EMU and the monetary transmission mechanism

EMU study

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This study has been prepared by HM Treasury to inform the assessment of the five economic tests

This study has benefited from review by Professor Charles Goodhart, working in a personal capacity as an academic consultant to HM Treasury. All content, conclusions, errors and omissions in this study are, however, the responsibility of HM Treasury alone.

This is one of a set of detailed studies accompanying HM Treasury's assessment of the five economic tests. The tests provide the framework for analysing the UK Government's decision on membership of Economic and Monetary Union (EMU). The studies have been undertaken and commissioned by the Treasury.

These studies and the five economic tests assessment are available on the Treasury website at:

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For further information on the Treasury and its work, contact:

HM Treasury Public Enquiry Unit
1 Horse Guards Road
London
SW1A 2HQ

E-mail: public.enquiries@hm-treasury.gov.uk

Printed by the Stationery Office 2003 799335

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Executive Summary

1 A key issue determining whether it would be in the UK's economic interest to join Economic and Monetary Union (EMU) is whether a single euro area monetary policy would affect the UK economy in a different way to other euro area countries. A different response in the UK to a change in European Central Bank (ECB) interest rates, in terms of the speed of response or its overall effect on output and inflation, might generate a different cyclical path for the UK relative to the rest of the euro area and greater volatility of output and inflation.

2 The transmission of monetary policy is complex both in theory and in practice. A large economic literature is devoted to its understanding, including extensive research by both the Bank of England and the European Central Bank. This study takes a wide-ranging approach to consider both the workings of the transmission mechanism, and the overall speed and strength of the UK transmission mechanism when compared to other countries. However, the approach stops short of looking at the broader question of the mechanisms by which economies adjust to shocks. This issue is dealt with in the EMU study *Modelling shocks and adjustment mechanisms in EMU*.

3 In the long-run steady state, standard economic theory suggests that monetary policy has little impact on the trend path of output, which is largely determined by real variables, such as the degree of knowledge, skills and technology in the economy. However, monetary policy can affect output in the short to medium term due to the presence of price and wage rigidity in the economy; and even in the long run, volatility may affect the output-inflation trade-off.

Summary of structural analysis

4 Monetary policy may impact on output and prices through a wide variety of channels, and numerous structural factors will influence the speed and extent of the transmission mechanism through these channels. Analysis of these structures suggests that the UK may be more sensitive to monetary policy through some channels, and less sensitive through others.

5 Factors which may make the UK *more* sensitive than euro area countries to monetary policy, that is, factors which may lead monetary policy to have a stronger and faster effect on output, include:

- the greater speed and extent of the **pass-through of interest rate changes** from official interest rates to bank lending rates in the UK; studies suggest it is weaker in other large countries such as France and Germany;
- high levels of **mortgage debt** in the UK, combined with the dominance of variable rate mortgages, implies that the sensitivity of household interest payments to changes in interest rates is higher in the UK than in euro area countries;
- the competitive, liberalised mortgage market in the UK makes it easier for households to access **housing wealth** than is the case in the large euro area countries. Real house price growth in the UK has been stronger than in most euro area countries, and the low response of housing supply in the UK appears to be an important reason for this. The importance of the housing sector in the UK is why HM Treasury has produced the EMU study *Housing, consumption and EMU* devoted to this issue. The key conclusions of that study are repeated in Section 3;

- the UK may experience a greater impact on consumption from changes in **financial wealth**, due to the greater size of equity holdings and the wider demographic profile of equity holders. However, the impact on consumption in the UK may be lessened because financial wealth is primarily held in life and pension funds;

- the UK and Germany have higher levels of **non-EMU trade** than France and Italy, though the differences are not great in relation to overall GDP;

- the UK has a larger stock of **foreign assets and liabilities** than major euro area countries, although this may be a reflection of the UK's role as an international financial centre and so have limited implications for the behaviour of consumption; and

- the **broad credit channel** of the transmission mechanism, whereby the ability of firms to secure financing is reduced in a monetary tightening, may be stronger in the UK. Relationships between banks and firms tend to be less close than in countries such as Germany, and UK firms may have higher levels of leverage.

6 Factors which may make the UK *less* sensitive than euro area countries to monetary policy, that is, factors which may lead monetary policy to have a weaker and slower effect on output, include:

- the UK is likely to have a lower exposure to the **bank-lending channel** of the transmission mechanism, whereby banks reduce lending in a monetary tightening due to supply constraints. The UK banking sector is dominated by large banks for whom these supply constraints may be less important; in addition, UK firms have greater access to alternative sources of finance. Structural factors suggest the bank-lending channel could be stronger in France, Italy and Spain;

- the **structure of production** is relatively service-intensive in the UK. Monetary policy may have a stronger impact on investment and durable goods sectors; these sectors are more important in the German economy; and

- the UK is seen to have relatively low levels of **nominal wage rigidity**. Nominal wage and price rigidity strengthen the impact of monetary policy on output (and temporarily reduce the impact on inflation): if wages and prices are fully flexible then standard economic theory implies monetary policy has no influence on output – the principle of the neutrality of money.

7 The UK's overall sensitivity to monetary policy relative to euro area countries will depend on how these effects balance out in aggregate. The analysis in this study indicates that there is more evidence for structural factors that will increase the strength of the transmission mechanism in the UK relative to other countries. But it is difficult to weigh up in aggregate the impact of structural factors so as to identify the overall relative strength of the monetary transmission mechanism. To do this would require each structural factor to be weighted according to its importance in the transmission mechanism. The wide range of structures which influence the transmission mechanism has distributional implications. For example, the importance of the housing market in the UK suggests that homeowners will be affected differently to non-homeowners by the level of interest rates and by interest rate changes.

Summary of empirical analysis using economic models

8 Section 4 takes an alternative approach to analysing the monetary transmission mechanism, examining empirical studies which use econometric techniques to capture cross-country differences at the macroeconomic level. Rather than identify the specific structural microeconomic factors which may drive differences, these studies identify the overall sensitivity of output or inflation to a monetary policy change. In Section 5, HM Treasury has undertaken a new modelling exercise which supplements existing analysis by attempting to model the transmission of monetary policy in the UK and the euro area when the UK is assumed to be inside and outside EMU.

9 The existing and new analyses lead to the following conclusions:

- a study by Smets (1995) compares the cross-country responses to a monetary policy shock using the different country-specific macroeconomic models maintained by national central banks. This study stands out as suggesting that the UK has a significantly stronger output response than euro area countries. However, the Treasury Public Model estimates that the UK response to the same shock is broadly in line with the results for the euro area countries. The Bank of England (2000) also estimates a lower UK output response than in Smets (1995).

- a different modelling approach is to apply the same theoretical model across countries. In contrast to the Smets (1995) results, these cross-country models often find that differences in transmission mechanisms are quite low, and the UK does not appear to be an obvious outlier; and

- the National Institute Global Econometric Model (NiGEM) is a multi-country structural model which can simulate the UK response to a change in monetary policy as if the UK were inside EMU. New simulations on this model, undertaken by HM Treasury, find some differences in the compositional impact, but no significant difference between the overall impact on output and inflation between the UK and the euro area.

10 Two main modelling approaches are considered in this study. In the first, a common theoretical model is applied across countries. This reduces the likelihood of differences in model specification being responsible for differences in results. But it also means that real structural differences which exist between countries are not fully captured. The second approach is to use a different theoretical model for each country. This approach is in principle better suited to identifying real structural differences between countries, but in practice it is difficult to distinguish these from differences due to modelling approaches. This conflict between the desire to identify real stuctural differences and the need to minimise potential differences due to modelling approaches has not been satisfactorily resolved despite extensive and on-going research by academics and international organisations.

11 Overall, empirical model-based studies do not demonstrate consistently that the UK transmission mechanism stands out in terms of leading to divergent outcomes. However, as noted above, many of these models do not fully reflect the structural differences which exist in reality, because they use techniques which are not always the best way of considering specific area which may have special characteristics and particular importance such as the housing market in the UK. This is a key motivation for the EMU study by HM Treasury *Housing, consumption and EMU*.

12 For example, although the NiGEM model has recently been developed to include a consumption channel via housing wealth effects for the UK, the scale of the effects are assumed to be small. Because the housing sector is a potentially important structural difference between the UK and euro area economies, the degree of asymmetry between the UK and euro area is likely to be greater than the NiGEM simulations predict. The EMU study *Housing, consumption and EMU* finds that although empirical evidence on the impact of changes to interest rates and housing wealth on consumption is not as clear-cut as the evidence of structural differences, on balance it supports the view that the sensitivity of household spending through the housing market is higher in the UK than elsewhere.

Summary of analysis of the endogeneity of the transmission mechanism

13 Much of the analysis of these issues is static – examining current or past differences between the UK and the euro area. But the influence of EMU membership and other developments could change the structure of transmission mechanisms:

- entry to EMU would involve a shift to a regime with no movement in the nominal exchange rate against the euro area, and so an immediate effect would be to reduce the importance of the exchange rate channel;
- one reason why the UK is exposed to high levels of mortgage debt at variable rates is its history of macroeconomic instability with high and volatile inflation. In such an environment, lenders tend to be unwilling to offer fixed rate mortgages except at very high rates, to avoid the risk that inflation will erode returns. The UK now has a macroeconomic framework which is delivering stability and low inflation. Since 1999, the ECB has maintained price stability in the euro area. In or out of EMU, the more stable macroeconomic environment might erode differences in the structure of mortgage debt;
- entry to the euro has the potential to facilitate further convergence in mortgage systems by aiding cross-border competition in savings and mortgage products. There are still significant barriers though, and structural factors, such as differences in the responsiveness of housing supply, mean variations in house price trends are also likely to continue in the near future; and
- EMU has promoted the growth and integration of financial markets in the euro area. In turn this may promote convergence of financial structures. Some argue that the euro area will develop capital markets more like those of the UK, due to the rise in institutional investment driven by an increasing provision of private pensions. There is some evidence that this is happening.

Conclusions

14 Certain features of the UK economy, in particular the household sector's large stock of mortgages held at variable rates and other aspects of the housing market (analysed in detail in the EMU study *Housing, consumption and EMU)*, suggest the UK monetary transmission mechanism may be stronger than that of the euro area. Other features of the economy may act to reduce the strength of the UK transmission mechanism in relation to euro area countries. The structural analysis in this study suggests that the former group of features are dominant. Empirical model-based studies do not demonstrate consistently that the UK transmission mechanism stands out in terms of leading to divergent outcomes. But these models do not fully reflect the structural differences which would be most relevant in practice. That said, at least some of any differences which do exist may erode over time, particularly if the UK were to enter EMU on the basis of sustainable convergence between the UK and the euro area. This issue is considered further in the convergence test – the first of the Government's five economic tests for EMU entry.

1 INTRODUCTION

1.1 This study analyses the monetary policy transmission mechanisms of the UK and the euro area. It considers whether the UK response to monetary policy is different to that of the euro area, and whether any differences would be likely to remain if the UK were to join EMU.

1.2 Differences in the transmission mechanism of monetary policy matter for the EMU decision because they imply that the appropriate monetary policy response for the UK to a given shock would not be the same as for the euro area. Such differences could be caused by structural asymmetries between the UK and the euro area, which would not only cause the effects of interest rate changes to be divergent, but could also cause the response of the economy to differ in the face of shocks to the economic environment. So these possible asymmetries between the UK and the euro area could have important effects on the macroeconomic performance of the UK, were it to join EMU.

1.3 The transmission of monetary policy is complex both in theory and in practice. A large economic literature is devoted to its understanding, including extensive research by both the Bank of England and the European Central Bank, and a solid theoretical understanding of the range of mechanisms through which the UK transmission mechanism operates has been developed.[1] This study takes a wide-ranging approach to consider the workings of the transmission mechanism in practice, and the overall speed and strength of the UK transmission mechanism when compared to other countries. It reviews the range of external literature on these issues, undertakes new analysis of the economic structures which may affect the transmission mechanism, and then presents the results of new modelling of the UK monetary transmission mechanism. However, the approach stops short of looking at the broader question of the mechanisms by which economies adjust to shocks at the macro and micro levels. These issues are dealt with in the EMU studies *Modelling shocks and adjustment mechanisms in EMU* and *EMU and labour market flexibility.*

Differing views on the importance of differences in the transmission mechanism

1.4 Apparent differences in the monetary transmission mechanisms of the UK and the euro area are a key argument in the debate on UK entry to EMU. In particular, it is often asserted that two components of the UK's economic structure are potential sources of asymmetry: the structure of mortgage debt interacting with housing market features; and the structure of corporate finance. For example, Bush (2001) argues that "*British firms and households are more sensitive to interest changes than Eurozone countries because of a higher level of home ownership and a larger proportion of variable-rate mortgages*" (page 11) and that "*The structure of corporate finance in the UK is substantially different to the Eurozone 'model'... The higher proportion of equity and security market finance means that UK corporations are more directly exposed to interest rate movements*" (page 36-37).

1.5 In contrast, Layard *et al.* (2002) argue "*empirical analysis does not show demand to be more sensitive to interest rates in Britain than elsewhere... the structure of debt is highly endogenous, and it will be heavily influenced by Britain's entry into the euro*" (page 24).

[1] For example, see Monetary Policy Committee (2001).

1.6 The importance of potential asymmetries in monetary transmission mechanisms in a monetary union was recognised in the October 1997 five tests assessment (HM Treasury, 1997). That assessment focused on differences in the housing sector and on the levels of mortgage debt. It noted that while differences existed between the UK and other European economies in this regard, evidence on the eventual impact of the transmission of monetary conditions was largely inconclusive. Moreover, it was recognised that patterns of household and corporate financing could change over time.

The approach of the study

1.7 The objective of this study is therefore to examine whether the impact of monetary policy changes on output and inflation is different in terms of strength and speed in the UK compared to the euro area. There are many elements to the theory of the transmission of monetary policy and these are set out in Section 2.

1.8 The third section of the study examines those economic and financial structures which may underpin the transmission mechanism in the UK and the euro area. If significant differences in structures can be identified, this suggests there could be differences in the speed or strength of the transmission of monetary policy to changes in output and inflation. In many cases it is not possible to find aggregate euro area wide data to enable direct comparison between the UK and the euro area. In these cases, the best alternative is to compare structures in the UK with those of the large euro area countries.

1.9 However, because of the lack of consensus over the importance of the different channels in the transmission mechanism, it is difficult, through analysis of structural factors taken one at a time, to determine how important such differences could be overall. Therefore, the fourth section examines economic models which aim to gauge the strength of the transmission mechanism at the aggregate level. This alternative approach focuses on the overall impact of monetary policy on output and inflation.

1.10 Few of the existing studies using economic models are fully focused on the particular question of possible UK entry to EMU. In an attempt to address this, the fifth section contains new model-based analysis undertaken by HM Treasury using the National Institute Global Econometric Model (NiGEM).

1.11 Some of the economic and financial structures involved in the transmission mechanism may evolve in response to changes in the macroeconomic environment, and product, labour and capital markets. EMU may act as the catalyst for a period of particularly rapid change, which could erode differences in national transmission mechanisms. This issue is considered in Section 6 of the study.

Structure of the study

1.12 The rest of this study is split into five analytical sections:

- Section 2 provides a **theoretical** overview for the analysis;
- Section 3 considers whether there are **structural** differences between the UK and euro area economies which may lead to differences in monetary policy transmission;
- Section 4 reviews **economic model-based** studies of the monetary transmission mechanism, which analyse the overall response of the economy to monetary policy changes;
- Section 5 contains new **simulations** of the overall effects of a monetary policy change in the UK and the euro area;

- Section 6 examines **how entering EMU may affect the transmission mechanism**; and
- Section 7 concludes.

Relevant EMU studies

1.13 This study should be read in conjunction with the EMU study *Housing, consumption and EMU* by HM Treasury which focuses on comparing the structure of the housing markets in the UK and the euro area, and implications for possible UK entry to EMU. The key conclusions of that study are repeated in Section 3. There is also a strong read across between the material contained in Section 5 and the EMU study *Modelling shocks and adjustment mechanisms in EMU*. The EMU studies by HM Treasury on *EMU and trade* and *EMU and labour market flexibility* are also relevant to some areas of this study.

2 A Theoretical Framework for the Analysis

2.1 The focus of this study is the mechanism through which monetary policy affects output and inflation. The primary objective of monetary policy is very similar in the UK and the euro area. In 1997, the UK Government put in place a new macroeconomic framework in which the primary objective for monetary policy is price stability. The UK framework makes clear that monetary policy should also support the Government's objective of high and stable levels of growth and employment. The primary objective of the European Central Bank is also to maintain price stability. The secondary objective, without prejudice to this first objective, is to support the general economic policies of the Community.

Monetary policy in the short, medium and long run

2.2 In the long-run steady state, standard economic theory suggests monetary policy has little impact on the trend path of output, which is determined by real variables, such as the degree of knowledge, skills and technology in the economy. This is the principle of long-run neutrality of money – in theory, in the long run monetary policy only determines the level of prices in the economy.[1] An important caveat is that it is recognised that inflation volatility can affect long-run real variables. Large and unpredictable fluctuations in output, employment and inflation impose significant economic and social costs and can hold back the economy's long-term growth potential. Stability helps businessess, individuals and the Government to plan effectively for the long-term, improving the quantity and quality of long-term investment in physical and human capital, and helping to raise levels of productivity. This is why price stability is a key component of the UK Government's economic strategy.

2.3 Monetary policy will indirectly affect output in the short and the medium run if there is short-run nominal price and wage rigidity in the economy. There are a number of reasons why prices and wages might be rigid in the short run, for example because contracts may be fixed in nominal terms, because of costs associated with changing prices, or because of the difficulty in distinguishing between inflation and relative price changes. It is generally accepted that these nominal rigidities are present in the economy (though it is a matter of dispute as to how pervasive and long lasting they are), which means that monetary policy will impact on output in the short run and possibly into the medium term.[2]

2.4 A formal representation of the impact of monetary policy can be found in the relationship between money supply and price inflation. The quantity theory of money identity links the stock of money in the economy (M) multiplied by the speed with which it is transferred around the economy, its velocity (V), to output (Y) valued at current prices (P):

$$MV \equiv PY$$

If velocity were reasonably stable over time, and if long-run real output is assumed to be determined by real variables, it can be seen that there would be a direct relationship between money and the price level in the long run. However, over the short and medium run, with price rigidities in the economy, so P is fixed or changes only slowly, the level of output will be affected by changes in the stock of money in the economy brought about through monetary policy.

The transmission mechanism of monetary policy

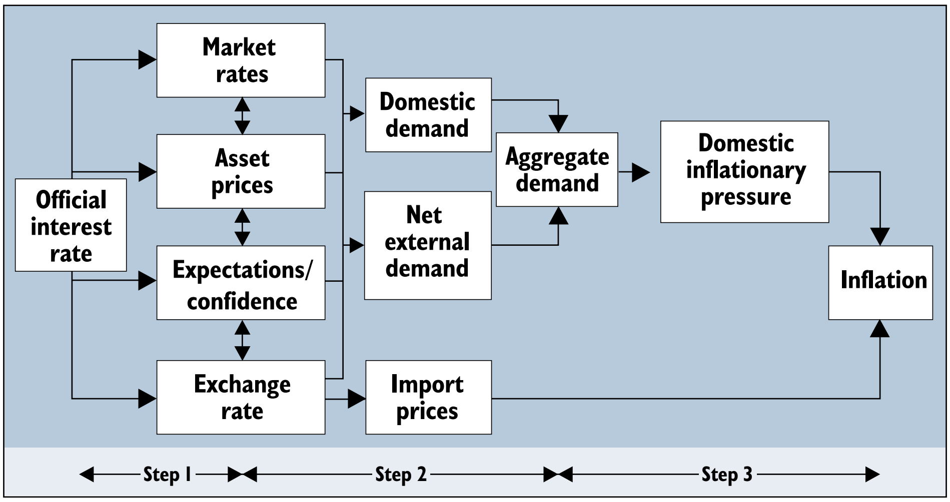
2.5 While there is widespread agreement that monetary policy can affect output in the short and medium run, there is less agreement over exactly how this occurs. Economists have suggested numerous channels for the transmission mechanism, but there is little consensus as to the relative importance of these different channels. This is especially true across countries where different economic structures may lead to differences in the importance of the various channels. This is why the next section of this study examines the range of

[1] For a more detailed account of the impact of monetary policy in the short and long run see Issing *et al*. (2001).

[2] For a fuller discussion of these issues see the EMU study *Modelling shocks and adjustment mechanisms in EMU*.

economic and financial structures which economists have suggested could play a part in the transmission mechanism. To provide a framework for the analysis of this complex issue, Chart 2.1 gives a simple diagrammatic representation of the steps and channels that are likely to be involved in the monetary transmission mechanism.

Chart 2.1: The transmission mechanism of monetary policy



Note: For simplicity this chart omits some important interactions between variables.

Source: Adapted from Monetary Policy Committee, 2001.

Step 1 **2.6** There are three main steps in the transmission of monetary policy. In step 1, a change in official interest rates is reflected in changes in market interest rates, asset prices, expectations and exchange rates.

Step 2 **2.7** In step 2, changes in these variables feed through to changes in spending behaviour in the economy through their impact on the components of domestic demand and net external demand. To illustrate the workings of this channel it is useful to consider the standard aggregate demand identity:

$$\text{Aggregate demand} = Y = C + I + G + (X - M)$$

where C = private consumption, I = private investment, G = government expenditure, X = exports and M = imports. There are a number of routes through which changes in market interest rates, asset prices, exchange rates and expectations could affect the components of aggregate demand. These are often divided into three channels: the interest rate channel; the credit channel; and the exchange rate channel.

Interest rate channel:

- short-term changes in interest rates may change the incentives to borrow and save;
- short-term changes in interest rates may lead to short-term changes in disposable income for borrowers and savers, and assuming that individuals face credit constraints, this may affect consumption; and
- changes in asset prices brought about by interest rate changes may affect individuals' and firms' wealth and thus consumption, or impact on the cost of capital and hence investment.

Credit channel:

- the ability of the banking sector to supply credit may be affected by changes in monetary conditions, which may affect corporate and household investment; and
- changes in interest rates may alter the value of collateral used to secure borrowing and change expectations of future cash flow; this may affect the ability of firms and households to secure financing for investment.

Exchange rate channel:

- a change in the exchange rate will tend to alter the relative prices of foreign and domestic goods, and so affect import and export patterns;
- a change in the exchange rate will affect the purchasing power of consumers via the effect on import prices; and
- a change in the exchange rate may also affect the value of assets and liabilities denominated in foreign currency, and the purchasing power of assets denominated in domestic currency, which may affect consumption.

2.8 The cumulative impact of monetary policy on spending behaviour through these channels leads to changes in real aggregate demand.

Step 3

2.9 Finally, step 3 in the transmission mechanism is from changes in aggregate demand to changes in output and inflation. As mentioned above, the impact of changes in aggregate demand on output will depend on the amount of nominal wage and price rigidity in the economy. In the absence of nominal wage and price rigidities, changes in demand would lead immediately to price changes with no impact on output. But in the short run, when it is generally accepted that nominal rigidities are present, changes in aggregate demand will lead to changes in output.

2.10 The impact of changes in demand on output and inflation may depend in part on the level of the output gap, which measures the difference between actual gross domestic product (GDP) and potential GDP. Potential GDP is the level of output at which the economy would be working without excess demand. If actual GDP is higher than this level then demand has increased output to a level where firms are working above sustainable levels. This will tend to lead over time to increases in wages and prices, as firms' costs grow and the demand for labour increases. If increases in spending come when there is a negative output gap, then there may be little overall upward impact on prices; by contrast, an increase in spending when the economy is above potential could lead to an inflationary boom with sharp price rises. This suggests that the impact of monetary policy on prices may be non-linear, and may depend on the baseline starting point.

Comparing transmission mechanisms across countries

2.11 This discussion shows that the transmission of changes in monetary policy to changes in output and inflation is complex. This is true not just of the theory of transmission but also in practice. It has proved difficult to establish exactly how the monetary transmission mechanism operates in the UK. Partly this is a by-product of the instability which beset the economy until recently, which meant that the output-inflation trade-off and its interaction with monetary policy was difficult to pin down.[3]

[3] For a discussion of these issues, see Balls and O'Donnell (2002).

2.12 The extent of the transmission of monetary policy changes is likely to vary across countries due to different economic structures. Moreover, certain structural features are likely to have offsetting effects, which further complicate the analysis. It is commonly accepted that monetary policy operates with a time lag, and the speed of the transmission mechanism is also likely to vary across countries. These issues are important for the question of possible UK entry to EMU, as in a monetary union a single authority sets monetary policy. Variations in the strength and speed of monetary policy transmission across countries in a monetary union could therefore lead monetary policy to be a source of asymmetric shocks.

3 Structural Factors Which Drive the Transmission Mechanism

Monetary policy can impact on the real economy through a wide variety of channels, and numerous structural factors will influence the speed and extent of the transmission mechanism through these channels.

The pass-through of monetary policy from official interest rates to bank lending rates is faster in the UK than in other large countries, such as France and Germany, potentially making the UK more sensitive to monetary policy changes.

The UK household sector may react more strongly to interest rate changes than in euro area countries:

- **UK households have a greater exposure to mortgage debt at variable rates;**
- **UK households are able to draw more easily on housing wealth gains to support current spending, and real house price growth has been stronger in the UK than in most euro area countries; and**
- **UK household consumption may be more sensitive to changes in financial wealth.**

There is little to suggest the UK corporate sector will react more strongly to monetary policy than the euro area corporate sector. The structure of UK production is service-intensive, banks are relatively large and firms use a range of financial products.

The UK has relatively high levels of non-EMU trade and a larger stock of foreign assets and liabilities than major euro area countries, which may make the UK more sensitive to monetary policy through the exchange rate channel.

The UK is seen to have relatively low levels of nominal wage rigidity. Nominal wage and price rigidity strengthens the impact of monetary policy on output (and temporarily reduces the impact on inflation).

The UK's overall sensitivity to monetary policy relative to euro area countries will depend on how these effects balance out in aggregate. There is more evidence for structural factors tending to increase the strength of the transmission mechanism in the UK. But it is difficult to weigh up in aggregate the impact of structural factors so as to identify the relative strength of the monetary transmission mechanism. To do this would require each structural factor to be weighted according to its importance in the overall transmission mechanism.

3.1 This section considers whether there are structural differences between the UK and the euro area which would suggest that the speed and strength of the transmission of monetary policy to output and inflation would be different in the UK. The representation of the transmission mechanism provided by Chart 2.1 in the previous section is used as a guide to examining these structures. The framework for this section is:

- **step 1**: the impact of a change in official rates on market rates, asset prices, expectations and the exchange rate;
- **step 2**: from market rates, asset prices, expectations and exchange rates to changes in spending behaviour. The analysis here is split into three subsections:
  - impact of changes in market rates and asset prices on spending behaviour in the household sector;
  - impact of changes in market rates and asset prices on spending behaviour in the corporate sector; and
  - impact of changes in the exchange rate on spending behaviour.
- **step 3:** the impact of a change in spending behaviour on output and inflation.

STEP 1: FROM OFFICIAL RATES TO CHANGES IN MARKET RATES, ASSET PRICES, EXPECTATIONS AND THE EXCHANGE RATE

3.2 A change in the official interest rate will be transmitted, via changes in wholesale banking market rates, to the rates that banks charge domestic and corporate clients for borrowing, and offer for saving.

3.3 As well as affecting market interest rates, a change in official rates will also lead to changes in asset prices, including housing, and expectations. For example, changes in interest rates affect house prices through movements in housing demand and supply – a cut in interest rates (if transmitted to mortgage market rates) will make borrowing to fund house purchases more affordable, thereby increasing demand and subsequently prices. Bond prices are inversely related to long-term interest rates – a fall in long-term rates leads to an increase in the bond price. Economic theory predicts that equity prices will rise after a cut in interest rates. This is because equity prices represent the market's expectation of the present value of the future stream of income from the equity. As interest rates fall, this future stream of income will be discounted at a lower rate, and so its present value will increase. A fall in long-term interest rates also reduces the attractiveness of bonds relative to equities, increasing demand for equities and raising their price.[1]

3.4 However, this relationship is not clear-cut. Market expectations may also be affected by changes in the official rate; for example, if an interest rate cut is taken as a signal that policy makers expect low demand growth in the future, then equity prices may fall. This is one example of how changes in the official rate will affect the expectations of financial markets and of firms and households as to the future direction of growth and inflation. This is a potentially important influence on household and firm behaviour.

3.5 With open capital markets, the level of the exchange rate is also influenced by changes in official interest rates. The *uncovered interest-rate parity* (UIP) condition suggests that a rise in the official rate will, other things being equal, lead to an appreciation of the exchange rate, as international investors adjust their portfolios to reflect higher sterling interest rates by buying sterling assets. In fact, the UIP condition has been found to be a poor empirical model for exchange rate movements.[2] Again, one reason may be the impact of monetary policy on expectations. For example, if international investors perceive that an interest rate reduction will boost economic growth, they may shift funds into UK equities, which will tend to push up the value of sterling.

3.6 The first round effects of monetary policy on asset prices, expectations and the exchange rate[3] will be important, but the literature on cross-country differences in the first step of the transmission mechanism is more focused on differences in the transmission of interest rates. This apparent gap in the literature on the effects of monetary policy on asset prices and expectations across countries clearly limits the conclusions that can be drawn from the analysis in this section. One tool for helping to address gaps such as this is to use economic models which consider the strength of the transmission mechanism at the aggregate level. This is the focus of Section 4 of this study. The discussion in the current section focuses on the response of market interest rates to official rate changes, and on the key conclusions from the EMU study *Housing, consumption and EMU* by HM Treasury on the response of house prices to interest rate changes.

[1] For more detail on the impact of monetary policy on equities see Mishkin (2001). For empirical literature on the pass-through to asset prices see Cassola and Morana (2002) on the euro area and Rigobon and Sack (2002) on the US.

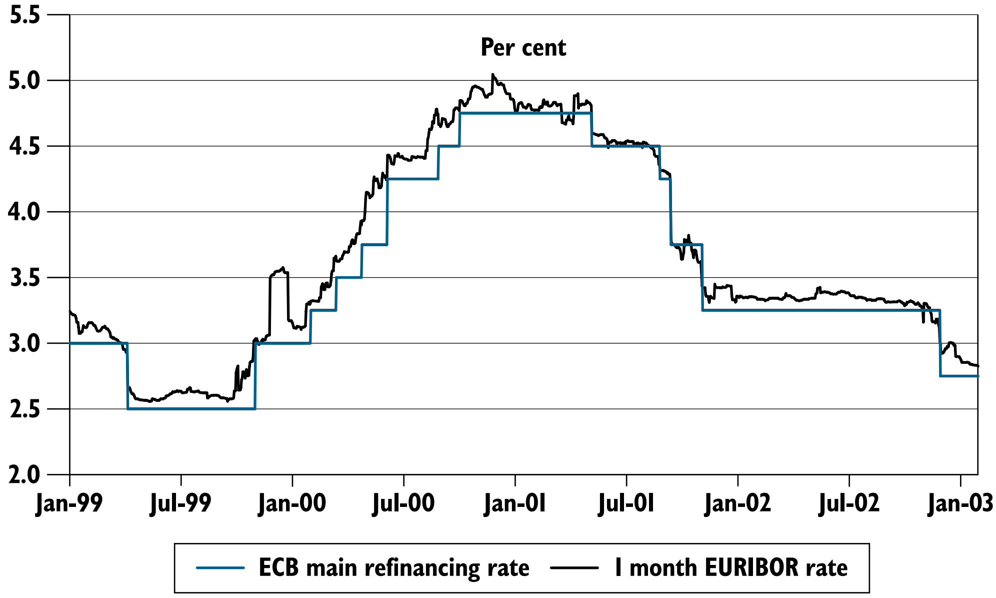
[2] For a review of the literature in this area see Taylor (1995). Also see the EMU studies *The exchange rate and macroeconomic adjustment* by HM Treasury and *Estimates of equilibrium exchange rates for sterling against the euro* by Professor Simon Wren-Lewis.

[3] Any differences which did exist in the transmission of monetary policy to the exchange rate would be removed on entry to EMU where countries share a common monetary policy and exchange rate. However, the impact of exchange rate changes on spending behaviour may still vary across the members of a currency union – this issue is considered in the discussion of step 2 in this section.

Response of market and bank lending rates to official rates

3.7 The first step in the transmission of changes in official rates to retail rates is from the official rate to short-term rates in the wholesale banking market. In general, market forces ensure this is a rapid transmission; indeed, if the market correctly anticipates policy makers, then wholesale rates may move ahead of the official rate change. Charts 3.1 and 3.2 indicate that in the euro area, the euro area inter-bank offer rate (EURIBOR) tracks the ECB's main refinancing rate fairly closely; the same is true in the UK, where the London inter-bank offer rate (LIBOR) follows the Bank of England's official rate.

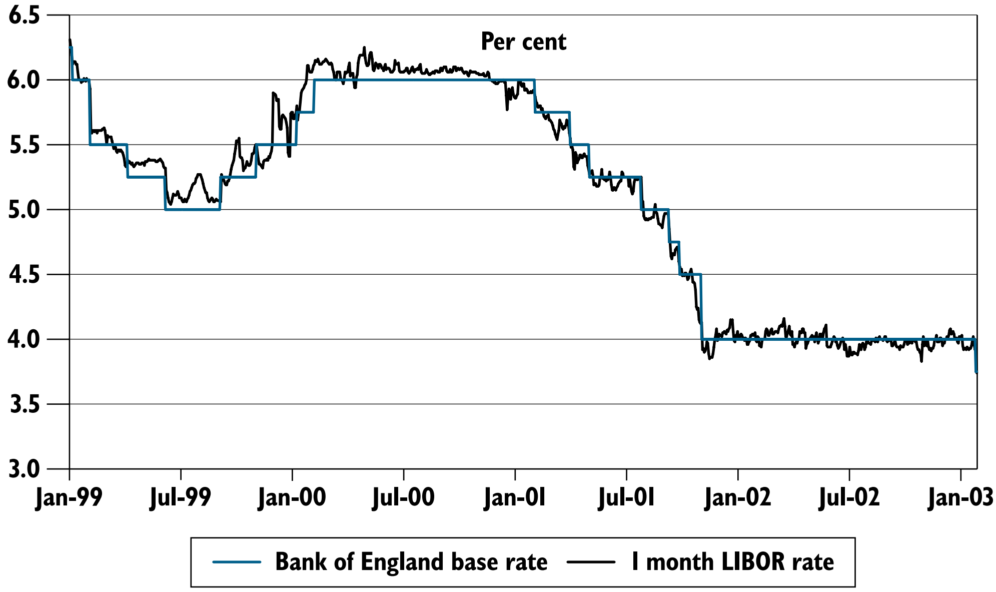
Chart 3.1: ECB main refinancing rate and the euro area inter-bank offer rate (EURIBOR)



Source: ECB/Bloomberg.

3.8 For a number of reasons the transmission of changes in wholesale rates to retail rates may not be so rapid, or to the same degree, as the original official rate change. Banks may feel that it is damaging to customer relations to change retail rates frequently, or a lack of competition may allow banks to withhold changes. Long-term rates are unlikely to reflect closely changes in official rates as they are influenced by both current rates and by the expectation of future rates. The impact on long-term rates of a short-term rate cut may be muted if it leads to expectations of a future rate rise, and vice versa.

Chart 3.2: Bank of England base rate and London inter-bank offer rate (LIBOR)



Source: ECB/Bloomberg.

3.9 Evidence suggests that in the UK, changes in official rates feed through more quickly and more completely to short-term retail rates than in the euro area. Borio and Fritz (1995) compare the response of bank lending rates to changes in the policy interest rate across countries. The results are presented in the left-hand side of Table 3.1. The UK achieves full pass-through after one month; in most other countries there are large differences between short-term responses and those over the long term. Over the short term, the UK has the fastest response of all the countries; it is considerably slower in the large euro area countries. The variation in long-run responses relative to the UK is somewhat narrower; France is the main outlier, with a significantly smaller response than the other countries.

3.10 Similar results were found by Cottarelli and Kourelis (1994); these are also reported in Table 3.1. Again, the UK has the most rapid short-run response to interest rate changes. Over the long run, the differences are less sharp, though it is noticeable that Italy has a strong response in the long run.

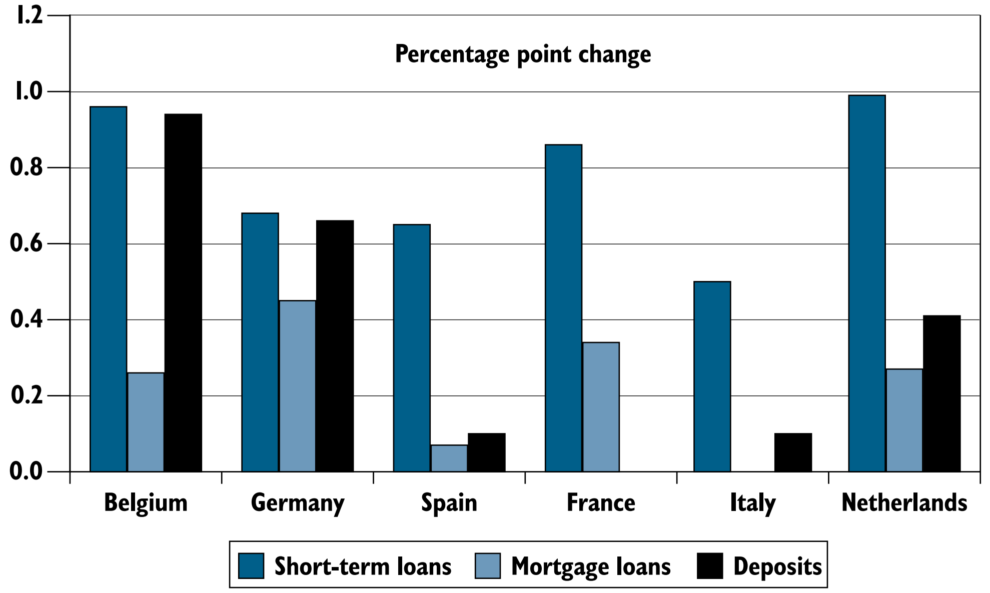
Table 3.1: Response of bank lending rates to one percentage point increase in the official interest rate

Percentage point change	Borio and Fritz				Cottarelli and Kourelis			
	1 month	3 months	6 months	12 months	Impact	3 months	6 months	Long run
UK	**1.00**	**1.00**	**1.00**	**1.00**	**0.82**	**1.02**	**1.04**	**1.04**
Germany	0.00	0.32	0.50	0.73	0.38	0.67	0.83	1.04
Netherlands	0.71	0.90	0.95	0.95	0.52	0.97	1.03	1.04
Belgium	0.61	0.82	0.85	0.85	0.21	0.61	0.81	1.03
France	0.53	0.56	0.58	0.59	n.a	n.a	n.a	n.a
Spain	0.00	0.95	1.02	1.05	0.35	0.80	0.98	1.12
Italy	0.19	0.72	0.97	1.06	0.11	0.40	0.61	1.22

Source: Borio and Fritz, 1995; Cottarelli and Kourelis, 1994.

3.11 A more recent study by Mojon (2000) looks at the response of retail interest rates to changes in money market rates for a number of euro area countries. In all the countries, the short-term loan rate reacts most rapidly to a change in the money market rate. In Belgium and Germany in particular, the deposit rate reacts more fully than mortgage rates. As in the two previous studies, Italy seems to have a particularly weak short-term response. These data are useful in that they highlight differences between existing euro area countries, though Mojon does not include data for the UK.

Chart 3.3: Response of retail interest rates to a one percentage point money market rate change after three months



Note: Responses over period 1988-98; no data provided for French deposit rates and Italian mortgage interest rates.
Source: Mojon, 2000.

Impact of EMU on interest rate pass-through

3.12 The more rapid response of retail market rates to official interest rates in the UK is typically attributed to the structure of banking in the UK. In particular, banks in continental Europe have tended to have more inter-linked relations with their borrowers than banks in the UK, which might make them more reluctant to pass through official rate changes immediately to their customers. Dornbusch *et al.* (1998) assert that another factor is a lack of competition in some euro area banking sectors.

3.13 Such differences may narrow in EMU, and some recent research suggests that the strength of pass-through is increasing in the euro area. De Bondt (2002) models the pass-through from money market rates to bank retail deposit and lending rates at the aggregate euro area level. In line with earlier studies, the results indicate an incomplete pass-through in the short term of at most 50 per cent of the money market change. In the long run, pass-through reaches 100 per cent for bank lending rates. However, the research also shows that adjustment has become faster since January 1999. This could be attributed to an increase in competition in the euro area banking market, although more evidence would obviously be needed to confirm any trend. This issue is returned to in Section 6 of this study.

HM Treasury calculations of interest rate pass-through

3.14 The studies which compare the degree of pass-through in the UK to other euro area countries are now rather dated. To bring this analysis up-to-date, HM Treasury has used the methodology in Mojon (2000) with data over the period 1995 to 2002, to compare the pass-through of official rates to variable rate mortgage lending rates in the large EU economies, including the UK.

3.15 The results in Table 3.2 show that the UK three-month pass-through remains significantly higher than euro area countries at 0.97 percentage points. France aside, the EMU pass-through rates found in this work are higher than in Mojon's results for the period 1980 to 1998, which, like De Bondt (2002), suggests that pass-through rates may have increased recently.

Table 3.2: Response of variable mortgage rates to a one percentage point change in official interest rates after three months

Percentage point change	UK	Germany	Italy	Spain	France
Three-month response	0.97	0.78	0.62	0.66	0.33

Source: HM Treasury calculations.

Response of house prices to interest rate changes

3.16 This stronger pass-through of official interest rate changes to variable mortgage rates in the UK has implications for the effect of monetary policy on the value of housing assets. The response of house prices to changes in interest rates will depend on demand and supply factors in the housing market. Theory suggests that the interest rate sensitivity of housing demand reflects income and substitution effects; for example, as the cost of borrowing to fund house purchases falls, demand for owner-occupied housing will tend to increase. The strong pass-through of official rate changes to variable mortgage rates, combined with greater exposure to mortgage debt at variable rates (discussed in step 2), would therefore point to housing demand in the UK being potentially more responsive to changes in interest rates than in other euro area countries – an issue discussed in the EMU study *Housing, consumption and EMU* by HM Treasury.

3.17 That study also finds evidence of weak housing supply responses, i.e. a relatively low price elasticity of housing supply in the UK compared to euro area countries, reflected in the relatively strong long-term upward trend in UK house prices.

3.18 Where supply responses are weak, longer-term movements and also shorter-term volatility in house prices are likely to be much stronger in the face of changes in interest rates, or indeed other demand shocks. The UK has experienced relatively strong real gains in house prices over the past 25 years or so, compared with Germany, France and Italy. UK house prices have also been quite volatile compared with Germany and France; although throughout the EU as a whole, the UK's experience in this regard has not been that unusual.

Conclusions on step 1 of the transmission mechanism

3.19 Overall, the evidence suggests that the pass-through from official rates to retail interest rates is faster in the UK than in major euro area countries, although there is some evidence that the speed of pass-through in the euro area may have increased in recent years. The evidence on housing demand and supply implies that UK house prices are potentially more responsive to interest rate changes than in other EU countries. Even if the interest sensitivity of housing demand were to become more similar across the EU – driven by convergence in mortgage markets for example (discussed further in Section 6) – price inelastic housing supply in the UK means that house prices may rise by more in the UK than in many other EU countries, for any given increase in housing demand.

STEP 2: FROM MARKET RATES, ASSET PRICES, EXPECTATIONS AND EXCHANGE RATES TO CHANGES IN SPENDING BEHAVIOUR

3.20 The second step in the transmission mechanism is from changes in market interest rates, asset prices, expectations and the exchange rate, to changes in the spending behaviour of firms and households. There are three main channels through which this may happen: the interest rate channel, the credit channel and the exchange rate channel.

3.21 These channels are linked to the structure of corporate and household financing – the level of borrowing, credit and saving in the economy. If there are significant differences in these structures across countries, then the strength and speed of the monetary transmission mechanism could also differ. This section first compares the overall structure of finance in the UK and the euro area. It then examines in more detail the structure of household and corporate sector finance. The exchange rate channel is then considered separately. This analysis does not consider the impact of monetary policy on the government sector, on the grounds that this is small compared to the impact on households and firms.

Overall structure of financing in the UK and the euro area

3.22 A stylised fact in the financial literature is that the UK has a different corporate financing structure from elsewhere in Europe, with higher levels of equity and lower levels of bank lending. Byrne and Davis (2002) have constructed a set of data on the G7 economies that enables a detailed comparison of financial structures.[4] These data have been used to put together Table 3.3, which illustrates three key facts on corporate and household financial structures:

- the UK household sector has a high level of net financial assets;
- however, the net interest-bearing asset[5] position of the UK household sector shows a small deficit, primarily because a significant proportion of the UK's household assets are in non-interest bearing life and pension funds; and
- the UK corporate sector has a large negative net financial asset position, of a similar magnitude to France. Those in Germany and Italy are much smaller. However, the net interest-bearing asset position of the corporate sector is very similar in each economy. This is because a significant proportion of the UK corporate sector's liabilities are non-interest bearing equities.

[4] HM Treasury is grateful to the authors for kindly making their dataset available for use.

[5] Equal to the sum of deposits, notes and coins, money market instruments and bonds. It has not been possible to exclude notes and coins from this total, because the sectoral division of holdings cannot be identified.

Table 3.3: Net financial assets, 1998-2000

Per cent of GDP	UK	Germany	France	Italy
Household sector				
Total financial assets	307	166	220	219
Total financial liabilities	70	72	37	21
Net financial assets	**237**	**94**	**183**	**198**
of which:				
Total interest-bearing assets[1]	68	82	67	101
Total interest-bearing liabilities[2]	70	72	37	21
Net interest-bearing assets	**–2**	**10**	**31**	**80**
Non-financial corporate sector				
Total financial assets	95	76	173	58
Total financial liabilities	272	141	337	137
Net financial assets	**–177**	**–65**	**–164**	**–79**
of which:				
Total interest-bearing assets[3]	44	25	39	17
Total interest-bearing liabilities[4]	77	59	74	53
Net interest-bearing assets	**–33**	**–34**	**–35**	**–36**

[1] Sum of deposits, notes and coins, money market instruments and bonds.
[2] Sum of consumer credit and housing loans.
[3] Sum of deposits, notes and coins, money market instruments, bonds and loans.
[4] Sum of money market instruments, bonds and loans.
Source: Adapted from Byrne and Davis, 2002. Figures may not sum due to rounding.

3.23 Overall, the Byrne and Davis dataset suggests some cross-country differences in the structure of finance, though at this aggregated level the UK does not stand out as being a particular outlier.[6] This illustrates the importance of analysing in more detail the structure of financing in the UK and the euro area. The remainder of this section does this by dividing the analysis into three parts:

- impact of changes in market rates and asset prices on spending behaviour in the household sector;
- impact of changes in market rates and asset prices on spending behaviour in the corporate sector; and
- impact of changes in the exchange rate on spending behaviour.

Impact of changes in market rates and asset prices on spending behaviour in the household sector

3.24 The first part of the analysis of step 2 considers the impact of changes in market interest rates and asset prices on household sector spending behaviour through three key channels:

- the impact of changes in interest rates on mortgage payments;
- the impact of changes in housing asset prices on consumption; and
- the impact of changes in financial asset prices on consumption.

[6] The net financial positions of the household and corporate sectors should be balanced by the positions of the government, financial and external sectors. Byrne and Davis (2002) show the positive Italian combined household and corporate position balanced primarily by a significant negative government position. In the UK, negative government and financial sector positions mirror the positive combined household and corporate sector position. In France and Germany, lower positive combined household and corporate position reflect negative government positions but a small positive financial sector position. In terms of interest-bearing assets, in the UK, Germany and France, negative corporate and household positions match positive positions in the financial sector; in Italy the government has a negative interest-bearing asset position.

3.25 Another potential channel to consider is the impact of changes in interest rates on net interest-bearing assets. Although the UK household sector has lower levels of net interest-bearing assets than France or Italy, implying that a change in interest rates will have a greater impact on French and Italian households through interest paid, in practice Table 3.4 shows that interest-bearing short-rate sensitive assets (deposits) are broadly similar across countries.

3.26 The first two of the three key channels above are concerned with the housing market. The housing market is often described as one of the key structural differences between the UK and euro area economies. Because of the importance of this issue, HM Treasury has produced the EMU study *Housing, consumption and EMU* that covers the issue in detail. The key conclusions of this study are repeated here.

Impact of changes in interest rates on mortgage payments

3.27 The examination of housing and mortgage market structures in *Housing, consumption and EMU* provides good evidence that UK household finances, on average, are likely to be more sensitive to changes in short-term interest rates than in euro area economies. The UK's combination of high mortgage debt levels and exposure to variable rates of interest is striking. For credit-constrained households, this implies much stronger direct cash flow effects on consumer spending in the UK. More generally, it implies that the demand for housing in the UK may be more responsive to changes in interest rates than in other euro area countries.

Impact of changes in house prices on consumption

3.28 The full impact of a change in interest rates on consumer spending will also depend on the response of house prices, as this will affect the level of housing wealth and thus influence consumption. As discussed in step 1, it is likely that a change in interest rates will have a greater impact on UK house prices than in the euro area, due to the UK's relatively low price elasticity of housing supply. Since increases in house prices create both winners and losers, it seems likely that wealth effects can only be strong if owner occupiers increase spending following an increase in house prices simply because they feel better off. Their ability to do so is strongly influenced by the degree of regulation in credit and mortgage markets.

3.29 The relationship between house prices and consumer spending is therefore likely to be strongest in countries where the degree of home ownership and levels of housing equity are high, and where the financial system is sufficiently liberalised to allow homeowners to access housing equity to support current consumption. The UK owner occupation rate is not significantly out of line with the EU average, and housing is a key asset for households in all large EU countries, accounting for around one third of total household wealth in the UK, Germany and Italy, and around 40 per cent in France.

3.30 However, UK households do appear to be able to draw more easily on housing wealth to support current spending. Average mortgage equity withdrawal has been high in the UK compared to Germany, France and Italy since the 1980s. This may reflect liberalisation in UK credit and mortgage markets during the 1980s which appears to have greatly enhanced the liquidity of housing wealth. Empirical studies, reviewed in the EMU study *Housing, consumption and EMU*, on balance support the view that the sensitivity of household spending to housing wealth and house prices is higher in the UK than in other EU countries.

3.31 Overall, differences in housing and mortgage markets between the UK and other EU countries together indicate the potential for greater sensitivity of household spending to interest rate changes in the UK than in large euro area countries.

Impact of changes in financial asset prices on consumption

3.32 The third channel through which interest rate changes affect household spending behaviour is through the impact of financial asset prices on consumption. Changes in financial asset prices will affect consumption via their impact on household wealth.

3.33 There is a wide-ranging economic literature on the propensity to consume out of financial wealth compared to housing wealth.[7] This generally suggests that the latter is stronger. One reason is that the liquidity of these two types of assets is different; before financial liberalisation in the UK in the 1980s, equity holdings were easier to cash in than housing wealth. However, equity prices are typically more volatile than house prices, so households are more likely to see house price rises as permanent and therefore to increase consumption in response. Finally, housing wealth is typically highly leveraged as households usually borrow to fund house purchases but not equity purchases. This means house price rises will tend to lead to larger net returns on investment than equivalent equity price rises. The propensity to consume from wealth may also vary between countries. For example, individuals in countries with market-based finance systems may find it easier to borrow against their wealth, compared to households in countries with bank-based financial systems which offer a less diverse range of financial products.

3.34 The theoretical assertion that consumption could be more responsive to housing wealth than financial wealth has been confirmed by some recent empirical work. For example, a multi-country study by the IMF (2002) found that the marginal propensity to consume from housing wealth is greater than from equity wealth. Another recent study by Case *et al.* (2002) also found that housing market wealth has a greater impact on consumption than financial wealth.

3.35 Table 3.4, again based on the Byrne and Davis dataset, indicates holdings of financial wealth in the large EU countries. Direct equity holdings are particularly large in France, though Norman *et al.* (2002) show that a significant component of these holdings are unquoted equity which may be less liquid and so less likely to provoke changes in consumption. In general, the size of equity holdings in continental Europe has been increasing in recent years as equity markets have grown in importance.[8]

Table 3.4: Household financial assets, 1998-2000

Per cent of GDP	UK	Germany	France	Italy
Deposits, notes and coins	65	63	61	58
Money market instruments	0	0	1	3
Bonds	3	18	5	40
Direct equity holdings	53	28	82	53
Mutual funds	16	18	20	40
Life & Pensions	170	39	51	26
Total	**307**	**166**	**220**	**219**

Note: Figures may not sum due to rounding.
Source: Byrne and Davis, 2002.

[7] For example see IMF (2002) or Poterba (2000).
[8] The data in Table 3.4 are based on the high equity price valuations of between 1998-2000. Given the recent stock market declines current figures may be significantly lower, although reductions in equity prices have been fairly uniform across countries and so relative positions are unlikely to have changed as much as absolute ones. The EMU study by HM Treasury *Housing, consumption and EMU* includes data indicating that UK household financial assets had fallen to just under 250 per cent of GDP in quarter three of 2002.

3.36 The UK stands out as having very large life and pension fund assets: UK households hold a high share of their equity wealth indirectly in life assurance and pension funds rather than through direct ownership. Household spending has not, to date, reacted strongly to recent falls in the value of life and pension fund assets. Thaler (1990) suggests that individuals develop 'mental accounts' which lead them to consume different assets in different ways. So the propensity to consume out of pension fund assets may be relatively low, as individuals may have earmarked it as retirement income. The propensity to consume pension fund income will also depend on whether the fund is defined benefit or defined contribution. In the former case, increases in the value of a fund will accrue to the firm rather than the household and so are unlikely to lead to increases in household consumption.[9] However, recently improved regulations on disclosure, for example through pension and endowment projections, and gravitation from defined benefit to defined contribution occupational pension schemes, will have made individuals more aware of the value of their indirect institutional asset holdings. These developments, and associated publicity, can therefore be expected to have strengthened the link between changes in indirect wealth holdings and consumer spending.

3.37 A number of studies have tested empirically for the impact of changes in equity wealth on consumption. Much of this research has focused on the US, though there are also some cross-country studies. In general, results suggest that the equity wealth effect is higher in the US, Canada and the UK than in the other G7 countries, due to the greater size of equity markets in these countries.[10] Norman *et al.* (2002) also show tentative evidence that in Germany and France the propensity to consume out of financial wealth is lower, due to differences in the demographic distribution of equity holdings between Germany, France and Italy on the one hand, and the US and the UK on the other. In the former group, high-income and older households dominate equity holdings to a much larger degree than in the UK and the US. Such households may have a lower marginal propensity to consume than lower-income and younger households. The IMF (2002) also finds that the impact of changes in wealth is higher in economies which it classifies as using market-based financial systems, such as the UK, than in economies which it classifies as using bank-based financial systems, such as those of continental Europe. This is supported by simulation results from the European Commission's QUEST model presented in the EU Economy 2002 Review (European Commission 2002). In the face of a shock to equity prices, the reaction of EU output is only about one half to one third of the US response.

3.38 Overall, there is evidence to suggest that the UK may experience a greater impact on consumption from changes in financial wealth than other European countries. This is due to the greater size of equity holdings in the UK and the wider demographic profile of equity holders. On the other hand, the high level of equity holdings in life and pension funds may constrain the impact. Households may have earmarked pension holdings as retirement income. If pensions are defined benefit then changes in their value may not be viewed as changes in future household income. Moreover, studies suggest changes in housing wealth impact more strongly on consumption than changes in financial wealth.

Conclusions on the household sector – a potential source of asymmetry?

3.39 In conclusion, this analysis has highlighted some significant structural differences between the UK and euro area household sectors, which could have important implications for the monetary transmission mechanism:

- the UK has a high level of mortgage debt as a per cent of GDP and more of this debt is held at variable rates than in euro area countries;
- UK households are able to draw more easily on their housing wealth gains to support current spending, and real house price growth has been stronger in the UK than in large euro area countries; and
- the UK has high levels of financial wealth, held predominantly in life and pension funds.

[9] For example, see Greenspan (2001).

[10] For a review of this literature see Boone *et al.* (1998).

3.40 These factors suggest that consumption in the UK could be particularly sensitive to mortgage rate changes, to changes in housing wealth and to changes in financial wealth. This source of asymmetry is a key consideration in the assessment of whether the UK has achieved sustainable convergence with the euro area. However, household debt is one factor out of many that influence the transmission mechanism. Additionally, it is possible that the structure of housing and financial markets in the UK may change in the future, in or out of EMU; an issue considered in Section 6 of this study.

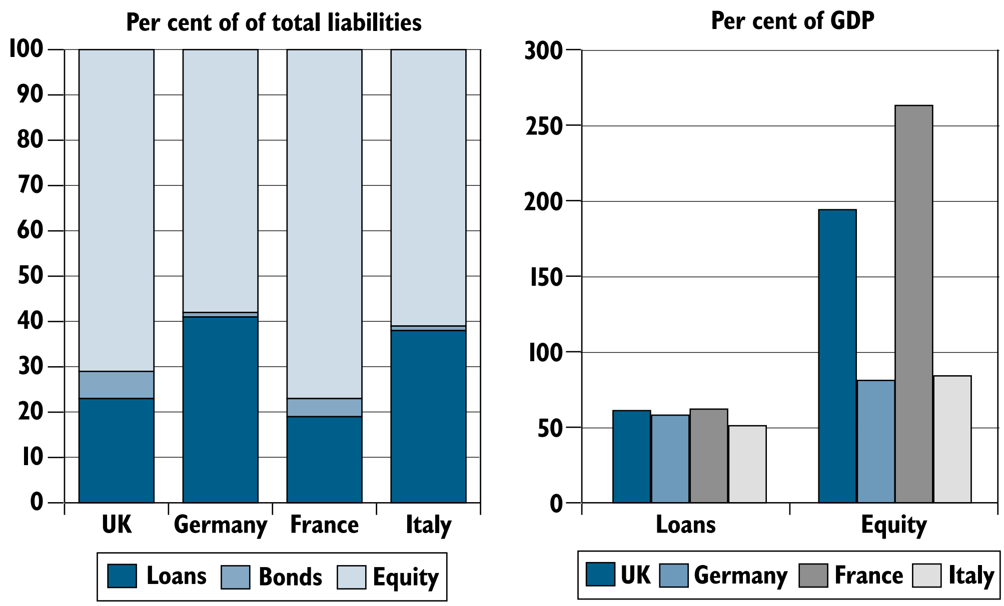
Impact of changes in market rates and asset prices on spending behaviour in the corporate sector

The structure of corporate finance

3.41 The analysis of the transmission of interest rates and asset prices to spending behaviour via the corporate sector requires consideration of the structure of financing in the UK corporate sector. Table 3.3 above shows that the UK non-financial corporate sector has a high level of financial liabilities and a large negative net financial asset position; at this aggregated level it is more similar in structure to France than to Germany or Italy.

3.42 Chart 3.4 disaggregates these data, giving the proportion of corporate liabilities accounted for by loans, bonds and equity in the period 1998-2000. As a per cent of total liabilities, there is a clear divide between the UK and France, with high levels of corporate bonds and equity,[11] and Germany and Italy, where bank loans are more important. However, as a per cent of GDP, loans to the corporate sector are very similar across these four economies – at around 50 per cent of GDP. The key difference is that the UK and France have much higher levels of equity financing.

Chart 3.4: Sources of corporate finance, 1998-2000



Source: Byrne and Davis, 2002.

3.43 As with the household sector, the scale of the direct impact of interest rate changes on the corporate sector will depend on the quantity of debt held at variable rates and the

[11] The owners of this equity differ in France and the UK. A large portion of French corporate equity is held by other corporates and by the financial sector; while in the UK a significant degree of corporate equity is held by life and pension funds.

maturity of the debt. Unfortunately, comparable data on the corporate sector are difficult to come by. The latest available data come from a survey of central banks undertaken in 1995; this is presented in Table 3.5. It suggests that in 1993 the amount of credit at variable rates to the UK corporate sector was lower than the average, and that the UK and Italy had a higher proportion of debt held at short maturities than other countries.

Table 3.5: Credit to corporates: maturity and type, 1993

Per cent of total	UK	Germany	France	Italy	Netherlands	Belgium
Short term[1]	50	22	27	56	23	37
Medium and long term	50	78	73	44	77	63
Variable[2]	48	40	56	76	37	67
Fixed	52	60	44	24	62	33

[1] *Up to one year (Italy up to 18 months; Netherlands up to two years).*
[2] *At short-term and adjustable rates of interest.*
Source: Borio, 1995.

3.44 In summary, evidence on the structure of financing does not suggest that the UK corporate sector will be particularly sensitive to direct interest rate changes. The UK corporate sector has a relatively low level of loans as a per cent of total liabilities; Germany has a significantly higher level of loans on this measure. However, as a per cent of GDP the level of loans in the four major EU economies is relatively similar.

The importance of the credit channel

3.45 The analysis above focuses on the direct impact of an interest rate change on the corporate sector cost of finance. However, much of the recent analysis of the monetary transmission mechanism has emphasised the potential importance of the credit channel. This highlights the role of capital market imperfections, such as asymmetric information, in amplifying the direct cost of capital impact of monetary policy changes. Two forms of the credit channel are identified in the literature:

- the bank-lending channel; and
- the broad credit channel.[12,13]

3.46 The **bank-lending channel** centres on the supply of bank credit. After an official interest rate rise, corporate and household debt service burdens will rise, which increases the number of non-performing loans on bank balance sheets. This will reduce bank profitability and their ability to raise further capital. In order to keep the ratio of capital-to-assets at credible levels (often a minimum capital-to-asset ratio is set by regulation), banks will then have to reduce the volume of loans which they offer. If there is imperfect substitution between bank loans and other available credit such as securities – a reasonable assumption for households and smaller firms – then credit and thus investment will fall. This channel may particularly affect small firms, which tend to be more reliant on bank lending. It may also impact more sharply on small banks, which are less able to secure additional funding in the event of a monetary tightening; and, for similar reasons, on banks in poor financial health.

3.47 The **broad credit channel** relates to differences in the cost of internal and external sources of finance. In theory, under perfect information, these costs should be equal at the margin. However, in the presence of asymmetric information – where the borrower knows more about the risk of the project than any prospective lender – there will be an extra cost for external finance. The size of this spread is likely to be a negative function of a firm's net worth – in the absence of complete information, a lender will use a firm's net worth and/or collateral to control for the risk of a project.[14] Other things being equal, if interest rates rise then net worth will decline, as future profit is discounted at a higher rate. With lower net worth banks

[12] See for example, Bean *et al.* (2002) for a description of the credit channel.

[13] Most of the literature concentrates on the impact of the credit channel on the corporate sector. However, households may also be affected – they are reliant on bank lending, and may use collateral, such as housing, to obtain credit.

[14] See Ashworth and Davis (2001) for a discussion of this issue.

will ask for a higher spread or more collateral, so raising the cost of capital – in addition to the standard interest rate channel – and so lead to a fall in investment.

Structural evidence on the credit channel

3.48 A number of structural factors potentially determine the strength of the credit channel:

- the degree to which firms use bank loans as opposed to equity or other forms of finance. If financial markets are diverse then firms or households can raise finance through other sources if bank lending is constrained;
- high levels of corporate leverage and a reliance on collateral would increase the impact on net worth of an interest rate rise, suggesting a strong broad credit channel effect;
- small firms are more likely to use bank financing and are more exposed to asymmetric information. The credit channel is likely to be stronger in countries with a large small firm sector; and
- small and financially weak banks may be less able to acquire alternative sources of capital in the face of a monetary tightening. In the past, the provision of government assistance may have enabled small banks to continue lending in the face of a monetary tightening. Banks may also be able to secure funds from larger banks in banking networks. It is also argued that close relations between banks and firms may reduce information problems. Evidence from a recent ECB research programme (see Box 4.3) has suggested that in the EU it is the lending of *liquidity-constrained* banks that is most sensitive to interest rate changes. All this means that the structure of the banking sector is likely to be an important determinant of the strength of the bank-lending channel.

Use of bank loans

3.49 Chart 3.4 indicated that the UK corporate sector uses more equity and bonds relative to bank loans than Germany and Italy. This suggests the bank-lending channel may be less strong in the UK than elsewhere. UK firms also tend to make greater use of internal finance for investment than Germany (for example, see Corbett and Jenkinson, 1997). This makes them less reliant on bank-lending, though it also suggests that there may be an extra cost for external finance, which could suggest the broad credit channel may be more important.

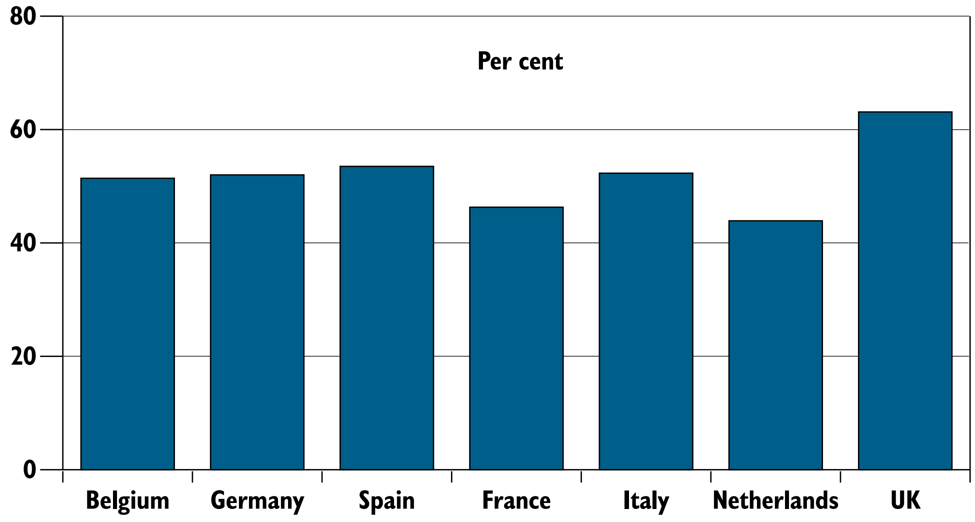
Leverage and the use of collateral

3.50 Chart 3.4 also indicated that UK and French firms have lower levels of debt compared to equity than firms in Germany and Italy, suggesting lower levels of corporate leverage. However, there are a couple of problems with this approach. First, it measures equity of listed firms only, but debt is the total of listed and non-listed companies. Second, it relies on the market value of equity, which may be highly volatile. An alternative is to use the book value of a company's equity. However, the book value may be irrelevant in terms of the current value of a firm. The equity market's current valuation of a firm may represent the best estimate of its worth, and will be a better representation of the rate at which companies could raise new finance by issuing new equity.

3.51 Guiso *et al.* (2000) provide an alternative measure of leverage as total debt divided by total debt plus net capital, for a sample of large firms which includes listed and non-listed companies. Chart 3.5 shows the UK with a higher level of leverage than euro area countries, suggesting that unlisted UK firms have high leverage levels.

3.52 Another issue of potential importance to the credit channel is the amount of collateral used to back borrowing. Changes in the value of collateral through monetary policy changes would change expected returns to lenders if a borrower were to default, thus affecting the availability of capital. Borio (1995) cites the boom and bust of asset prices in the UK, Nordic countries and Japan in the 1980s and 1990s as evidence: as asset prices boomed, credit access increased and then fell away as prices slumped. However, data on the use of collateral tend to be limited, with differences in coverage and methodology between countries.

Chart 3.5: Firm leverage: total debt as a per cent of debt plus net capital assets for an average firm, 1996

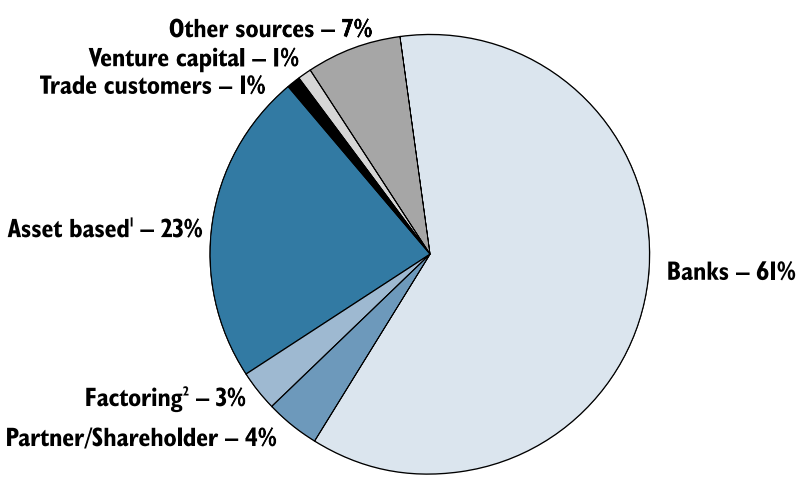


Source: Guiso et al. 2000.

Size of firms

3.53 Bank lending is generally more important for small firms. For example, in the UK banks account for over 60 per cent of total small and medium-sized enterprise (SME) financing (see Chart 3.6). Lower availability of information on small firms generally means that asymmetric information problems are more likely to be an issue, so the importance of small firms in the economy is a potential indicator of the likely importance of the credit channel.

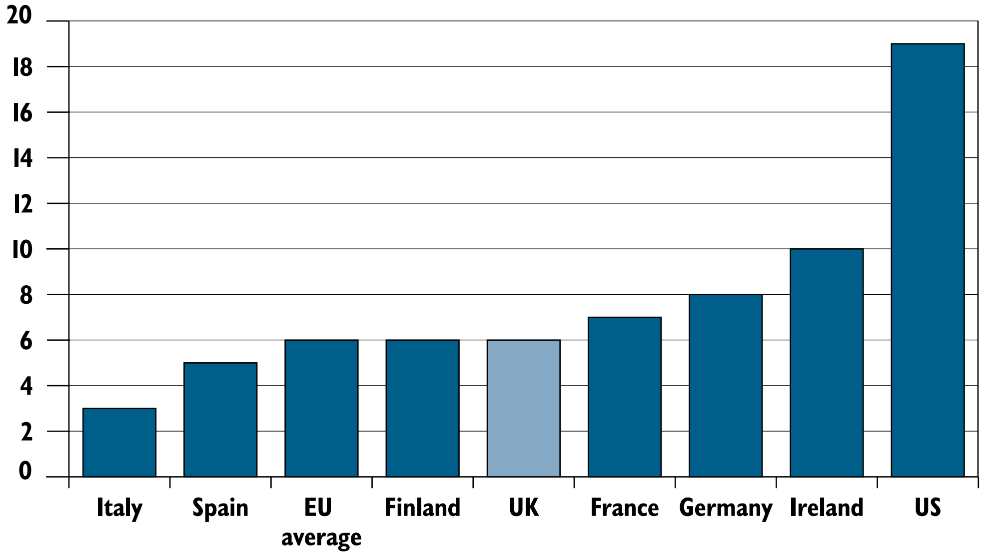
Chart 3.6: Sources of external finance for UK SMEs, 1997–99



[1] *Asset based finance includes leasing and hire purchase.*
[2] *Factoring provides business with finance against outstanding invoices.*
Source: Bank of England, 2001.

3.54 Chart 3.7 shows that the average UK firm size is comparable with the EU average, and smaller than in France or Germany. However, the EMU study by HM Treasury *EMU and business sectors* also shows that a relatively high proportion of UK employees work in large firms.

Chart 3.7: Average number of employees per firm, 2000



Source: European Commission, DG Enterprise, 2002a.

Structure of the banking sector

3.55 Table 3.6 presents data on the structure of banking sectors in the largest EU economies. This indicates that the UK market is concentrated relative to euro area countries, and there is no state ownership of large banks (in the past, state assistance to small banks may have supported bank lending).

Table 3.6: Structure of banking sectors in large EU economies, 1997

	UK	France	Germany	Italy	Spain
Number of banks[1]	551	1,299	3,578	935	416
Market share of five largest banks (per cent of total assets)	57[2]	40	17	25	44
State ownership[3] (per cent of total assets)	0	17	36	36	2
Importance of relationship lending	Not important except small firms	Not important except small firms	Very important	Very important	Not important

[1] Credit institutions.

[2] For UK-owned institutions. When including assets of foreign owned-banks incorporated in the UK the figure falls to 28 per cent of total assets.

[3] Share of assets of the top 10 banks owned or controlled by the government, 1995 data.

Sources: ECB, 1999; Ehrmann et al. 2001 and HM Treasury.

Cross-country comparisons of the credit channel

3.56 Kashyap and Stein (1997) consider the role of the bank-lending channel, and in particular the implications for EMU. They focus on four factors:

- the importance of small banks;
- the financial health of banks;
- the importance of small firms in the economy; and
- the availability of non-bank finance.

3.57 Table 3.7 summarises their results. Kashap and Stein grade each country according to the four factors above, with an 'A' grade indicating low bank-lending channel sensitivity. For each factor, the UK is given an 'A' grade, suggesting a low sensitivity to the bank-lending channel relative to euro area countries. In contrast, the analysis suggests the bank-lending channel may be relatively strong in Italy and Portugal.

3.58 A very similar analysis is undertaken in Cecchetti (1999). This ranks EU countries' exposure to the bank-lending channel on the basis of the importance of small banks, bank health and the availability of alternative finance. The evidence suggests the UK has the lowest exposure to the bank-lending channel of all EU countries, while Austria and Italy have the highest exposure.

Table 3.7: Summary of factors affecting the bank-lending channel

Country	Importance of small banks	Bank health	Importance of small firms	Availability of non-bank finance	Overall predicted potency
UK	**A**	**A**	**A**	**A**	**A**
Belgium	A	B	B	A	A/B
Denmark	B	B	B	A	B
France	B	C	B	B	B/C
Germany	C	B	A	B	B
Greece	B	B	C	C	B/C
Ireland	B	B	B	B	B
Italy	B	C	C	C	C-
Luxembourg	C	A	A	B	B
Netherlands	A	A	C	B	A/B
Portugal	B	C	C	C	C
Spain	B	B	C	B	B

Note: 'A' grade indicates low bank-lending channel sensitivity, 'B' indicates medium, and 'C' high.
Source: Kashap and Stein, 1997.

3.59 The structural evidence seems to suggest a relatively weak bank-lending channel in the UK: firms are less dependent on bank finance than euro area countries, and the banking sector is strong and dominated by large institutions. However, it is possible that the broad credit channel may be more important. UK firms do not tend to have close relationships with banks, increasing the potential for asymmetric information problems. A review of empirical research into the credit channel is provided in Section 4 (Box 4.3).

The structure of production and output

3.60 In addition to financial structures, the overall structure of economic activity may also be important for the strength of the transmission mechanism through the corporate sector. There are a number of reasons why the relative size of different sectors in the economy will affect monetary policy transmission. Interest rate changes will affect expenditure on investment and durable goods, and so industries producing these goods are likely to be especially affected by a policy change. Interest rate changes will also have a more significant impact on capital-intensive sectors of the economy. For example, a recent study of 21 industrial sectors across five OECD countries (Dedola and Lippi, 2000) found that in response to an interest rate increase, sectors producing durable-consumer goods or investment goods generally undergo a larger decline in output than non-durable goods.

3.61 Table 3.8 demonstrates the composition of production at an aggregated level in the UK, France and Germany in terms of the gross value added of each sector. At this aggregated level, the UK's production structure is broadly similar to that of France and Germany.[15] In all cases,

[15] For a detailed discussion of the structure of production in the UK and euro area see the EMU study by HM Treasury *EMU and business sectors*.

the gross value added of services account for around 70 per cent of output, and manufacturing between 20 and 25 per cent. However, there are some important differences. France has a larger public sector, while Germany has a large manufacturing sector. The fact that manufacturing constitutes a higher proportion of output in Germany would suggest that, in this regard, it would have a strong response to monetary policy changes.

Table 3.8: Sectoral per cent share of gross value added (GVA), 2001

Per cent of total GVA	UK	Germany	France
Agriculture, hunting, forestry, fishing	0.9	1.2	2.8
Manufacturing, mining, utilities	21.1	24.4	20.1
Construction	5.1	4.8	4.7
Services total	72.1	69.7	72.4
Of which:			
Wholesale, retail, repair, hotels, restaurants, transport and communication	22.4	18.7	19.3
Finance, real estate, other business activities	27.8	29.7	30.1
Public administration, social security, education, health, defence	21.9	21.3	23.1

Source: Eurostat.
Note: Figures may not sum due to rounding.

3.62 Guiso *et al.* (2000) point out that countries with a higher capital to output ratio will tend to have higher investment levels in order to maintain their capital stock. They find that Germany has a much higher capital to output ratio (4.0 per cent in 1999) than the UK (2.0 per cent), with Italy and France in between (3.2 per cent and 3.0 per cent, respectively). This also suggests that monetary policy changes will have greater impact through investment in Germany.

Conclusions on the corporate sector

3.63 The analysis of the corporate sector provides evidence that there are factors which may make transmission in the UK both stronger or weaker than elsewhere in Europe:

- the UK is likely to have a lower exposure to the bank-lending channel. Firms are less dependent on bank finance than euro area countries; the banking sector is also strong and dominated by large institutions. Structural factors suggest the bank-lending channel could be stronger in France, Italy and Spain;
- in contrast, the broad credit channel may be stronger in the UK as relationships between banks and firms tend to be less close than in countries such as Germany, increasing the potential for asymmetric information problems. UK firms may also have high levels of leverage and use more collateral; and
- the structure of production is relatively service-intensive in the UK. Monetary policy may have a stronger impact on investment and durable goods sectors; these sectors are more important in the German economy.

The impact of changes in the exchange rate on spending behaviour

3.64 So far, the analysis on the second stage of the transmission mechanism has focused on the impact of changes in interest rates and asset prices on spending behaviour in the household and corporate sectors. The following examines the impact of changes in the exchange rate on spending behaviour.

3.65 There are two ways in which exchange rate changes may impact on firm behaviour:

- first, through trade. Within EMU, for countries with a higher level of external trade an exchange rate change will have a greater impact on the relative prices of traded to non-traded goods, at least in the short to medium term, and on the volume and price of exports and imports. However, the impact of the exchange rate channel is balanced by the fact that its impact on exports and on imports tends to pull domestic income in opposite directions. For example, a domestic currency depreciation will tend to increase domestic incomes from *export* production. But as a depreciation also increases the price of *imports*, this will lower domestic incomes through lower profits; and
- second, through the level of foreign credit. An exchange rate movement will impact on the cost of servicing foreign credit. There will also be a wealth effect, as an exchange rate change will affect the value of assets and liabilities held in foreign currencies.

Relative trade

3.66 Table 3.9 shows the value of goods and services exports for the UK, Germany, France, Spain and Italy as a per cent of GDP. Table 3.10 shows corresponding data for the value of imports. The UK has a higher share of trade with NAFTA (the North America Free Trade Association), but Germany and Italy have greater trade with other non-EU countries. From the perspective of the monetary transmission mechanism, the important issue is the total quantity of trade which is with non-EU countries; this is indicated in the final column. As a per cent of GDP, the UK and Germany have higher levels of trade from outside the EU than the other major economies.

Table 3.9: Exports of goods and services, 1999-2001

Per cent of GDP	EU15	NAFTA	Others	Total	Total non-EU
UK	**14.3**	**5.3**	**7.5**	**27.1**	**12.8**
Germany	18.4	4.2	10.6	33.2	14.8
Spain	21.3	2.3	5.8	29.4	8.1
France	16.6	3.4	7.9	27.9	11.3
Italy	15.0	3.2	8.6	26.8	11.8

Source: Eurostat.

Table 3.10: Imports of goods and services, 1999-2001

Per cent of GDP	EU15	NAFTA	Others	Total	Total non-EU
UK	**15.1**	**4.8**	**9.2**	**29.1**	**14.0**
Germany	17.9	3.0	11.1	32.1	14.1
Spain	20.7	2.4	7.9	31.0	10.2
France	17.1	2.4	6.5	26.1	9.0
Italy	14.6	2.0	8.6	25.2	10.6

Source: Eurostat.

Pricing to market

3.67 The exchange rate channel can affect inflation directly when firms adjust prices in the face of an exchange rate movement. For example, a domestic currency depreciation will lead to domestic inflation if importers raise prices in response to the currency change. However, importers may choose to keep the price of goods fixed in the domestic currency and instead in the short run absorb the impact of the exchange rate change through changes to their profit margins.

3.68 A large literature is devoted to considering the degree to which exchange rate changes 'pass-through' to import and export prices – for a recent review see Obstfeld (2002). This is discussed in detail in the EMU study *The exchange rate and macroeconomic adjustment* by HM Treasury. Exporters may prefer to keep prices fixed in their consumers' local currencies if they practice 'pricing to market', whereby they align prices with those of domestic producers in order to maintain market share. This may occur because there are sunk costs to setting up trading links. The shape of the demand curve will also determine the degree of pricing to market. For example, if demand is very price elastic then importers may prefer to avoid raising selling prices in the face of an exchange rate depreciation, preferring instead to maintain volumes (for further discussion see Krugman, 1986). Pricing to market may also vary across countries, for example it may be more likely to occur in large countries where overseas producers hold a relatively small market share. Taylor (2000) argues there may be lower pass-through in low inflation countries, as overseas producers are unlikely to raise prices if they expect relative price stability in domestic prices. Equally, if exchange rates are volatile then firms may be reluctant to adjust prices continually.

3.69 Campa and Goldberg (2002) find evidence across the OECD of partial pass-through to import prices in the short run. They also find some evidence to support the Taylor (2000) hypothesis, though the results suggest that it is a weak effect. McCarthy (2000) finds evidence of only a modest pass-through in the short run of the exchange rate to consumer prices in industrialised countries – including the UK, Germany and France. If firms are less willing to increase prices where inflation is low and stable, then EMU may lead to convergence in the degree of pass-through in participating countries. Campa and Minguez (2002) test for differences in pass-through across the euro area. They find that in the short run pass-through averages around 60 per cent across the euro area. In the long run, pass-through is not significantly different from 100 per cent and does not differ substantially across countries or industries. They find that movements in the euro exchange rate cause different inflation evolutions in euro area countries, but these differences are mainly due to differences in openness to trade rather than to differences in pass-through.

Foreign credit position

3.70 Table 3.11 indicates that the UK has higher levels of foreign assets and liabilities (i.e. foreign holdings of domestic assets) relative to GDP, than large euro area countries. This suggests that the impact of an exchange rate change on foreign assets and liabilities may be larger than elsewhere. The impact of an exchange rate change will differ between debtors and creditors to the foreign sector. A currency depreciation could risk sending some debtors to the foreign sector into insolvency, while for creditors the change will only lead directly to a change in net wealth.

3.71 One caveat is that a large portion of the UK's foreign assets and liabilities is likely to be denominated in euros. Bank of England data indicate that in the first three quarters of 2001, around one-third of UK based banks' foreign assets were denominated in euros.[16] Moreover, much of the UK's foreign assets and liabilities are held by the banking sector. This is primarily a consequence of London's position as a large international banking centre. These positions largely represent intermediation and therefore exchange rate changes are unlikely to feed through into changes in consumption. Much of the asset and liabilities positions may net out in the banking system. However, exchange rate changes will affect UK wealth and therefore consumption through direct and portfolio investment positions. Exchange rate changes will also affect the value of earnings flows from these positions. Again, however, a significant proportion of these holdings will be denominated in euros.

[16] Currency breakdown of claims of banks operating in the UK from Bank of England Monetary and Financial Statistics, Table C3.3, March 2002.

Table 3.11: Foreign position: ratio of assets and liabilities to GDP, 1999

Per cent of GDP	UK	Germany	France	Italy
Financial account total assets	**262**	**112**	**120**	**92**
Direct investment abroad	48	20	24	16
Portfolio investment assets	84	42	39	47
of which:				
equity securities assets	42	24	12	18
debt securities assets	42	18	27	29
Financial derivative assets	0	0	8	0
Other investment assets	127	46	44	26
of which:				
monetary authority	0	2	1	0
general government	2	2	2	1
banks	94	29	32	12
other sectors	32	12	10	13
Reserve assets	2	4	5	4
Financial account total liabilities	**278**	**108**	**122**	**88**
Direct investment in home economy	27	12	17	9
Portfolio investment liabilities	96	51	54	47
of which:				
equity securities liabilities	61	18	30	5
debt securities liabilities	34	33	24	42
Financial derivative liabilities	0	0	8	0
Other investment liabilities *of which:*	155	45	44	31
monetary authority	0	1	2	0
general government	0	1	1	1
banks	116	37	35	21
other sectors	39	6	6	10

Source: Byrne and Davis, 2002. Figures may not sum due to rounding.

Conclusions on the exchange rate channel

3.72 This analysis suggests two factors which may make the UK more sensitive to monetary policy through the exchange rate channel:

- the UK and Germany have higher levels of non-EMU trade than France and Italy, though the differences are not great in relation to overall GDP; and
- the UK has a larger stock of foreign assets and liabilities than major euro area countries, although this may be a reflection of the UK's role as an international financial centre and so have limited implications for the behaviour of consumption.

STEP 3: FROM CHANGES IN SPENDING BEHAVIOUR TO CHANGES IN OUTPUT AND INFLATION

3.73 The final step in the chain of monetary policy transmission (as represented in Chart 2.1) is from changes in spending behaviour to changes in output and inflation. Output in the economy is equal to total domestic expenditure – the sum of private consumption, government consumption, and investment – plus the balance of trade (exports minus imports).

Elasticity of trade to income

3.74 Increases in spending that increase private consumption will directly raise output. Spending increases that are directed to imports will raise overseas output rather than domestic output. This means that the elasticity of exports to foreign demand and imports to domestic demand will affect the degree to which a change in spending behaviour leads to a change in output and inflation.

3.75 Hooper *et al.* (1998) review empirical studies of the income elasticities of trade. Long-run income elasticities for the major EU countries are shown to be relatively similar on average, though the UK's export elasticity is found to be lower than other countries in some studies. Their own results show that the UK has a higher long-run import elasticity than other EU countries, and a lower long-run export elasticity. Senhadji and Montenegro (1999) also found that the UK had a lower long-run export income elasticity than euro area countries. These results offer some evidence that the impact of a change in income in the UK may lead to a less significant change in output, as a greater degree of the change in income will leak overseas through increased imports. Moreover, it also suggests that a smaller proportion of any change in overseas income will feed through to UK output through a change in UK exports.

Nominal price and wage rigidity

3.76 Monetary policy affects output in the short run and possibly into the medium term due to the presence of some degree of short-run price and wage rigidity in the economy. In the absence of such rigidities, prices would adjust immediately in the face of a nominal interest rate change to leave output unchanged; in such circumstances even in the short run the only impact of monetary policy will be on the level of prices. For example, it is the real interest rate which matters for decisions on spending, but without price and wage rigidities, monetary policy has no impact on the real interest rate. A monetary loosening would lead immediately to higher price inflation, leaving real interest rates unchanged and having no impact on output.

3.77 Therefore, the effect of changes in interest rates on output will be greater the more the nominal rigidity in wages and prices. Analysis of the degree of nominal price and wage flexibility in the UK and euro area economies is a key issue for the second of the five economic tests, the flexibility test. The EMU study *EMU and labour market flexibility* by HM Treasury covers nominal and real wage flexibility in detail. In the past, real wage flexibility has appeared relatively weak in the UK, and may have contributed to the high unemployment experienced in the 1980s and early 1990s. However, there is emerging evidence that real wage flexibility has improved. Relative wage flexibility is reasonably high in the UK meaning that wages adjust to imbalances across market segments. Nominal wages are generally adjusted on an annual basis in the UK, providing scope for a relatively high degree of nominal wage flexibility.

3.78 Most estimates of nominal price flexibility place the UK close to the EU average, though there is quite wide variability in levels of flexibility across the EU; for instance, Italy is gauged to be considerably less flexible than the average.

Second round effects

3.79 In addition to having a direct impact on output, changes in spending behaviour will trigger second round effects, where firms and households not directly affected by the change in monetary policy via interest rates, asset prices or exchange rates will be affected by changes in other firm/household behaviour.

3.80 The impact of changes in output on inflation will depend in part on the level of the output gap, which measures the difference between actual GDP and potential GDP. Potential GDP is the level of output at which the economy would be working without excess demand. If actual GDP is higher than this level then demand has increased output to a level where firms are working above sustainable levels. This will tend to lead over time to increases in wages and prices, as firms' costs grow and the demand for labour increases. If increases in spending come when there is a negative output gap then there may be relatively little overall upward impact on prices; by contrast an increase in spending when the economy is already above potential could lead to a inflationary boom with sharp price rises. This underlines the importance of ensuring the necessary sustainable convergence is achieved before entering a monetary union.

DO STRUCTURAL FACTORS MAKE THE UK STAND OUT?

3.81 It is apparent from the discussion in this section that monetary policy can impact on the real economy through a wide variety of channels. This makes it important to look at the structures governing the transmission mechanism as a whole rather than concentrating on any one component in isolation. A country may be more sensitive than others to monetary policy transmitted through certain routes, but less sensitive to transmission through others.

3.82 Focusing on the UK, the structural analysis has highlighted the following issues:

- the speed and extent of **pass-through of interest rates changes** from official interest rates to bank lending rates is strong in the UK; studies suggest it is weaker in other large countries such as France and Germany;
- high levels of **mortgage debt** in the UK, combined with the dominance of variable rate mortgages, implies that the sensitivity of household interest payments to changes in interest rates is higher in the UK than in euro area countries;
- the competitive, liberalised mortgage market in the UK makes it easier for households to access **housing wealth** than is the case in the larger euro area countries. Real house price growth in the UK has been stronger than in large euro area countries, and the low response of housing supply in the UK appears to be an important reason for this;
- the UK may experience a greater impact on consumption from changes in **financial wealth**, due to the greater size of equity holdings and the wider demographic profile of equity holders. However, the impact on consumption in the UK may be lessened because financial wealth is primarily held in life and pension funds;
- the UK is likely to have a lower exposure to the **bank-lending channel**. UK firms are less dependent on bank finance than in euro area countries; the banking sector is also strong and dominated by large institutions. Structural factors suggest the bank-lending channel could be stronger in France, Italy and Spain;
- in contrast, the **broad credit channel** may be stronger in the UK as relationships between banks and firms tend to be less close than in countries such as Germany. UK firms may also have high levels of leverage;
- the **structure of production** is relatively service-intensive in the UK. Monetary policy may have a stronger impact on investment and durable goods sectors, these sectors are more important in the German economy;
- the UK and Germany have higher levels of **non-EMU trade** than France and Italy, though the differences are not great in relation to overall GDP;

- the UK has a larger stock of **foreign assets and liabilities** than major euro area countries, although this may be a reflection of the UK's role as an international financial centre and so have limited implications for the behaviour of consumption; and
- the UK may have relatively low levels of **nominal wage rigidity**.

3.83 The UK's overall sensitivity to monetary policy relative to euro area countries will depend on how these effects balance out in aggregate. There are several factors which suggest UK output may be more sensitive to monetary policy – interest rate pass-through, mortgage debt, housing and financial wealth effects and trade effects – but these will be balanced to some extent by factors which may make the UK less sensitive – bank size, the structure of production, nominal wage flexibility and income elasticities of trade. The analysis in this section suggests the former group of factors are dominant.

3.84 However, while comprehensive, the problem with the structural approach is that it is difficult to assess the aggregate impact of the different structural factors so as to identify the relative strength of the monetary transmission mechanism in each country. To do this would require each structural factor to be weighted according to its importance in the overall transmission mechanism.

3.85 To address this problem the next section of the study considers economic models which have used econometric techniques to capture cross-country differences in the monetary transmission mechanism at the macroeconomic level. Rather than identify the specific microeconomic factors which may drive differences, these studies identify the overall sensitivity of output or inflation to a monetary policy change.

3.86 The wide range of structures which influence the transmission mechanism has distributional implications. For example, the importance of the housing market in the UK suggests that homeowners will be affected differently to non-homeowners by the level of interest rates and by interest rate changes.