these rates rise, one would expect, *ceteris paribus*, that individuals and firms may cancel or postpone new expenditure plans because the cost of funding these activities has increased. If, in addition, rates charged on outstanding borrowings is also increased, an income effect will also come into play since the adverse cash flow effect may induce borrowers to cut-back on expenditure.⁶ The extent to which changes in market rates impact on interest payments of existing debtors depends, for the most part, on the prevalence of fixed versus variable rate lending and on the mix of short versus long-term borrowing. A higher proportion of variable rate lending implies greater responsiveness of interest payments on all outstanding debt to changes in market rates; a similar situation arises with fixed-rate lending if the proportion of short-term lending is higher since, in this case, a higher proportion of debt will be 'rolled-over' at new rates.

Another caveat worth mentioning in this context concerns the implications of the mix of fixed/variable and short/long-term assets and liabilities on banks' balance sheets. To the extent that there is a mismatch between assets and liabilities - for example, if banks' assets are fixed rate and long-term while liabilities are short-term and variable rates - changes in short-term market interest rates may impact on bank profitability and bank solvency. In this example, if rates rise, banks' net interest margins will be squeezed and the deterioration in the financial condition of the banking system may give rise to tightening credit market conditions with adverse implications for domestic demand. However, to the extent that the maturity and conditions on the asset and liability

⁶ One should, of course, note that if increases in borrowing rates are matched by increases in rates on deposits and other liabilities, net asset holders will experience an increase in income which may dilute or offset, in the aggregate, the negative income effect on borrowers.

side are well matched - for example, if banks finance long-term lending at fixed rates by fixed-rate long-term deposits - then these problems should not arise.

1. Determination of Bank Lending Rates on New Loans in EC Countries

Community countries share a number of common features in relation to the determination of interest rates on bank loans to the personal and corporate sectors. In most countries banks are not constrained by regulations in respect to setting these rates and thus they depend on the general levels of interest rates, such as money market rates and bond yields.

The linkage between market interest rates and bank lending rates in Community countries, is however, by no means mechanical. The degree of linkage appears to depend on three factors. Firstly, differences in the degree of banking competition across countries and, within countries, across different categories of customers, appear to exert an important influence on the degree of responsiveness of lending rates to market rates. For example, Dale (1993) provides evidence for the UK that the response of bank lending rates to different classes of customers varies markedly in both speed and magnitude; for customer categories for which competition is less intense, the responsiveness is more muted. A second factor are expectations of the duration of the change in market rates. If a change in market rates is not expected to persist, then, given adjustment costs, it may be profitable for banks to leave their lending rates unchanged. The Banca d'Italia, for example, reports that the response of lending rates in Italy to changes in market rates differs depending on whether the change is accompanied by a change in the discount rate. If the latter is the case, then lending rates tend to adjust promptly, presumably reflecting expectations that the change in market rates is less likely to be temporary. Finally, differences in the degree of riskiness of lending, both over time and across customer categories, can influence the degree of responsiveness of lending rates to changes in market rates. For example, in a weak cyclical position where default risk is highly sensitive to the levels of rates charged, it may not be profitable for banks to pass on the costs of increased market rates to customers because of the resulting unfavourable impact on the level of defaults (e.g. Stiglitz & Weiss, 1981).

Some evidence on the relationship between lending rates and money and bond market rates is provided in Table 3, which shows the correlations between lending rates in EC countries and 'reference' market rates. For each lending rate the relevant reference rate - either a 3 month money market rate or a long-bond yield - was selected on the basis both of information supplied by the central banks and of partial correlation analysis of the relative importance of the two market rates. The simple correlations shown in Table 3 should be interpreted as descriptive statistics, presented in order to provide a quick summary measure of the degree of linkage over the period 1987-1993 between lending and market rates which can be compared across countries. As such, they show the extent of the relationship over this period which may not be valid either for earlier periods or in the future. Indeed, Davis (1992) shows that such relationships can change significantly over time as a result of such factors as deregulation. Another example of changes in the transmission of market rates to rates on new bank lending was provided in some countries experiencing sharp increases in market rates during the recent ERM crisis. In France, Ireland, Italy

Table 3. Correlations between Lending Rates and Reference Market Rate
(Monthly Data - January 1987 to February 1993)^a

		Money Mkt Rate	Long Bond Yield
BE	-Overdraft Rate for Corporate Sector	0.96	
	- Short Term Lending Rate (Corporate Sect.)	1.0	
	- Mortgage Rate		0.77
	- Rate on Long Term Lending to Corporates		0.84
DE	- Current A/C Credit (less than DM 1 million)	0.95	
	- Rate on Bills Discounted	0.97	
	- Rate on Instalment Credit (Personal Sector)	0.95	
	- Mortgage Rate (fixed for 10 years)		0.96
DK	- Overdraft Rate for Personal Sector	0.66	
	- Rate on Medium Term loans to Personal Sector	0.89	
	- Mortgage Rate (20 years)		0.76
ES	- Bank Rate on Current A/C Credits 3m - 1 year	0.74	
	- Bank Rate on Current A/C Credits 1-3 years		0.77
	- Bank Mortgage Rate		0.57
EL	- Average Short Term Commercial Bank Rate	0.36	
	- Average Long Term Commercial Bank Rate	0.28	
	- Mortgage Rate	0.11	
FR	- Base Rate	0.91	
	- Mortgage Rate (I)		0.42
	- Short Term Lending (to Corporate Sector)	0.68	-
	- Long Term Lending (to Corporate Sector)	0.72	-
	- Mortgage Rate (II)		0.47
IE	- Overdraft Rate Personal Customers	0.94	
	- Overdraft Rate Corporate Customers	0.96	
	- Mortgage Rate	0.87	
IT	- Prime Rate	0.69	
	- Overdraft Rate	0.74	
LX	- Overdraft Rate (Personal & Corporate)	0.82	
	- Mortgage Rate	0.84	
NL	- Overdraft Rate	0.99	
	- Mortgage Rate		0.97
UK	- Base Rate	0.99	
	- Building Society Mortgage Rate	0.93	

^a except for Luxembourg (all quarterly) and France short-term, long-term and mortgage rate II (quarterly).

and Spain, there was some evidence that the response of some bank lending rates to changes in market rates was somewhat different from the relationships observed in the past.⁷

Looking first at short lending rates, the evidence provided by central banks and by partial correlation analysis clearly shows that these rates are linked to short, rather than long, market rates, in line with expectations. However, the available information suggests that there are significant differences between countries in both the extent and speed of transmission of movements in money market rates onto short-term bank lending rates. Thus the correlations reported in Table 3 suggest that in some countries, such as Belgium, Germany, Netherlands and the UK, short lending rates respond rapidly and fully to movements in market rates. On the other hand, in other countries such as Greece, the relationship appears much less strong.

Differences in relation to determination of rates on longer-term lending, such as mortgage and long term corporate lending, appear to be more significant than in the case of short term lending rates. On the one hand, in Ireland, Luxembourg and the UK, interest rates charged on mortgages is closely linked to movements in *short-term* money market reflecting the prevalence of variable rate lending in these countries. On the other hand, in Denmark mortgages are usually at fixed rates for periods of up to 30 years, and the mortgage lending institutions finance their lending by issuing bonds of corresponding maturities. Hence, rates on new mortgages are linked to long market rates. Similarly, rates on new mortgage loans are highly correlated with long-term market rates in Belgium, Germany and the Netherlands. In France and Spain, mortgage rates also appear to move in line with long market rates, though the connection appears to be less strong than in other Community countries.

For countries supplying information on rates charged on long term corporate borrowing, in most cases the rates charged appear to move in line with long rates, notably in the case of Belgium and Spain. In Ireland and the UK, in contrast, rates on long-term lending are mostly linked to short market rates, as one might expect, since most long-term lending in these countries is at variable rates linked to short-term market rates.

2. Determination of Rates on Outstanding Loans: Fixed versus Variable Rate Lending

As mentioned earlier, the "income effect" of interest rate changes depends mainly on the relative importance of fixed versus variable rate lending and the mix between short-term and long-term lending. In this respect, it is worth noting that there are significant differences across Member States (see Table 4).

In particular, a contrast emerges between Ireland and the UK and most other Community countries. In these two countries, the bulk of lending to personal and corporate sectors - whether short or long term - is at variable rates. As a result, changes in market interest rates affect the rates charged not just on new lending but also on outstanding loans. Of course, the speed of

⁷ In order to avoid possible distortions arising from the effects of the ERM crisis in cross country comparisons, correlations for Denmark, Spain, France, Ireland and Italy, reported in Table 3, were calculated using data up to August 1992.

Table 4. Lending Practices in EEC Countries: A Summary

<p>Belgium: Variable rate lending is uncommon except for some mortgages and long term credit roll-overs. However, a new law introduced in April 1992 should greatly increase the scope for variable rate mortgage lending.</p>
<p>Germany: fixed rate lending is the norm on loans of all maturities. In addition, long and medium term loans account for over 80 per cent of total bank lending.</p>
<p>Denmark: Most mortgages and long term loans are at fixed rates for periods of up-to 30 years. Other bank lending is usually at variable rates linked to the discount rate and money market rates.</p>
<p>Greece: Most long-term loan contracts include provide for retrospective lending rate adjustments at regular intervals.</p>
<p>Spain: Bank lending, which accounts for 55 per cent. of total private sector financial liabilities, is mostly at fixed rates. However, in recent years the share of variable rate lending has increased, reaching 22 per cent. in 1991. The revision period on these contracts ranges from one month to one year.</p>
<p>France: According to a survey of members of the French Banking Association, the distribution of Franc lending to private clients in the second quarter of 1992 was as follows: Fixed Rate Lending (51%) ; Linked to Base Rate (14%); Linked to Money Market Rate (34%); and Other (1%).</p>
<p>Ireland: Virtually all lending to both households and firms is at variable rates linked to short-term market rates which can be change at a few days notice (mortgage rates generally at one month's notice).</p>
<p>Italy: Variable rate lending is uncommon, accounting for about 6 per cent. of total bank loans. However, some 49 per cent. of bank lending is accounted for by overdraft facilities, whose conditions can be adjusted in line with movements in market rates, particularly the discount rate.</p>
<p>Luxembourg: Most lending is at variable rates.</p>
<p>Netherlands: Variable rate lending is relatively uncommon. Most mortgages, for example, are contracted at fixed medium term interest rates and only a few banks offer variable rate mortgages.</p>
<p>Portugal: The majority of lending over 6 months is at variable rates with the rates usually being revised every 6 months. However, the share of fixed rate lending has been rising in the last two years.</p>
<p>UK: Variable rate lending is the widespread in the UK. Some 90 per cent. of mortgages an the bulk of lending to companies are floating rate linked to money market rates. However, there appears to be some evidence of a move towards fixed rate borrowing in the personal sector, with some 50 per cent. of new mortgage lending being at rates fixed for 2 to 5 years on average, though this trend has not, as yet, had much impact on the stock outstanding.</p>

transmission varies somewhat depending on institutional practices and the types of loan outstanding. In the UK, for example, evidence suggests that rates charged on certain categories of loans, such as personal consumer lending, are relatively slow to respond to changes in market rates in contrast to mortgage or corporate lending.

Elsewhere in the Community the situation is mixed, but in all cases, the degree of variable versus fixed rates nowhere approaches the situation found in the UK and Ireland. In Germany, fixed rate lending is the norm and less than 20% of loans are short-term, implying that rates charged on outstanding debt - as well as a large portion of new borrowing - are largely insulated from movements in short-term market rates except insofar as these influence long market rates. Variable rate lending is also uncommon in Belgium and the Netherlands while, in France, only one-third of outstanding loans are at variable rates. In Spain the share of variable rate debt amounts to 22%, having risen sharply from low levels over recent years and the rates on these loans are adjusted at intervals ranging from one month to one year. In Greece and Portugal, the rates on most long-term lending are adjusted at regular intervals. As noted above, rates on mortgage loans are usually fixed for a period of up to 30 years in the case of Denmark while the remainder of credit is usually at variable rates.

These differences have some implications for the transmission of changes market rates to aggregate demand. In countries where variable rate lending is the norm, changes in actual interest payments by the personal and non-financial corporate sector will be more responsive to movements in short-term market rates. Under these circumstances the 'income effect' for households and firms with net interest bearing liabilities may be more powerful than in case of countries where fixed rate long-term lending is the norm.

Section III. Interest Elasticities of Private Domestic Expenditures

The third crucial link in the transmission of official interest rate changes to private domestic expenditure is the elasticity of private expenditures to interest rates. The response of expenditure to an interest rate change operates through three channels:

- the substitution effect by which changes in interest affect the relative attractiveness of current versus future consumption and the choice of factor inputs, giving rise to changes in expenditure patterns;
- the income effect by which changes in interest rates impacts on the incomes of households and the profitability on non-financial corporate enterprises, leading to changes in expenditure. The magnitude and direction of this effect depends on the balance sheet structure of households and firms. For example, households with net floating rate interest bearing assets will experience an increase in income following a rise in interest rates, while, in contrast, indebted households will experience a fall in income;

- wealth effects which reflect the impact of changes in interest rates on the value of financial and non-financial assets and liabilities. Again the magnitude and direction of this effect will depend on balance sheet structure.

In this section we examine some evidence on these issues. The first part provides some evidence of the results on empirical investigation into the responsiveness of the main components of private domestic expenditure to changes in interest rates. Given the importance, noted above, of balance sheet structure of firms and households in determining the magnitude and direction of the income effect of interest rate changes, some evidence on this issue for some EC countries is presented in the second part of this section.

Empirical studies of the effect of changes in interest rates on aggregate demand have typically approached the issue by focusing on specific components of aggregate demand. Thus studies have presented estimates of the consumption function, the investment function, etc. In this section we provide an overview of more recent results in this area. In most of the studies examined little attention is addressed to the issue of establishing empirically the relative importance of short versus long rates, and the selection of the interest rate variable employed is usually on the basis of such criteria as a priori reasoning or data availability.

1. Private Residential Investment

Available evidence suggests that there is a significant and relatively robust relationship between interest rate movements and residential investment. In a survey of over 40 studies of G7 countries, reported by Egebo, Richardson and Lienert (1990), nearly all studies report significant negative effects of interest rate changes on the volume of residential investment. In most cases, the relevant interest rate employed is the mortgage rate or a long bond rate, sometimes expressed after adjustment for tax allowances. In some studies, attention is confined to nominal rates while in others real interest rate variables are employed.

The results for housing investment present the clearest evidence of an impact of interest rates on a component of demand. However, even in this case, interest rate movements are clearly not the dominant influence, with much of the year-to-year movement in residential investment being dominated by changes in real income of households.

2. Business Fixed Investment

Considerable efforts have been expended in attempting to explain the behaviour of business fixed investment, reflecting the importance of this component in determining the long run growth path of economies as well as its significant role in shorter run cyclical movements. Empirical modelling of investment has, in recent years, been based on one of two interrelated approaches: the neo-classical approach of Jorgenson (1967) and the q-theory approach of Tobin (1969).

In the neo-classical approach, firms are seen as choosing a minimum cost combination of inputs to produce a given level of output. Thus the desired level of the capital stock depends on the level of output and the cost of capital relative to other inputs, where the cost of capital depends

upon factors such as the price of capital goods, nominal interest rates, expected inflation, the rate of depreciation, tax rates, etc. Assuming delays in adjusting actual capital stock to desired capital stock yields a formulation in which the level of business fixed investment depends on current and lagged output and the relative cost of capital.

A large number of studies have attempted to apply this approach in various countries. In general, the evidence for a strong link from the cost of capital -- and, hence, interest rates -- is relatively weak and not robust with movements in actual and expected output and the lags of investment accounting for much of the variation in investment. This conclusion is confirmed by the results of Ford and Poret (1991), who applied the neo-classical model to each of the G7 countries. They found almost no evidence of a significant link between business fixed investment and the cost of capital. Addition of variables to capture profitability and uncertainty did not improve the results. They conclude that, "the neo-classical model, even when augmented with profit and uncertainty variables, is not consistent with the data" (ibid., p108).

A number of reasons have been adduced for the failure to detect a significant influence of the cost of capital on investment. It has been argued that shocks which increase the profitability of investment and, at the same time, result in a higher level of interest rates obscure the true negative relationship between investment and interest rates. Problems with measuring the 'true' cost of capital -- which includes unobservable expectations -- have also been cited, as have aggregation problems. Whatever the reason, it is clear that the neo-classical approach has not yielded much evidence of a strong effect of interest rate changes on business fixed investment.

The alternative approach to modelling business fixed investment relies on the argument advanced by Tobin that the level of investment depends on the gap between the market value and the replacement cost of capital, known as the q ratio. If the market value exceeds replacement cost (for example, if the cost of buying an existing company exceeds the cost of setting up a similar company from scratch), then there exists profitable opportunities which will result in a higher level of investment. However, in practice, empirical evidence in favour of the q approach has been weak. Mullins and Wadhvani (1989) applied the q model to data for the US, Japan, Germany and the UK and found no evidence that their q variable contributed significantly to the explanation of the behaviour of corporate investment. These results were confirmed by Sensenbrenner (1991) for each of the US, Canada, Japan, France, Germany and the UK. However, Sensenbrenner found that when the traditional q model was modified to incorporate a richer dynamic specification, there was significant evidence of a link from q to investment activity in all of these countries. In addition, there is evidence that variables reflecting internal supply of funds to companies - such as cash-flow or profitability - have a significant role, when added to the traditional q model (Viñals, Berges and Valero, 1992). This result may be due, among other things, to the fact that many firms may be subject to some form of borrowing constraints.

Overall, the results suggest that it is difficult to detect a significant influence of the cost of capital, and therefore interest rates, on business fixed investment although recent evidence provides some support for the q theory implying, in particular, that changes in interest rates will impact on investment via movements in stock prices. However, investment appears to be rather

slow in adjusting in response to movements in q and the size of the effect of changes in interest rates on investment is difficult to determine given the uncertainty surrounding the response of the q ratio, and, in particular, stock prices, to changes in interest rates. In addition, the empirical evidence suggests that a significant influence of interest rate changes on business investment stems from the effect on corporate profitability and cash flow rather than relative price effects. The magnitude of this response of corporate profitability/cash flow to interest rate movements depends on the structure of corporate balance sheets and the responsiveness of corporate interest payments to market interest rates, issues which are examined below.

3. Inventory Investment

In principle, real short-term interest rates should exert a significant influence on inventory investment because interest rates represent the opportunity cost of holding inventories. Since inventory holdings have to be financed, either by borrowing or by reducing other liquid assets, it follows that when interest rates rise the cost of holding inventories will also increase, resulting in a lower, and perhaps negative, level of stockbuilding.

In practice, empirical investigation of the determinants of inventory investment has received relatively little attention, despite the importance of changes in this variable for the business cycle. The few studies that exist suggest that there is little evidence of a strong influence of interest rates on the level of stockbuilding, with much of the variation in this component of aggregate demand being determined by variations in expected or actual output (Blinder and Maccini, 1991), although some empirical evidence for the UK provides evidence of such effects (Callen, Hall & Henry, 1990).

4. Consumer Expenditure

In principle, movements in interest rates should affect consumer expenditure through three channels. First, higher interest rates would make current consumption less attractive relative to future consumption; this is a substitution effect. Second, since households usually have significant interest bearing assets and liabilities, changes in interest rates would result in changes in households interest payments and receipts, thereby altering income and expenditure -- the income effect. Thirdly, changes in interest rates will affect the value of households' assets such as bonds, equities and housing, resulting in wealth effects on consumer expenditure.

In practice, empirical analysis has had some difficulty in identifying strong direct effects of interest rates on non-durable consumption. In relation, to the 'substitution effect,' studies by Hall (1988) for the US and Carroll and Summers (1989), for 15 OECD economies, found that there was no evidence of a significant intertemporal substitution effect of interest rates on non-durable consumption. However, in relation to consumer expenditure on durables, which are the most volatile component and typically account for around 10% of total spending, there is considerable literature dating back to the 1960s reporting strong effects of interest rates on expenditure.

In relation to income effects, the effect of interest rates on consumption is subsumed in the income term in consumer expenditure models. The overwhelming body of evidence suggest

a strong effect of changes in disposable income on consumption, and, by implication, changes in income caused by interest rate movements will exert a significant effect on consumer spending. The response of consumer spending to changes in income due to interest rate movements depends critically on the structure of household balance sheets and lending practices which are discussed further below.

Recent empirical work suggests a significant effect of interest rates on consumption via wealth effects. Most studies show a significant effect of wealth or liquid assets on consumer expenditure (Tease et al, 1990) so that changes in interest rates will impact on the market value of wealth and, therefore, on the level of consumption. In addition to financial assets, housing wealth has also been suggested as an important channel through which interest rates affect consumption, particularly in the case of the UK. Fisher (1992) argues that the housing market, in general, plays only a limited role in determining consumer spending but that the adverse impact of falling house prices on household wealth in recent years may be a decisive factor in explaining the sustained weakness of consumer spending in the UK since 1990.

5. Balance Sheet Structure and the Income Effect of Interest Rate Changes: Some Evidence

Changes in interest rates can give rise to changes in incomes of households and firms which, in turn, affects expenditure decisions by these agents. For an individual agent, the direction and magnitude of such income effects depends on two factors, 1) the composition of the balance sheet with respect to the amounts of interest bearing assets and liabilities and, 2) the response of actual interest receipts/payments to changes in market interest rates, which, in turn depends on the extent to which assets and liabilities are floating rate as against fixed rate and the mix of short-term versus long term assets and liabilities. Given data on the structure and composition of an agent's holdings of interest-bearing and liabilities, the response of actual interest flows to changes in market interest rates can be readily derived. When one aggregates over individuals and firms, however, it is more difficult to determine the net effect on incomes of changes in interest rates. This arises because interest payments - with the exceptions of interest flows between residents and non-residents - are, in effect, transfers between different groups of asset/liability holders within any country. In general, losses in interest income arising for debtors are offset by gains to asset holders.

The above line of reasoning may suggest that, in the aggregate, the income effect of change in interest rates may wash out. However, there are a number of reasons for believing that change in interest rates may, nonetheless, give rise to aggregate income effects on private expenditures. Firstly, the distribution of assets and liabilities may be important. For example, if indebted households have a higher marginal propensity to consume than net asset holders, then changes in interest rates can affect total expenditures. Secondly, it can be argued that the losers from any change in interest rates are likely to adjust expenditures more rapidly than gainers because budget constraints take effect more quickly than perceptions of greater spending potential.

Table 5. Non-Financial Sector Balance Sheets
(as a % of Gross Sector Income)

Personal Sector:

	1979a			1990		
	France	Germany	UK	France	Germany	UK
Deposits	46	51	43	37	52	65
Equities	14	4	18	60	7	25
Other	46	44	83	47	70	153
Total Financial Assets	106	100	144	144	129	243
Total Financial Liabilities	44	42	46	53	46	90
Net Financial Assets	62	58	98	91	83	153

a. Data for Germany refer to 1980

Non-Financial Corporate Sector:

	1979			1990		
	France	Germany	UK	France	Germany	UK
Total Financial Assets	656	178	273	1058	230	347
Financial Liabilities:						
Equities	387	68	223	880	96	505
Loans	422	215	70	333	206	164
Other Financial Liabilities	363	48	175	279	50	132
Total Financial Liabilities	1172	331	468	1491	352	801
Net Financial Assets	-516	-153	-195	-433	-122	-453

Thirdly, to the extent that changes in market interest rates give rise to changes in bank's net interest margins then non-financial sector agents will experience a net loss in income in any case⁸.

In this section we examine some evidence on the structure of personal and corporate sector balance sheets and consequent levels of interest payments relative to income.

Data on the financial assets and liabilities of both the personal and corporate sectors in France, Germany and the UK, expressed as a percentage of sector income, is presented in Table 5.⁹ In addition, details of sectoral interest payments, relative to sector income, for these three countries as well as for six other Community countries -- Belgium, Ireland, Italy, Netherlands, Spain and Portugal -- are presented in Chart 3.¹⁰ These 'income gearing' ratios, which are sensitive both to the level of debt and to the level of interest rates, provide some useful information as regards the impact on private expenditure of changes in interest rates.

5a. Personal Sector

Examination of the data presented in Table 5 reveals that the ratio of personal sector debt to gross income - measured by total financial liabilities - is, at 90%, highest in the UK. In common with the experience of some other OECD countries (such as Australia, Sweden and Finland) the level of personal sector indebtedness rose strongly in the UK over the 1980s against a background of significant financial liberalisation, buoyant income expectations and the related rise in asset prices. In France and Germany,¹¹ in contrast, the level of personal sector debt relative to income is significantly lower, amounting to 56% and 43% of gross income, respectively. While the ratio has grown in both countries over the 1980s, the rise has been more modest than was experienced in the UK.

One consequence of the high level of personal sector debt in the UK is the high level of gross interest payments relative to income (see Chart 3). These data are striking, showing that in 1990 personal sector interest payments in the UK amounted to almost 11% of gross income -- well above the levels recorded in any of the other countries for which information is presented. This ratio has risen strongly over the 1980s on foot of the significant build-up in personal sector indebtedness referred to above as well as, in the last two years of the decade, a significant increase in interest rates. Since 1990, however, the ratio has fallen back strongly mainly due to reductions in interest rates. The behaviour of this ratio in the UK during the late 1980s provides a striking example of the implications of increases in interest rates against a background of high levels of

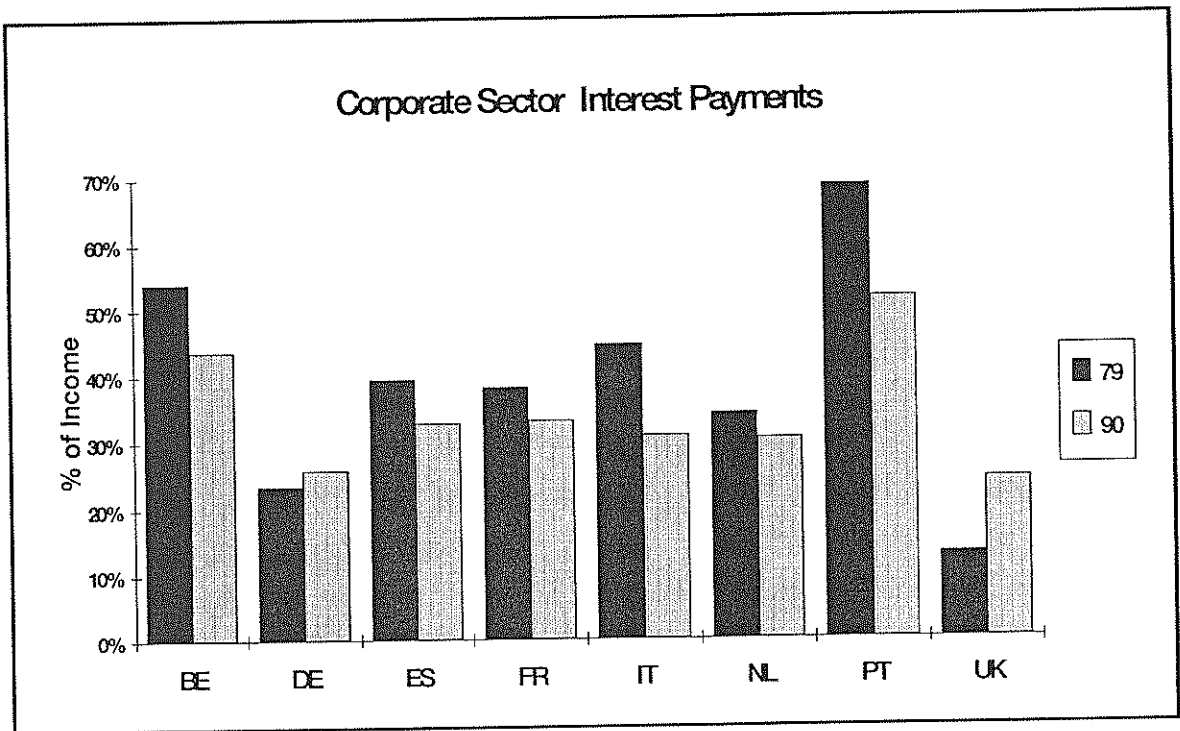
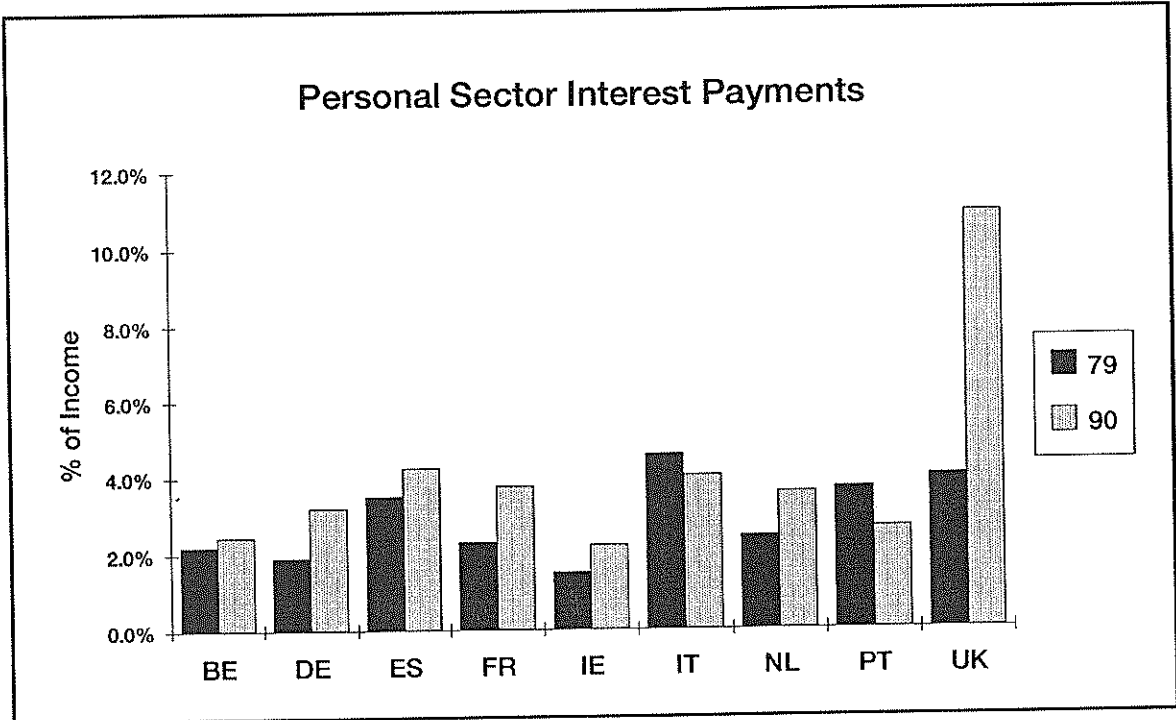
⁸ However, to the extent that the resulting increase in bank profitability leads to higher dividend payments, this effect may wash-out, but lags between changes in profitability and changes in dividend payments may give rise to a change in incomes of the non-financial sectors for a significant period of time.

⁹ Source: OECD Financial Accounts, UK CSO Financial Statistics, Deutsche Bundesbank Monthly Report.

¹⁰ For most countries the data in this table are from the OECD National Accounts. For Germany and the Netherlands an adjustment has been made to correct for the omission of mortgage interest payments using information contained in the reports of the central banks of both countries. The figures for Ireland are estimates derived from information published in the Central Bank's Quarterly Bulletin.

¹¹ The April 1993 issue of the Monthly Report of the Deutsche Bundesbank provides an analysis of the evolution of personal sector debt in Germany over the 1980s in an international context.

Chart 3. Personal and Non-Financial Corporate Sector Interest Payments
 (as a % of Gross Sector Income)



personal debt most of which is at variable interest rates linked to short-term market rates (see above). The sharp increase in market interest rates after 1988 resulted in strong rise in interest payments by the personal sector while the concomitant slowdown in output growth resulted in a slower pace of income growth. The coexistence of increasing interest payments and declining income growth exerted a significant downward influence on the expenditures of indebted households and this, in turn, contributed further to the severity of the recession in the UK. In contrast, in the other countries considered here personal sector debt-levels are significantly lower and much borrowing is at fixed rates, suggesting that adverse effects on personal sector income resulting from increases in short interest rates are likely to be more muted than in the UK.

As regards financial asset holdings in 1990, the UK personal sector has significant holdings, amounting to 243% of income -- as against 144% in France and 130% in Germany. However, the bulk of these assets, in the UK case, is in the form of equity in life assurance funds and pension funds. Thus while the UK personal sector has substantial net financial assets, its net floating position -- i.e. deposits minus loans -- is now negative, having deteriorated significantly over the 1980s (Easton, 1990). As a result, it appears that the UK personal sector is now a net payer of interest. In France, too, the growth in personal sector borrowing has outstripped growth in deposits so that borrowings now exceed deposits, and the sector is also a net payer of interest. However, despite this, the prevalence of fixed-rate lending in France suggests that French households are insulated from movements in short rates to a greater extent than is the case in the UK. In contrast, in all of the other countries for which data is presented in Chart 3, interest receipts are in excess of interest payments, in some cases by a substantial margin.

An assessment of the overall 'health' of the personal sector balance sheet depends not only on the value of financial assets and liabilities but also on the value of physical assets. The value of the housing stock, which comprises a major component of the assets of the personal sector, is the major concern in this regard. On the basis of information supplied by central banks, change in the value of this component of personal sector wealth has varied considerably across countries in recent years. In Germany, house prices have increased sharply since the mid 1980s, rising by around 30% since 1986. Thus the contribution to Personal Sector wealth from housing has been favourable in the second half of the 1980s. In France house prices have fallen slightly in 1991 and 1992, after recording strong growth between 1985 and 1989. In contrast, households in the UK have seen a significant fall in the market value of their housing wealth. UK house prices, on average, have fallen around 14% since the peak in 1989 with the falls being concentrated in southern England. Since housing accounts for about half of personal sector wealth, this represents a significant fall in the value of Personal Sector wealth. Some households have been particularly hard-hit. According to estimates published in the November 1992 issue of the Bank of England Quarterly Bulletin, some 1.2 million households, who, in the late 1980s, financed residential property purchases by borrowing at high loan-to-value ratios, are now in a situation where the value of the loan outstanding exceeds the market value of the property.

5b. Non-Financial Corporate Sector

In all three countries the non-financial corporate sectors are net debtors. In 1990 the ratios of long and short-term loans to corporate income were: 332% in France, 206% in Germany and 164% in the UK (see Table 5). It is notable that over the 1980s the ratio of loans to income fell substantially in France, remained broadly unchanged in Germany, while in the UK the ratio more than doubled over the same period.

There are significant variations in the structure of corporate sector balance sheets. In France and the UK equities constitute the main part of the stock of corporate financial liabilities, accounting for 59 and 62% of the total, respectively. In Germany, in contrast, equities play a much less significant role, amounting to 27% of total financial liabilities, while bank loans account for 60% of liabilities.

Details of the income gearing of the corporate sector in the EC countries for which data are readily available are presented in Chart 3. Differences in this ratio reflect, in addition to the structure of the balance sheet, differences in the level of profitability and in the level of interest rates charged. Nonetheless, this ratio provides important information about the potential impact of interest rate changes on the financial position of the corporate sector.

As is evident from the data presented, there are substantial variations in the degree of income gearing of the corporate sector across Community countries reflecting differences in the structure of corporate balance sheets as well as in interest rate levels. The ratios of corporate interest payments to income range from 52% in Portugal to 24% in the UK. A notable feature of the data is that this ratio has fallen over the 1980s in all countries examined, with the exception of the UK and Germany. In the former country, the increase in income gearing has been particularly strong, almost doubling over the decade.

The impact of changes in market interest rates on corporate cash flow and expenditures depends, in part, on the levels of outstanding debt and income gearing. Where levels of outstanding debt are high, increases in short interest rates could, *ceteris paribus*, have a large adverse effect on corporate financial positions. However, the responsiveness of interest rates actually paid by corporate borrowers to changes in market rates, which reflects the lending practices in different countries, will also have an important role in this context. For example, in countries where most lending is at fixed rates, the corporate sector may not be as vulnerable to a rise in market rates, even when the recorded gearing is high, since the cost of existing loans will not be affected. In contrast, the profitability of the corporate sector in a country with a relatively low income gearing could be highly vulnerable to an interest rate increase if the borrowing is at variable rates linked to short rates. The above data suggests that UK corporate sector investment spending, by virtue of the lower ratio of borrowing and interest payments to income, is less responsive to a rise in interest rates. However, as noted above, most corporate borrowing in the UK is at variable rates -- in contrast to the situation in most other EC countries -- so that changes in market rates will quickly impact on corporate profitability. In contrast, in the other countries for which data is reported in Table 2, most corporate borrowing is at fixed rates which, despite high

gearing ratios, will tend to cushion the effect on corporate profitability of higher market interest rates.

Conclusions

As noted in the introduction, the transmission of changes in official rates to private domestic expenditure can be considered as consisting of three stages. Firstly, changes in official rates influence market interest rates at the short, and, more unpredictably, at the longer end of the maturity spectrum. Secondly, these changes in market rates give rise to changes in the lending rates charged by financial intermediaries to non-financial customers. Thirdly, changes in market and bank lending rates, taken together, influence actual private expenditure decisions via the usual income, substitution and wealth effects. Following this framework, the conclusions suggested by the evidence examined in this paper may be summarised as follows:

Firstly, in relation to market interest rates, both theoretical and empirical evidence suggests that expectations play a crucial role in determining the levels of longer term rates. As a result, while central banks can exercise strong control over market rates at the shorter-end, the response of longer term rates is more complex and unpredictable. However, both theoretical and empirical evidence suggests that for most Community countries long rates are likely to be relatively more important for private expenditure than short rates (see, for example, King 1992). Against this background, the unpredictability of the response of long rates to changes in short rates implies that the ability of central banks to influence the behaviour of domestic demand is rather imperfect.

Secondly, since financial intermediaries are the main source of external finance for the non-financial private sector in EC countries, the rates charged by these institutions may be more important for private spending decisions than either short or long market rates. While the evidence suggests that these rates are linked to market rates of corresponding maturities, the linkage is by no means mechanical and, in addition, appears to differ somewhat across Community countries. Again, this factor adds to the short-run unpredictability in the connection between changes in official rates and private domestic expenditure and may contribute to differences across countries in this regard.

Thirdly, the results of empirical studies on the responsiveness of domestic expenditure to interest rate changes present mixed evidence. There appears to be a relatively robust link between interest rates movements and residential investment. In contrast, it has proven especially difficult to establish a strong effect of interest rate changes on business fixed investment via the cost of capital, though there is some evidence of an important channel via the effect on corporate cash flows. There is little evidence of a significant impact of interest rates on inventory investment nor is there much evidence in favour of interest rate induced substitution effects on consumer expenditure, with exception of spending on durables. However, there is some empirical support for effects of interest rate changes on consumption via wealth effects and, more directly, via effects of consumer income.

Finally, the combined effect of institutional lending practices and balance sheet structure is likely to exert an important influence on the response of private expenditures to official interest rates changes. In this regard, there appear to be significant differences across Community countries. In countries where lending is mostly at variable rates linked to short market rates, the response of expenditure to changes in official rates is likely to be stronger. This effect will be strengthened if, in addition, the non-financial sector has high levels of debt relative to income. Both of these conditions appear to apply, at least as regards the personal sector, to the UK. Elsewhere in the Community, the prevalence of fixed-rate long term lending combined with lower levels of personal sector debt suggests that consumer spending is likely to be less sensitive to changes in official rates; in relation to the corporate sector, the prevalence of fixed-rate long-term lending may insulate the sector from the effects of changes in market interest rates, notwithstanding a higher level of debt than UK. These differences suggest that the responsiveness of private domestic expenditure to changes in official interest rates is likely to be higher in the UK than elsewhere in the EC.

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