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Quarterly Bulletin—Winter 2001

Markets and operations
(pages 369–87)

This article reviews developments in international and domestic financial markets, drawing on information from the Bank of England's market contacts, and describes the Bank's market operations in the period 1 August to 26 October 2001.

The external balance sheet of the United Kingdom: implications for financial stability?
(pages 388–405)

By Stephen Senior of the Bank's G10 Financial Surveillance Division and Robert Westwood of the Bank's Monetary and Financial Statistics Division. In 2000, UK gross external assets and liabilities grew by more than 20%, boosted particularly by international mergers and acquisitions and international banking activity. In net terms, UK external liabilities fell moderately but remained substantial, at about 13% of annual GDP. This fall was associated with changing nominal values of UK external assets: the currency denomination of UK external assets and liabilities means that, other things being equal, a lower exchange rate reduces UK net external liabilities via revaluation changes. As reported in last year's article in this annual series, the UK net liability position may be misleading: UK net external assets are probably underestimated because of the way foreign direct investment is calculated. Policy-makers in the international community have focused on identifying key tools that could be useful for monitoring and analysing external balance sheet vulnerabilities. The second section of this article looks at the extent to which the United Kingdom can compile and assess the IMF's set of key indicators of external vulnerability.

Public sector debt: end-March 2001
(pages 406–16)

By Bruce Devile of the Bank's Monetary and Financial Statistics Division and Stephen Senior of the Bank's G10 Financial Surveillance Division. The nominal value of public sector net debt outstanding fell by 9.9% during the financial year to end-March 2001. At end-March 2001, the net debt represented 31.6% of GDP, the lowest figure since 1992 and 5 percentage points lower than at end-March 2000. This article analyses the financial liabilities of the public sector, and considers the implications of the current level and structure of UK government debt, including in the context of analysing the national balance sheet as part of the Bank's financial stability assessments.

The foreign exchange and over-the-counter derivatives markets in the United Kingdom
(pages 417–30)

By Sarah Wharmby of the Bank's Monetary and Financial Statistics Division. In April this year, the Bank of England conducted its triennial survey of turnover in the UK foreign exchange and over-the-counter derivatives markets, as part of the latest worldwide survey coordinated by the Bank for International Settlements. This article sets out the results of the UK survey and compares them with previous surveys and results for other major centres.

The Bank's contacts with the money, repo and stock lending markets
(pages 431–33)

This article looks at the Bank's liaison with the London money markets and in particular at the work of the Sterling Money Markets Liaison Group and the Stock Lending and Repo Committee.

Research and analysis
(pages 434–71)

Research work published by the Bank is intended to contribute to debate, and does not necessarily reflect the views of the Bank or of MPC members.

The formulation of monetary policy at the Bank of England (by Charles Bean, Executive Director for Monetary Analysis and Statistics and Chief Economist, and Nigel Jenkinson, Deputy Director for Monetary Analysis and Statistics). This article describes the internal processes adopted by the Monetary Policy Committee and the Bank for the formulation of monetary policy. It covers the regular monthly policy round as well as the quarterly forecast round and the preparation of the accompanying *Inflation Report*.

Credit channel effects in the monetary transmission mechanism (by Simon Hall of the Bank's International Finance Division). Economic models often assume that the impact on the wider economy of changes in financial conditions can be summarised by a relatively limited range of financial variables, such as risk-free interest rates and long-term government bond rates. But changes in financial conditions can at times have important effects, which these variables do not necessarily indicate. This article reviews so-called 'credit channel' models, which consider how changes in the financial positions of lenders and borrowers can affect spending in the economy. These models provide a useful framework for analysing some potentially important interactions between the monetary stability and financial stability objectives of central banks. Subsequent articles in this *Bulletin* use a specific 'credit channel' model to illustrate the potential for these interactions in the UK corporate and household sectors.

Financial effects on corporate investment in UK business cycles (by Simon Hall of the Bank's International Finance Division). The slowdown in corporate investment in the early 1990s recession was more marked than in the equivalent period of the 1980s downturn. This article reviews corporate sector investment and financial health in these periods. It then uses a 'credit channel' model to consider the potential for interactions between corporate financial positions and investment spending. Simulations of the model suggest that financial effects may vary in strength over time. In particular, the model provides some support for the view that financial effects might have been relatively more important in the early 1990s recession, given the greater dependence of the corporate sector at that time on external borrowing.

Why house prices matter (by Kosuke Aoki, James Proudman and Gertjan Vlieghe of the Bank's Monetary Assessment and Strategy Division). This article analyses the role of house prices in the transmission mechanism of monetary policy. It is argued that house prices matter because houses can be used as collateral, against which households borrow to finance housing investment and consumption. The implication of structural change in UK retail credit markets is also considered, as this may have changed the relationship between house prices and consumption.

Markets and operations

This article reviews developments in international and domestic financial markets, drawing on information from the Bank of England's market contacts, and describes the Bank's market operations in the period 1 August to 26 October 2001.

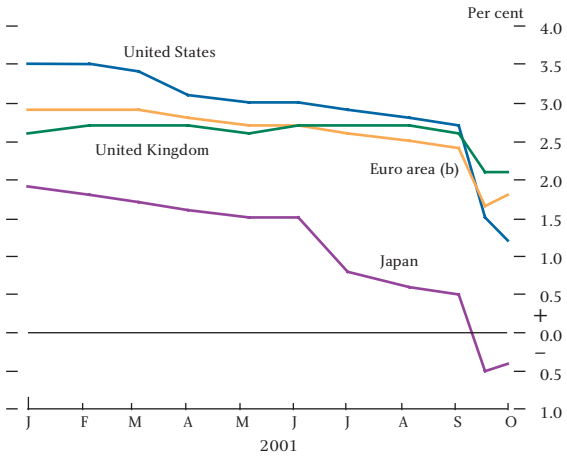
- *The terrorist attacks in the United States on 11 September had only a temporary adverse effect on the functioning of financial markets.*
- *Official interest rates were reduced by 125 basis points in the United States, and by 75 basis points in the United Kingdom and the euro area, and short-term interest rate expectations fell sharply in all three regions.*
- *Long-term interest rates in the United States, the United Kingdom and the euro area fell over the period.*
- *Exchange rate movements among the major currencies were relatively small.*
- *Equity prices fell sharply, especially after the terrorist attacks in the United States, but partly recovered from late September onwards.*

Macroeconomic background to market developments

Market developments were heavily influenced by expectations about economic growth. Private sector growth forecasts for 2002 were generally revised down between early August and early September, and then by more following the terrorist attacks in the United States on 11 September (see Chart 1 and Table A). In particular, there were increased concerns that the US economic slowdown might be more severe than previously thought, with adverse effects on other economies. According to surveys by Consensus Economics, consumer price inflation forecasts for 2002 were revised down for the United States, the euro area and Japan, by 0.3, 0.1 and 0.4 percentage points respectively, but were unchanged for the United Kingdom.

In the two weeks following the terrorist attacks, short-term interest rate expectations and equity prices declined sharply in the United States, the euro area and the United Kingdom, partly due to downward revisions of growth expectations, a flight to quality and liquidity from equities into short-term fixed-income products, and following monetary policy easing in all three regions (see also the box on market functioning following the events of 11 September on page 382). By contrast, long-term government bond yields rose in the two weeks following the attacks, partly due to expectations of lower tax

Chart 1
Forecasts for GDP growth in 2002(a)



Source: Consensus Economics.

(a) Means of survey samples.
(b) Weighted average for France, Germany and Italy for the interim survey of 25 September.

Table A
Changes in forecasts for GDP growth[a]

	13 Aug.–10 Sept.	10 Sept.–25 Sept.	25 Sept.–8 Oct.
2001			
United States	-0.1	-0.5	-0.1
United Kingdom	0.0	-0.2	0.2
Germany	-0.2	-0.2	0.0
Japan	0.1	-0.4	0.0
2002			
United States	-0.1	-1.2	-0.3
United Kingdom	-0.1	-0.5	0.0
Germany	-0.1	-0.6	0.0
Japan	-0.1	-1.0	0.1

Source: Consensus Economics.

(a) Changes between means of survey samples (percentage points).

receipts and fiscal stimulus packages leading to expectations of increases in government bond supply. Exchange rates among the major currencies did not change sharply following the attacks.

Short-term interest rates

During the review period, monetary policy was eased by the Federal Open Market Committee (FOMC), the European Central Bank (ECB), the Bank of Japan (BoJ), and the Monetary Policy Committee (MPC), as shown in Table B. The changes in monetary policy that were announced in the week following the 11 September terrorist attacks took place between regularly scheduled policy meetings.

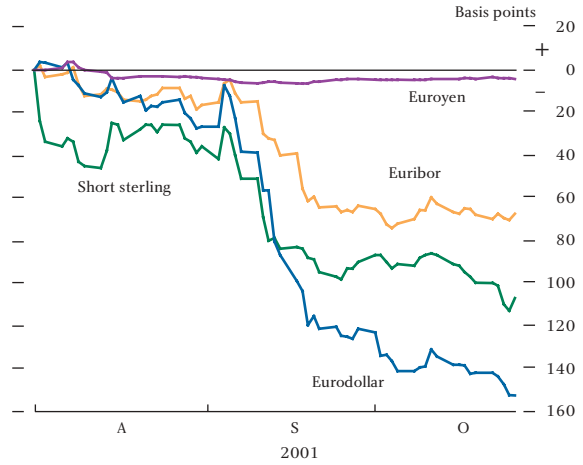
Table B
Monetary policy changes[a]

FOMC	Reduction in the Federal funds target rate by 25 basis points on 21 August	Reduction by 50 basis points on 17 September	Reduction by 50 basis points on 2 October (to 2.5%)
ECB	Reduction in the main refinancing rate by 25 basis points on 30 August	Reduction by 50 basis points on 17 September (to 3.75%)	
BoJ	Increase in target balances to around ¥6 trillion on 14 August	Change in target balances to above ¥6 trillion on 18 September	
MPC	Reduction in the repo rate by 25 basis points on 2 August	Reduction by 25 basis points on 18 September	Reduction by 25 basis points on 4 October (to 4.50%)

(a) After the review period covered by this article, official interest rates were reduced by a further 50 basis points by the FOMC on 6 November, and by the ECB and the MPC on 8 November.

Short-term interest rate expectations in the dollar, euro and sterling markets fell sharply over the review period, while Japanese rate expectations were little changed (see Chart 2). Between 1 August and 26 October, rates implied by eurodollar, short sterling and euribor futures contracts expiring in 2001 and 2002 fell by about 145–160, 95–130 and 70–100 basis points respectively (see Charts 3 to 5). Japanese short-term interest rate

Chart 2
Cumulative changes in short-term interest rate expectations[a]

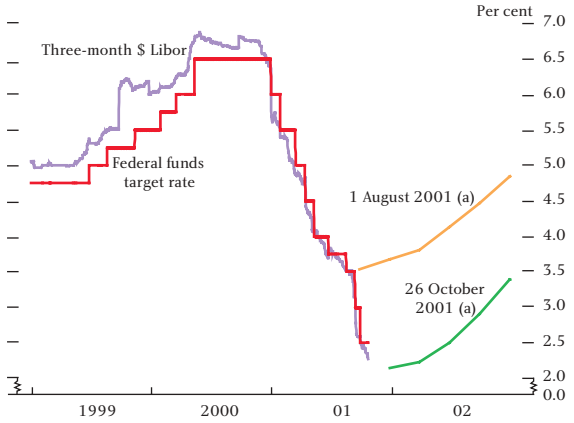


Source: Bloomberg.

(a) As indicated by futures contracts maturing in December 2001.

expectations, which were already quite close to zero, fell by up to 5 basis points (see Chart 6). Downward revision of growth expectations, the terrorist attacks on 11 September and monetary policy decisions were important influences on interest rate expectations, particularly in the United States and Europe.

Chart 3
US interest rates

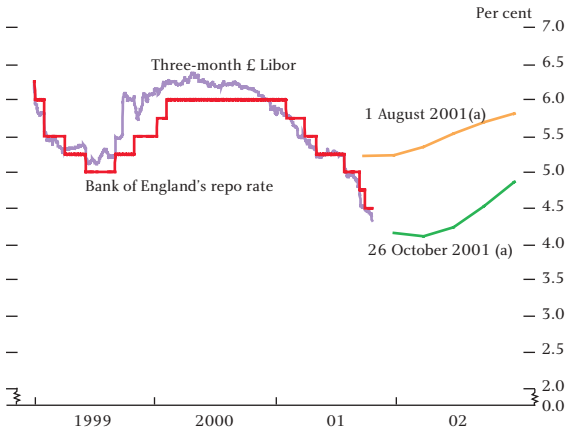


Source: Bloomberg.

(a) Three-month interest rates implied by eurodollar futures contracts at the dates specified. From August 2001 onwards, the x-axis relates to contract expiry dates.

Short-term interest rate expectations fell gradually in August and early September in the United States, the United Kingdom and the euro area (see Chart 2), as economic data releases led to concerns about a deeper economic slowdown than previously expected. Interest rate expectations in all three regions fell particularly following the publication of the Federal Reserve's *Beige Book* in August, the August Philadelphia Federal Reserve Bank survey, and the August US non-farm payroll and non-manufacturing NAPM data, all of which were weaker than expected. In the United Kingdom, rate

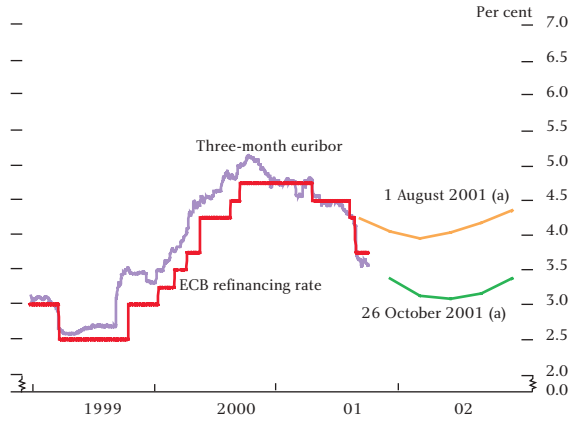
Chart 4
UK interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by short sterling futures contracts at the dates specified. From August 2001 onwards, the x-axis relates to contract expiry dates.

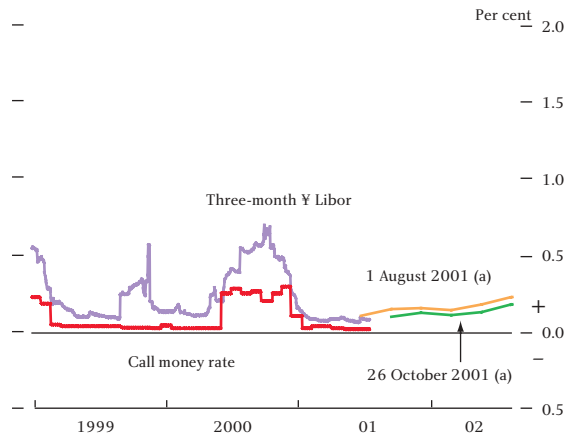
Chart 5
Euro-area interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by euribor futures contracts at the dates specified. From August 2001 onwards, the x-axis relates to contract expiry dates.

Chart 6
Japanese interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by euroyen futures contracts at the dates specified. From August 2001 onwards, the x-axis relates to contract expiry dates.

expectations fell after an unanticipated 25 basis point reduction in the repo rate by the MPC on 2 August, and following weaker-than-expected CIPS services and industrial production data for the United Kingdom. These factors were partly offset by the release of stronger-than-expected US NAPM data for August, and unexpectedly strong UK labour market data for June.

In the two weeks following the 11 September terrorist attacks in the United States, short-term interest rate expectations declined sharply in all three regions (see Chart 2), possibly since the attacks acted as a catalyst in bringing forward in time, and deepening, concerns about a global economic slowdown. Market participants considered that the economic slowdown would not be confined to the United States, and interest rate expectations fell internationally. The monetary policy easings by central banks on 17 and 18 September, in the week following the attacks, reinforced the view that central banks would cut rates as necessary. A flight to quality and liquidity away from equity markets after 11 September (see the section on equities) were also thought by market participants to have contributed to the fall in international short-term interest rates, with portfolio managers switching out of equities and into shorter-term fixed-income products.

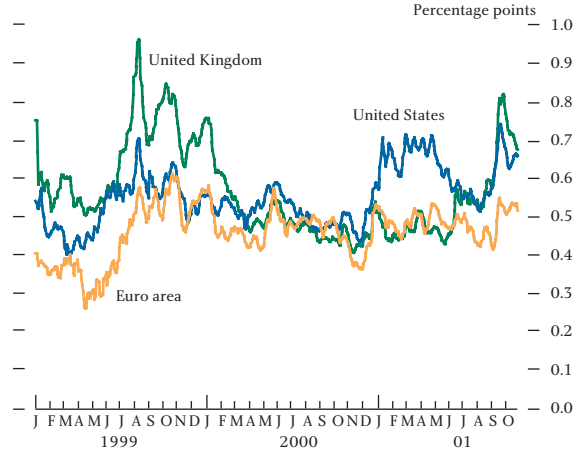
In late September and October, the sharp decline in rates implied by eurodollar, euribor and short sterling futures contracts expiring in December 2001 was halted. This partly reflected expectations that monetary policy easing and fiscal stimulus would contribute to economic recovery in 2002. Also, confidence survey data came in better than had been feared immediately after the attacks, and a decrease in risk aversion and a recovery in equity markets may have led to some reversal of the earlier flight to bond and money market securities.

Monetary policy decisions had a significant impact on short-term interest rate expectations during the period. Rates implied by the eurodollar futures contract expiring in December 2001 fell by 12 basis points following the FOMC's decision to reduce its target rate by 50 basis points on 17 September, suggesting that the change had not been fully anticipated by market participants. Similarly, rates implied by the euribor contract expiring in December 2001 declined by 16 basis points following the ECB's decision to reduce its refinancing rate by 50 basis points on 17 September. Other FOMC decisions during the period also had some impact on

market expectations. Following the FOMC's August and October decisions, interest rates implied by eurodollar futures contracts expiring in December 2001 fell by 6 and 11 basis points respectively. Similarly, the MPC's 2 August decision to reduce the official rate by 25 basis points was not widely anticipated by market participants, and short sterling futures yields for December 2001 fell by 24 basis points following the announcement. By contrast, the MPC decisions on 6 September, 18 September and 4 October had very little impact.

Uncertainty in interest rate expectations, as measured by implied standard deviations(1) derived from options on eurodollar, euribor and short sterling futures contracts, increased over the period at both the three and six-month horizons (see Chart 7). Implied standard deviations started to rise in August and reached a peak following the attacks on 11 September. The rise after 11 September may have partly reflected uncertainty about the economic impact of the attacks and about future official interest rates, but it is also likely to have been influenced at least initially by illiquid conditions in the options markets, particularly for short sterling options. Implied standard deviations rose more strongly in the United States and the United Kingdom than in the euro area; they had fallen back from their peak levels by late October. Short sterling implied standard deviations temporarily rose to levels close to those observed in Autumn 1998 following the Long-Term Capital Management crisis, but remained below the levels reached in the early 1990s.

Chart 7
Interest rate uncertainty(a)



(a) Implied standard deviations of six-month constant-horizon interest rate futures contracts; five-day moving averages.

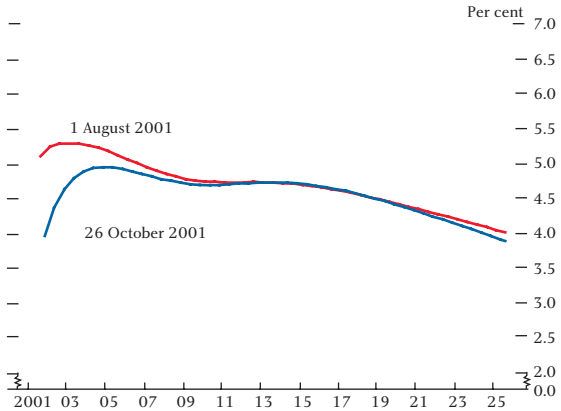
On 26 October, eurodollar and Federal funds futures contracts implied expectations of a trough in the Federal funds target rate at around 2% in 2002 Q1. Short sterling futures contracts implied expectations that a trough in the Bank of England's repo rate of about 4% would be reached by around 2002 Q1. Market participants expected the ECB to lower its official rate by at least 25 basis points by the end of the year, and attached some chance to a 50 basis point cut.

Short-term forecasts for Japanese economic growth were also revised down during the period. These downward revisions contributed to a fall in interest rate expectations for euroyen contracts expiring in 2001 and 2002, which fell by up to 5 basis points. Continued expectations of consumer price deflation, together with a further fall in equity prices, may also have contributed to the decline in rate expectations.

Longer-term interest rates

US, euro-area and UK long-term interest rates fell during the period. Short-dated government bond yields declined sharply (especially following the 11 September terrorist attacks) falling by 70 to 120 basis points over the period as a whole. Medium and long-dated yields fell by less; 30-year US and UK government bond yields declined by around 25 basis points while 30-year Bund yields fell by more than 30 basis points. Reflecting these developments, implied forward short-term interest rates derived from gilts and US Treasuries declined at dates out to around 2010. However, they were broadly unchanged for horizons beyond this point (see Charts 8

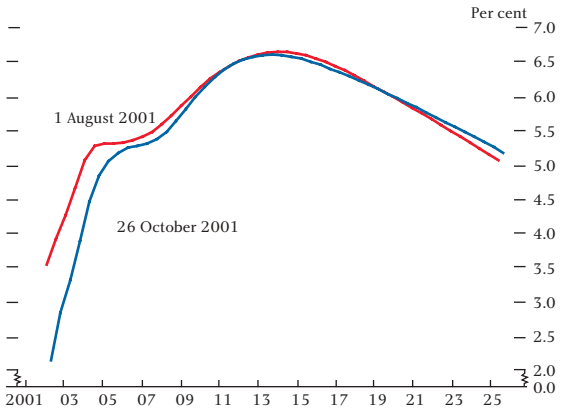
Chart 8
Three-month forward gilt yields(a)



(a) Derived using the Bank's VRP curve-fitting technique. For further details see Anderson, N and Sleath, J, 'New estimates of the UK real and nominal yield curves', *Bank of England Quarterly Bulletin*, November 1999.

(1) The implied standard deviation is a measure of the width of the probability distribution of expected future interest rates at the time of expiry of the option contracts.

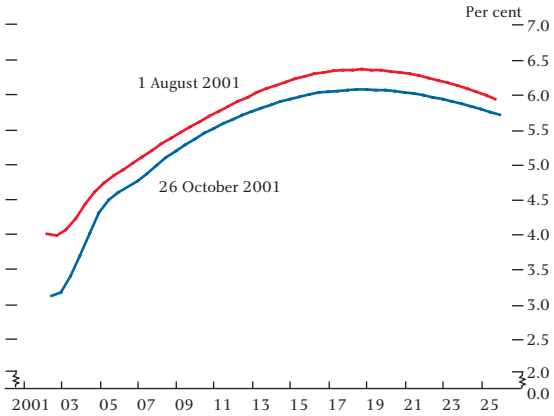
Chart 9
Three-month forward US Treasury yields(a)



(a) Derived using the Bank's VRP curve-fitting technique.

and 9). Forward rates derived from the Bund yield curve declined at all maturity horizons but near-term rate expectations fell by more than long-dated forward rates (see Chart 10).

Chart 10
Three-month forward Bund yields(a)

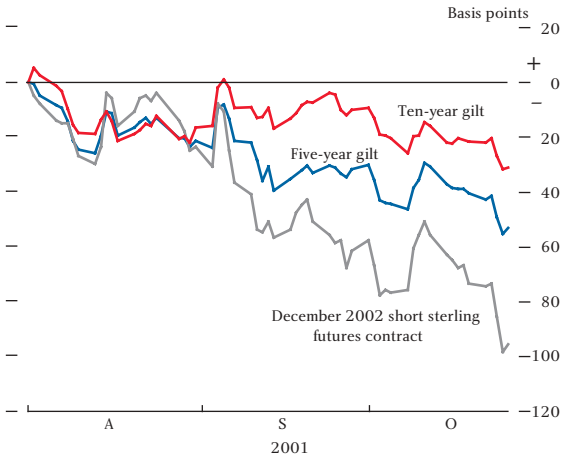


(a) Derived using the Bank's VRP curve-fitting technique.

The fact that short and medium-term forward rates declined while more distant forward rates were little changed suggests that the dominant influences on the US and European government bond markets were downward revisions to market participants' forecasts for growth and inflation over the next few years. Consequently, the profile of yield changes for government bonds with maturity dates out to about ten years was similar to that of short-term interest rate futures (Chart 11 illustrates this for the sterling markets).

In August and the first half of September, correlations between the daily percentage changes in equity price indices and the daily changes in bond yields for maturities out to ten years were positive and above the

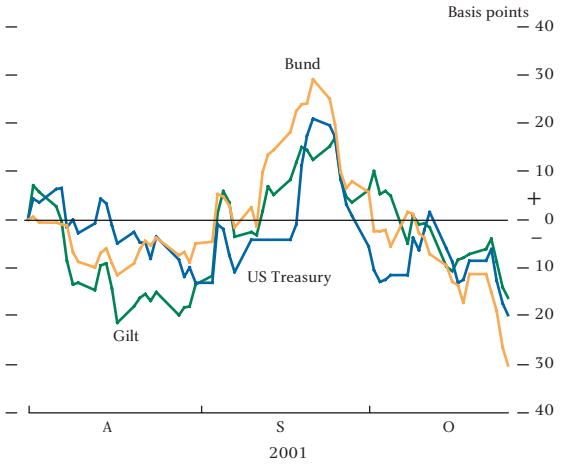
Chart 11
Cumulative changes in sterling interest rates since 1 August



average levels of the previous two years, with government bond prices tending to rise when equity prices fell. Two possible explanations (not necessarily mutually exclusive) may help to explain this. First, falling equity prices could have been associated with portfolio shifts (eg by pension funds) out of equities and into bonds. Second, both short-term interest rate expectations and equity prices may have been influenced by shifting perceptions about the economic outlook.

Although longer-dated US and European government bond yields ended the period only 20–30 basis points lower than their 1 August levels, they moved in a wide range within the period. Chart 12 illustrates that the daily profile of changes in long-dated gilt yields was similar to that of long-dated US Treasury and German Bund yields. This suggests that all three markets were mainly influenced by the same factors.

Chart 12
Cumulative changes in 20-year government bond yields since 1 August(a)



(a) Derived using the Bank's VRP curve-fitting technique.

The most pronounced change in long bond yields during the period was the rise and fall that occurred in September and October. It is difficult, however, to explain these movements fully. One of the reasons for the rise in long bond yields that was widely discussed by market participants was changes to forecasts of government budget positions. Market participants' forecasts for the US and UK government budget surpluses over the next two years were revised down between July and October and forecasts for the German government's budget deficit were increased (see Table C).

Table C
Forecasts for government budget positions(a)

	US ($ billions)		Germany (€ billions)		UK (£ billions)	
	2000/01	2001/02	2001	2002	2001/02	2002/03
9 July	210	219	-36.6	-28.2	6.7	1.3
13 Aug.	185	194	-39.0	-31.5	5.6	0.4
10 Sept.	170	168	-39.7	-31.5	4.3	0.3
8 Oct.	144	17	-42.7	-38.9	3.9	-3.3

Source: Consensus Economics.

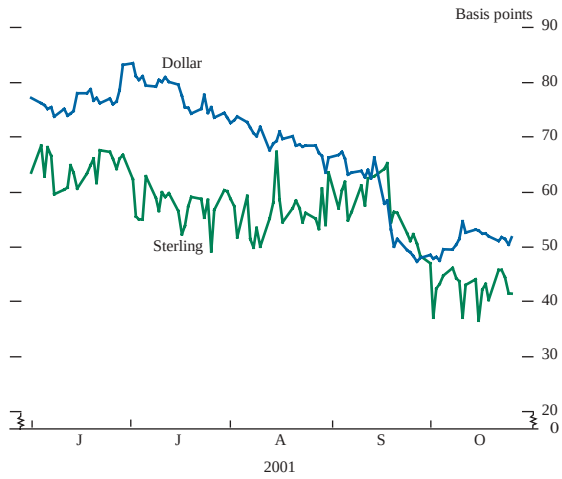
(a) Survey means.

The associated rise in market participants' forecasts of future government bond issuance principally reflected the expected impact of lower economic growth on tax receipts and social security expenditures. In the US case, these developments were likely to have been augmented by the administration's proposals for tax cuts and a widely held belief that the government's response to the 11 September terrorist attacks would involve increased military expenditures. Long-dated US government bond yields increased notably following the Treasury's announcement on 17 September that it was suspending its debt buyback operations until October; in the recent past, these operations have been largely targeted on long-maturity bonds.

A general rise in uncertainty and a desire to reduce risk after 11 September may have also contributed to the increase in long bond yields. As noted above, immediately following the terrorist attacks there was said to have been increased demand for the most liquid and lowest-risk assets, principally short-dated government paper, and a reduction in the demand for other types of financial assets. This may temporarily have added to the upward pressure on long gilt yields around this time.

Whereas the supply of government bonds is limited, there is no limit to the available supply of swap contracts that market participants can buy or sell. Furthermore, the fixed component of an interest rate swap contract is generally considered to contain only a relatively small credit risk premium.(1) Consequently, movements in the spreads between interest rate swaps and government bond yields may provide some indication of the impact of changes in market forecasts about future government bond issuance—the spread might be expected to narrow when increased issuance of government bonds is anticipated. Immediately after the terrorist attacks, short-dated swap spreads widened, reflecting a general flight by market participants to the most liquid short-dated government securities. This widening was only temporary, however; by the end of the period, swap spreads at short and medium maturities were slightly narrower than on 1 August. In contrast, there was less evidence of a flight to long-dated government bonds immediately after 11 September. Rather, prospective increases in future issuance dominated this segment of government bond markets; 30-year dollar and sterling interest rate swap spreads declined by around 10–20 basis points in mid-September (see Chart 13). This development is broadly similar to the narrowing in US swap spreads that occurred in the month after the Iraqi invasion of Kuwait, on 2 August 1990.

Chart 13
Thirty-year swap spreads



Source: Bloomberg.

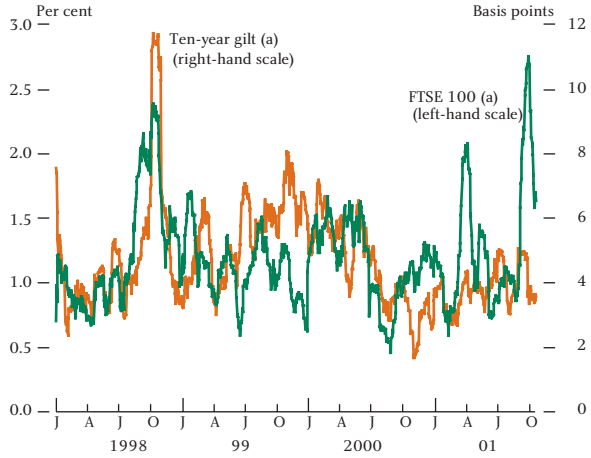
The fall back in long bond yields in late September and October is not readily explained by any further changes to forecasts of fiscal positions. The decline in long-maturity yields was common to most fixed-income instruments and swap spreads were little changed.

One potential explanation for the decline in long bond yields in the second half of the period is that risk

(1) The floating-rate leg of an interest rate swap settles against a six-month Libor or euribor rate; the banks that make up the Libor contributor panel exclude lower-rated banks.

aversion may have returned to more normal levels. This would have helped to reduce any risk premia required on longer-maturity bonds and swaps relative to short-dated, liquid bonds. The volatility of financial markets is commonly used by market participants as an indicator of uncertainty. As can be seen from Chart 14, equity market volatility picked up markedly in the period immediately following 11 September and then fell back again in October. In contrast, government bond market volatility was much less affected.

Chart 14
FTSE and gilt market volatility



(a) Twenty-day moving standard deviations of the daily changes in ten-year spot gilt yields and the daily percentage changes in the FTSE 100 index.

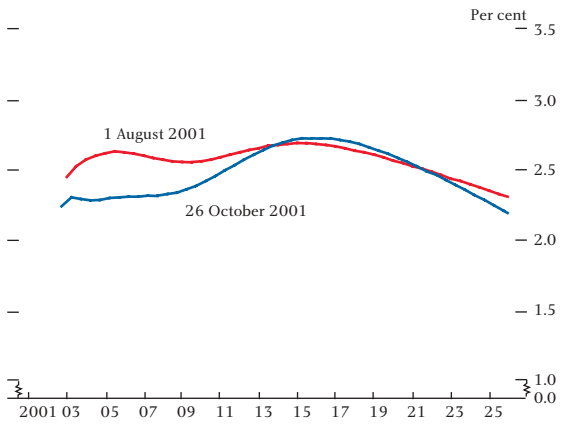
Another influence on long bond yields in the second half of the period may have been the fact that new issuance of non-government bonds was very low in the month after 11 September. Given that most non-government bonds are held to maturity by institutional investors and are not actively traded, much of the demand for long bonds is often met from new issuance. Consequently, the lack of new supply may have contributed to the fall in long bond yields in the second half of the review period for both government and non-government securities.

In addition to the above considerations, there were a number of factors specific to the United Kingdom that may have reinforced the previously mentioned movements in long-dated gilt yields. In mid-August, a report released by Bacon & Woodrow estimated that 17 of the FTSE 100 firms' defined benefit pension schemes were under-funded relative to their Minimum Funding Requirement (MFR) targets. This report may have contributed to an expectation of increased demand for long-dated gilts from pension funds, thereby generating downward pressure on long gilt yields in August. Then, on 18 September, the government released its proposals for reforming the MFR, including, as an interim measure, extending the deficit correction periods over which seriously under-funded pension schemes have to reach 90% and 100% of their MFR funding targets. This reduced the immediate pressure on some pension funds to sell equities and buy gilts, thereby adding to the upward pressure on gilt yields.

Similarly, on 24 September the Financial Services Authority announced a temporary relaxation of the resilience test applied to life insurance companies. This may have also lessened the need for such firms to sell equities and buy bonds as equity prices fell. However, by the time this measure had been announced, long gilt yields had already started to fall back. It is not clear, therefore, whether this development had a significant impact on gilt yields.

Movements in index-linked gilt yields broadly tracked the changes in conventional gilts during the period. Short-dated real yields fell by 50–75 basis points between 1 August and 26 October, while long-dated real yields were little changed in net terms. Reflecting these developments, implied expected inflation rates derived from conventional and index-linked gilts declined over the review period. The largest reductions in implied forward inflation rates occurred over the nearer-term horizons (see Chart 15). The index-linked gilt market is not as liquid as the conventional gilt market; movements in real yields often, therefore, reflect changes in the available supply of index-linked gilts, at least in the short term. Nevertheless, it appears that the dominant influences on index-linked gilts during August, September and October were downward revisions to growth forecasts. Similarly, in the United States, implied expected ten-year inflation rates declined over the period as a whole.

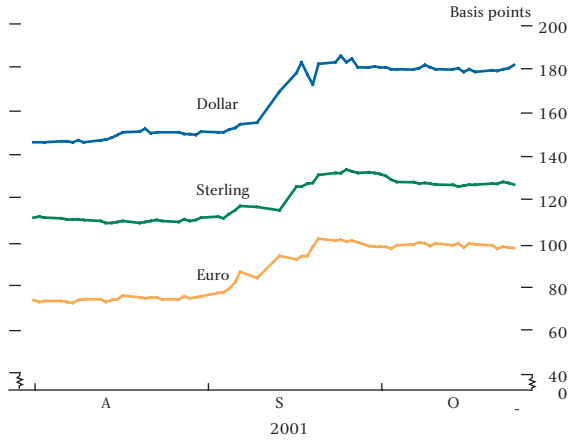
Chart 15
Implied forward inflation rates derived from gilts(a)



(a) Derived using the Bank's VRP curve-fitting technique.

The worsening outlook for world economic growth and corporate earnings generated increased concerns about credit risk and an associated rise in the spreads between the yields of non-government and government bonds (see Chart 16). A decomposition of the sterling corporate bond spreads by industry reveals that all sectors were affected, albeit to differing degrees. Firms in the basic industry, telecommunications, technology and electronics sectors experienced the largest increases in credit spreads, followed by industrials, while the credit spreads of financial firms increased only moderately.

Chart 16
Corporate bond spreads(a)



Source: Merrill Lynch.

(a) Spreads between Merrill Lynch's master non-government bond yield indices and government bond yields. The Merrill Lynch indices include non-government bonds from all sectors, ratings and maturities.

Japanese government bond yields were largely unchanged between August and October. This probably reflected the fact that (unlike the United States and Europe) there were only limited revisions to forecasts of future Japanese government bond issuance.

Equity markets

Major international equity indices fell over the period (see Table D), to levels still further below their 2000 peaks (see Chart 17). Equity prices fell substantially in August and early September (see Table E), as data releases pointed to a greater-than-expected slowing in the world economy. The major equity indices fell further after the terrorist attacks of 11 September. Perceptions of uncertainty rose and the risk premium may have increased. Implied volatilities from options prices jumped up (see Chart 18), while the skewness of the probability distribution of expected future equity prices implied by option prices became more negative. But, by late October, equity prices had risen back to levels similar to those before the terrorist attacks (see Table E).

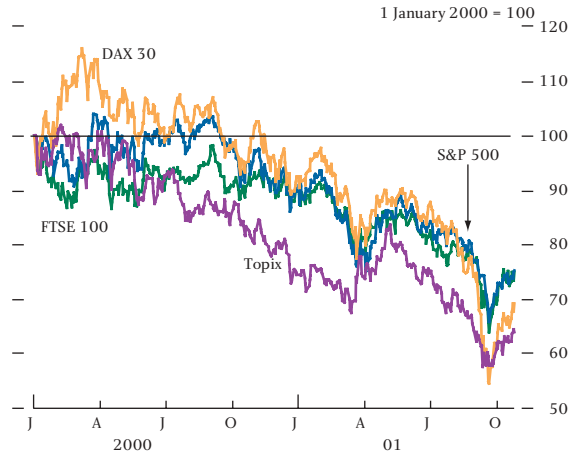
Table D
International equity market performance

Percentage changes between start and end of period in local currencies

	2000	2001		
	Year	Q1	1 Apr. to 31 July	1 Aug. to 26 Oct.
United States				
S&P 500	-10.1	-12.1	5.7	-9.2
Wilshire 5000	-11.9	-12.6	6.9	-9.5
Europe				
Euro Stoxx	-5.9	-11.2	-2.4	-12.5
CAC 40	-0.5	-12.6	-2.4	-12.4
DAX 30	-7.5	-9.4	1.7	-17.4
FTSE All-Share	-8.0	-9.1	-1.6	-7.2
FTSE 100	-10.2	-9.5	-1.6	-6.5
Japan				
Topix	-25.5	-0.5	-6.2	-8.8
Technology				
Nasdaq Composite	-39.3	-25.5	13.7	-14.5
FTSE techMARK 100	-32.2	-24.8	-17.5	-11.2
Neuer Markt	-40.1	-38.9	-19.6	-16.2

Source: Bloomberg.

Chart 17
International equity indices(a)



(a) In local currencies.

Table E
Equity index movements before and after the terrorist attacks

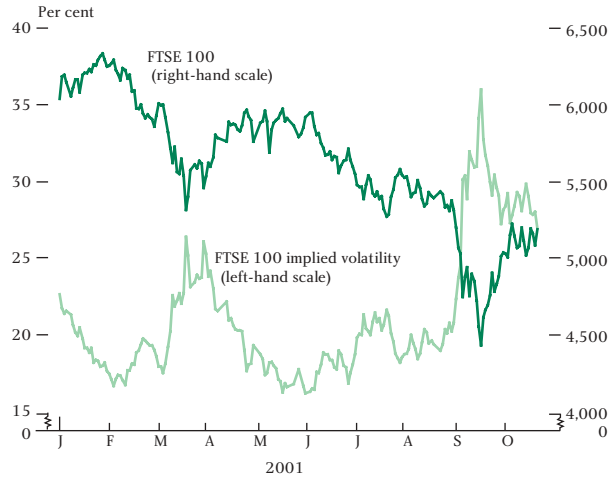
Percentage changes between start and end of period in local currencies

	1 Aug.–10 Sept.	10 Sept.–21 Sept.	21 Sept.–26 Oct.
United States			
S&P 500	-10.1	-11.6	14.4
Wilshire 5000	-10.3	-11.9	14.4
Europe			
Euro Stoxx	-14.6	-17.3	23.9
CAC 40	-14.3	-16.7	22.6
DAX 30	-20.0	-18.9	27.3
FTSE All-Share	-8.8	-12.7	16.6
FTSE 100	-9.3	-11.9	17.0
Japan			
Topix	-12.5	-5.5	10.3
Technology			
Nasdaq Composite	-18.0	-16.1	24.3
FTSE techMARK 100	-15.9	-20.6	32.9
Neuer Markt	-27.9	-22.9	50.7

Source: Bloomberg.

The recovery may have reflected a reversal in uncertainty (as indicated by Chart 18). The worst fears of market participants immediately after the attacks about the

Chart 18
FTSE 100 level and three-month implied volatility(a)



(a) Derived from options on FTSE 100 futures.

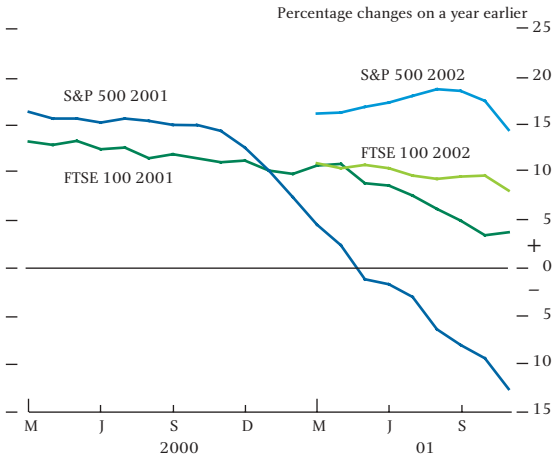
impact on consumer and business confidence were generally not realised, in the short term at least, and there was considerable monetary policy easing by central banks which may itself have boosted confidence. However, several sectors were affected in a fairly direct way by the terrorist attacks and fell particularly sharply between 10 September and 26 October; for example in the United Kingdom share prices in the insurance sector fell by 9.3% and in the leisure, entertainment and hotels sector by 9.7%.

Over the period as a whole, the falls in equity indices seem to have reflected both reductions in corporate earnings expectations and increased uncertainty about future equity prices and the general macroeconomic outlook (see the box on the decomposition of equity price movements on page 378). Lower short-term interest rates will have been an offsetting influence.

Analysts' expectations of growth in earnings per share(1) for the S&P 500 and FTSE 100 in 2001 and 2002 fell between the surveys conducted during August and October (see Chart 19).(2) 'Longer-term' earnings expectations, over a three to five-year horizon, also fell for the S&P 500—from 15.1% in September to 14.6% in November. In contrast, for the FTSE 100, they rose from 10.8% to 11.6% over the same period, suggesting that market views on long-term profitability may have helped to support UK equity prices in September and October.

A further indication of lower earnings expectations came from profit warnings. In Q3 there were 129 profit

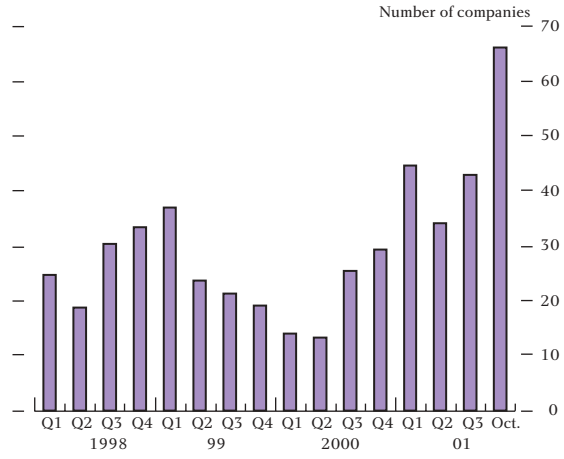
Chart 19
Earnings per share growth forecasts



Source: IBES.

warnings by UK firms, compared with 102 in Q2. Once again, IT companies accounted for more than a quarter of these warnings (more than would have been expected given the sector's 12% weighting in the FTSE All-Share index by number of firms). Reflecting this, the IT sector share price fell by 16% between 1 August and 26 October. Profit warnings were particularly high in October (see Chart 20). The terrorist attacks have so far been mentioned as an explanatory factor by 29 firms.

Chart 20
Profit warnings by UK firms(a)



Source: Reuters.

(a) Monthly average number of UK firms listed on the FTSE All-Share index issuing a profit warning or negative trading statement.

Uncertainty about the macroeconomic environment, and in particular about future equity prices, appears to have increased between August and October, leading to an increase in the equity risk premium, and putting downward pressure on equity prices. Options data

(1) As measured by IBES (Institutional Brokers Estimate System).
(2) The dating convention for IBES is that the stated figure for a particular month is the result of a survey conducted towards the end of the previous month.

Decomposing equity price movements

Using the standard discounted cash flow dividend discount model (DDM)[1] approach to valuing equities, a fall in equity prices could reflect:

- lower current dividend payments;
- a fall in expected dividend growth;
- higher risk-free interest rates; or
- a higher equity risk premium.

In the case of constant dividend growth, g, and interest rates, r, the DDM equity price formula is:

$$P_{t=}\frac{D_t\left(1+g\right)}{\left(ERP+r\right)-g}$$

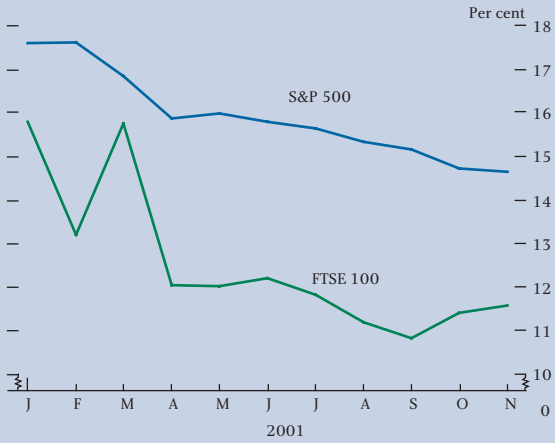
where D_t is the current level of dividends, and ERP the equity risk premium.

The current level of dividends is known, and government debt markets can be used to derive estimates of risk-free interest rates. The expected growth rate of dividends and the equity risk premium are not observable. However, it is possible to use market information as a guide to whether these two variables have changed over time.

There are direct market measures of uncertainty. As noted on page 379, there is a close short-term relationship between volatilities of future share prices, implied by options contracts, and the levels of the associated indices. Corporate bond spreads may also be informative in this respect. Both suggest that there may have been a rise in the equity risk premium since August, though the sharp rises in volatilities following the 11 September terrorist attacks were quite short-lived.

The market's view of the likely future growth of dividends will depend on current company profits—to the extent that these are retained and re-invested—and on the overall outlook for productivity and corporate earnings. GDP growth forecasts and profit warnings provide some indication of prospects. Another source of information on dividend growth is the monthly IBES survey of analysts' expectations for earnings per share for the FTSE 100 and S&P 500 indices. The main text notes the recent falls in the earnings per share forecasts for 2001 and 2002. There have also been falls in the 'long-term' forecasts, for a three to five-year horizon, since the start of 2001 (see Chart A).

Chart A
IBES long-term growth forecasts for earnings per share during 2001



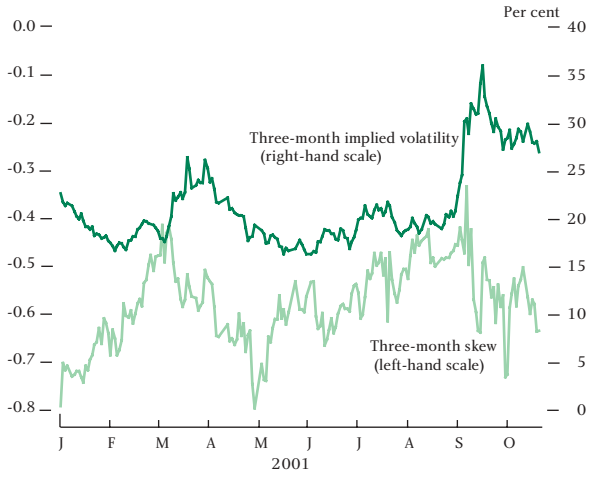
Source: IBES.

Using these forecasts, together with figures on current earnings and retention ratios,[2] suggests that changes in these forecasts help to account for some—but not all—of the falls in the S&P 500 and FTSE 100 since mid-2000. The calculations indicate that there have also been increases in equity risk premia, consistent with rises in other indicators of uncertainty.

(1) See for example, Grinblatt, M and Titman, S (1998), 'Financial markets and corporate strategy' (McGraw Hill), pages 375–76, and the box on equity market valuations in the *Bank of England Financial Stability Review*, June 2001, pages 36–37.
(2) It is assumed that, beyond the IBES horizon, earnings growth gradually adjusts down to a long-run rate tied down by the condition that the rate of return on capital equals the cost of equity.

suggest that the market became more uncertain about the outlook for equity prices, and increased the probability attached to further falls in equities. In the United Kingdom, the skew for the FTSE 100 was more negative at 26 October than at 1 August (although it was less negative than earlier in the year). Implied volatilities rose to unusually high levels (see Chart 21). Together with the more negative skew this implies that the likelihood of further falls in the index was thought by market participants to be much higher than at the start of August, or that risk aversion was greater. For the S&P 500, the movements in volatilities and skews were similar to the FTSE 100.

Chart 21
FTSE 100 skewness and implied volatility(a)

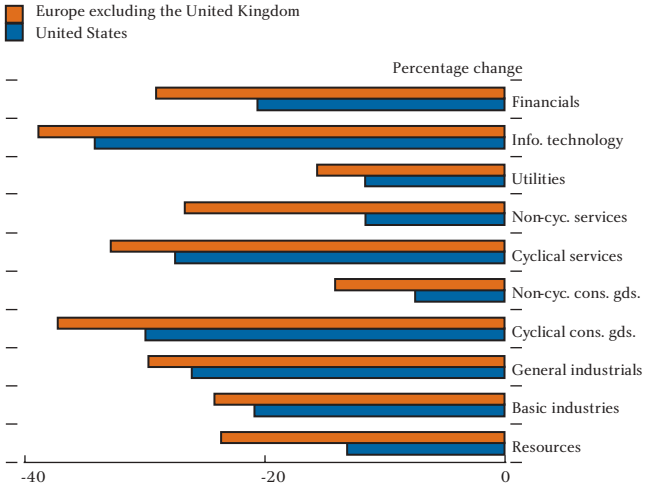


(a) Derived from options on FTSE 100 futures.

The increases in implied volatilities from options contracts appear to have been only partly related to the terrorist attacks—they had already been rising before 11 September. Although the sharp rise following the attacks was later mostly reversed, implied volatilities remained higher than in the summer. There has been a clear short-term inverse relationship between implied volatilities and the levels of equity indices over the past few years (see Chart 18).

Correlations among most major international equity indices increased between Q2 and Q3, reflecting the perception that the economic slowdown and the impact of the terrorist attacks were global phenomena. US, UK and euro-area equity markets moved broadly in line. Prices in the euro area fell by most over the period, reflecting relatively large falls to the 21 September trough (see Chart 17, and Chart 1.4 in the November *Inflation Report*). The German DAX index fell particularly sharply, much of this in the period prior to 11 September (see Table E). The falls in the euro area were greater across all sectors (see Chart 22), with different sectoral composition explaining little of the relatively larger falls in the aggregate indices.

Chart 22
Changes in Datastream sectoral equity indices(a)
between 1 August and 21 September 2001

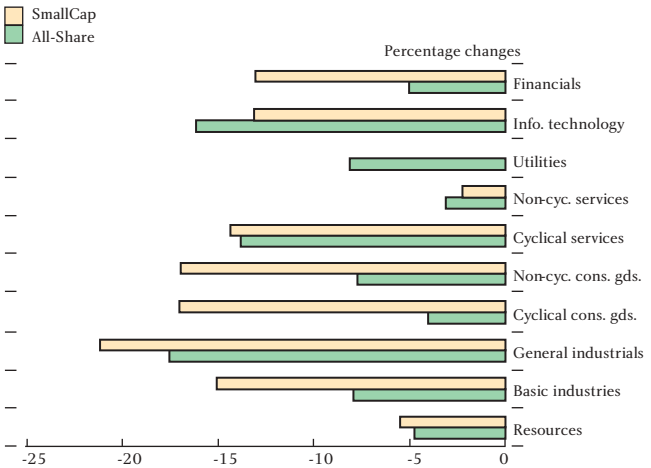


Source: Thomson Financial Datastream.

(a) In local currencies.

There have also been large differences between the various indices within the United Kingdom. In particular, as noted in the November *Inflation Report*, there were unusually large divergences between the FTSE 100, FTSE 250 and FTSE SmallCap indices in the weeks immediately following the terrorist attacks (see the November *Report*, Chart 1.7). Bank analysis suggests that around half of the gap that opened up between the FTSE SmallCap and FTSE 100 reflected the different sectoral weights of the indices, while such weighting differences can explain most of the gap between the FTSE 100 and the FTSE 250. The FTSE 250

Chart 23
Changes in FTSE sectoral equity indices between
1 August and 26 October 2001



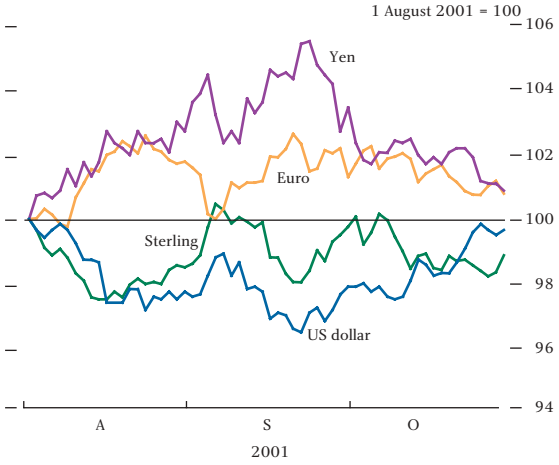
Source: Thomson Financial Datastream.

and FTSE SmallCap indices have high weights for the IT and cyclical services sectors, which are among those that have fallen by most since August (see Chart 23).

Foreign exchange markets

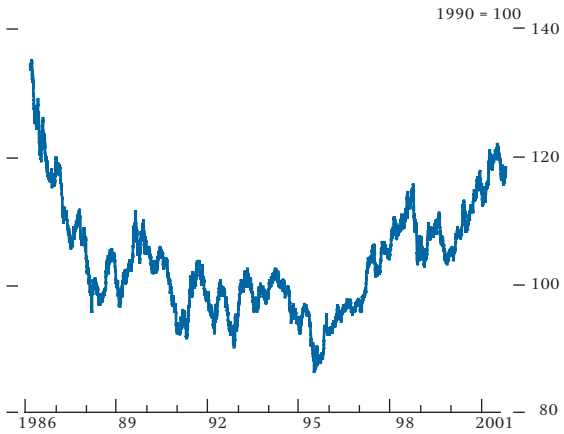
Among the major currencies, exchange rate movements were relatively small over the period as a whole (see Chart 24). Between 1 August and 26 October, the dollar trade-weighted exchange rate index (ERI) depreciated by 0.3%, while the euro and yen ERIs appreciated by 0.8% and 0.9% respectively. The sterling ERI fell by 1.1%.

Chart 24
Effective exchange rate indices



The depreciation of the US dollar between 1 August and 26 October, while limited, reflected falls of 1.5% against the euro, 1.3% against the yen and 0.1% against sterling, although it rose by 2.5% against the Canadian dollar. At the end of the period the dollar ERI was only 2% below its 15-year high recorded on 5 July this year (see Chart 25).

Chart 25
US dollar effective exchange rate index



The dollar's depreciation against the euro, yen and sterling over the period appeared to be related to changes in interest rate differentials and growth expectations. Official interest rates and short and medium-term market interest rates declined by more in the United States than in other industrial countries during the period. Furthermore, changes during the period in growth forecasts for 2001 and 2002 showed larger falls for the United States than for the United Kingdom, the euro area and Japan, according to Consensus Economics. However, most of the changes in interest rates and growth expectations occurred after 11 September, and yet most of the dollar's depreciation occurred in August.

Market participants explained the dollar's fall in August by reference to the relatively weaker economic outlook for the United States, and increased concerns over the sustainability of the United States' current account deficit. Before the attacks, economic data for the United States had, on balance, showed the economy continuing to weaken. The dollar's sharpest fall came after the 8 August release of the Federal Reserve's *Beige Book*. The dollar also fell sharply following the release in mid-August of the IMF's Article IV Report on the United States. Comments made by IMF Board members published with the Report led to renewed concerns among market participants about the possibility of a sharp and sustained dollar depreciation, and about potential difficulties in financing the US current account deficit (for example if overseas investors reduced their appetite for US assets). Over the period as a whole there was little change in the measures of equity and bond capital flows produced by investment banks, although on balance there was some limited evidence of diminishing demand for dollar-denominated assets.

In the immediate aftermath of the 11 September attacks, the dollar weakened further on concerns about the impact on the US economy. The Swiss franc appreciated sharply in mid-September against both the dollar and the euro, reflecting its traditional safe-haven status in times of uncertainty. The price of gold, another frequently mentioned safe-haven asset, also rose sharply. However, these movements were largely reversed by the end of the period, and the dollar on balance appreciated slightly between 11 September and 26 October. In general, other major exchange rates were relatively little changed over this period. Market participants have commented that the main characteristic of the foreign exchange market since the terrorist attacks has been risk

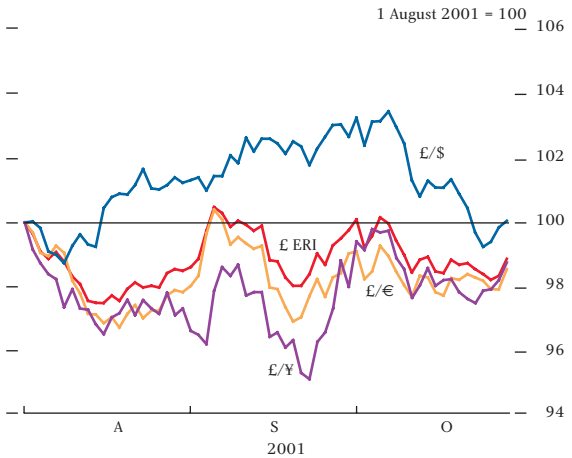
reduction, perhaps in response to the increase in global uncertainty, with risk-averse trading strategies and limited new position-taking.

Foreign exchange market participants initially viewed the impact of the attacks as more of a US-specific shock, but subsequently concluded that the economic downturn globally would be worse than previously thought. Such a view would be consistent with the large falls in short-term interest rates and equity markets around the world in the two weeks following 11 September, and the downward revisions in near-term growth forecasts. Nonetheless, many market participants considered that the longer-term growth prospects remained better for the United States than elsewhere, and such a view may have contributed to the appreciation of the dollar toward the end of the period.

The Japanese yen appreciated in the aftermath of the attacks on the United States. Market anecdote suggested that speculative players were looking to reduce risk by closing short yen positions (so-called 'yen carry trades'). Another explanation put forward by market commentators was that Japanese life assurance companies were reducing their holdings of US equities. The Bank of Japan intervened in the second half of September to limit the appreciation of the yen, principally buying dollars and selling yen; the total size of this intervention was reported to have been ¥3.2 trillion.

The sterling effective exchange rate index fell by 1.1% between 1 August and 26 October; sterling depreciated by 1.4% and 1.2% against the euro and yen respectively, and rose by 0.1% against the dollar (see Chart 26).

Chart 26
Sterling bilateral exchange rates



Sterling's movements were consistent with changes in short-term interest rates. UK short-term interest rates fell by less during the period than those in the United States, but by more than those in the euro area and Japan. At longer maturities interest rates in the United Kingdom fell by less than in the euro area. Growth forecasts for the United Kingdom for 2001 and 2002 were revised down by less than for other countries, consistent with sterling's appreciation against the dollar, but not with its depreciation against the euro and yen.

Between 1 August and 26 October, movements in sterling bilateral exchange rates appeared largely to reflect developments outside the United Kingdom. Sterling's depreciation against the euro was broadly consistent with the appreciation of the euro-dollar exchange rate, given the normal correlation between the two rates. During the previous period, and in particular around the time of the UK general election on 7 June, sterling's largest intra-day movements had been linked to speculation that the United Kingdom might apply for full EMU membership earlier than the foreign exchange market had previously expected. In the period after 1 August, there was less such speculation. Although sterling did depreciate against the euro and the dollar following the references to the euro made by the Prime Minister in his speech to the Labour Party conference on 2 October, these moves were largely reversed the following day.

Looking ahead, in response to political events and military actions following the terrorist attacks, some market commentators expect the dollar to appreciate, because of its safe-haven status, while others expect it to fall, because of the United States' role in the conflict. Despite these opposing views, and possibly since the events of 11 September were viewed as more of a global shock, the implied volatility of one-month euro-dollar option contracts fell over the period (see Chart 27), suggesting that uncertainty about future short-term movements in the euro-dollar exchange rate had diminished. Skew statistics derived from euro-dollar option contracts became more strongly euro-positive up to the middle of September, but then fell in the second half of the month (although remaining slightly euro-positive).

Over the period as a whole, implied volatilities for sterling from one-month to twelve-month maturities (as derived from sterling-euro and sterling-dollar option

Market functioning in the wake of the 11 September terrorist attacks

This box describes trading conditions in interest rate and foreign exchange markets in the week following the terrorist attacks in the United States on 11 September. It also provides details of liquidity provision by G7 central banks during that period.

Trading conditions

Activity in wholesale financial markets by market participants located in New York was greatly reduced for several days after the terrorist attacks. Dealing in many US dollar debt products continued in other centres but generally on a 'best efforts' basis only and for extended settlement. Some banks' operations in Europe were disrupted, for example by precautionary evacuations of their premises; and market participants reported that their clients were concerned during this period about settlement and liquidity issues in respect of dollar products. Prices were adjusted in response to the events but, with volumes very low, accurate price discovery was not possible in many markets. In the market for European government bonds most market-makers did continue to make two-way quotes, but at wider-than-normal spreads, particularly for non-benchmark issues. European government bond and interest rate futures contracts saw higher-than-normal volumes as a result. European equity markets continued to trade as normal, although trading of US equities listed on non-US exchanges was suspended in many cases.

In the London foreign exchange market, participants acted to limit trading as far as possible and to direct it towards risk reduction and essential customer order execution. Hedge funds and model-based players were said to be absent from the market for several days. Market participants mostly traded on an 'at best' basis; a few continued to quote two-way prices at wide spreads. With no appetite for position-taking, foreign exchange rates were stable after the initial reaction to the attacks, reacting little to data or other news until late in the week of the attacks. By contrast, implied volatilities increased markedly, although with options markets also very thin and spreads wide the moves may have been exaggerated. To a greater extent than in debt markets, trading continued to be for standard settlement dates.

In accordance with the advice of the US Bond Market Association, US-based bond market participants resumed trading on 13 September; normal trading hours were re-established on 20 September, and standard settlement resumed on 24 September.

Futures trading on the Chicago Mercantile Exchange and the Chicago Board of Trade also resumed on 13 September. US equity markets re-opened on Monday 17 September.

Once trading resumed in the United States, volumes and liquidity tended to improve day by day across markets. However, bid-offer spreads in debt markets remained higher than normal for several days, particularly for off-the-run issues. Repo markets took longest to return to normal: market functioning was impaired by a shortage of general collateral and failed trades associated with a large custodian. The dislocation in the US Treasury repo market was eased substantially by a special $6 billion reopening of the on-the-run Treasury note on 2 October.

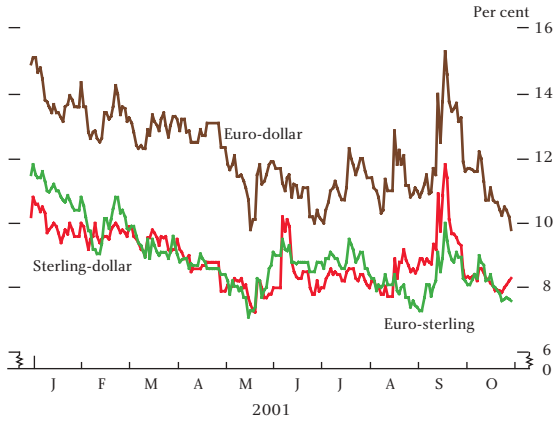
Central bank liquidity provision

On 12 September, G7 Central Bank Governors, in a joint statement with G7 Finance Ministers, indicated that they would 'provide liquidity to ensure that financial markets operate in an orderly fashion'. The Federal Reserve provided additional liquidity via its discount window—an average of $11.7 billion per day was reported for the week ending 12 September—as well as through its standard overnight repo operations—an average of $62 billion per day during the four working days from 12 September. Normal liquidity provision resumed on 19 September. The European Central Bank provided additional funds through snap tenders of €69 billion on 12 September and €40 billion on 13 September. In the immediate aftermath of the attacks, the Bank of Japan supplied an additional ¥2 trillion via normal open market operations. Short-term interbank cash rates in US dollars and euro were volatile for several days after the attacks. The Bank of England continued to provide the market's sterling liquidity needs with cash rates suggesting little evidence of pressures at this time.

Three central banks announced that they had agreed temporary swap facilities with the Federal Reserve under which their domestic currencies could be swapped for US dollars in order potentially to facilitate US dollar settlements in their domestic banking systems. These were the European Central Bank ($50 billion), the Bank of England ($30 billion), and the Bank of Canada (extending an existing facility from $2 billion to $10 billion). A number of other central banks announced that they would provide US dollar liquidity sourced from their foreign exchange reserves if necessary.

contracts) were broadly unchanged and remained below those for the euro-dollar exchange rate (see Chart 27), although volatility rose temporarily following the events of 11 September. Skew statistics derived from euro-sterling and sterling-dollar contracts appeared largely to reflect movements in the spot exchange rate and, latterly, the general risk aversion in the foreign exchange market; risk reversals were broadly neutral at the end of the period.

Chart 27
Exchange rate uncertainty(a)



(a) One-month implied volatilities derived from foreign exchange option contracts.

The sterling money market

The amount outstanding in the sterling money market increased by £12 billion to £555 billion in Q3, having been broadly unchanged in the previous quarter (see Table F). Gilt repo saw the largest increase in amounts outstanding, with rises also recorded in certificates of deposit (CD) and interbank deposits. These increases were partly offset by a fall in stock lending.

Nominal amounts outstanding in gilt repo rose by about £16 billion, after having been broadly unchanged for more than a year. There was a strong increase at maturities of three months and longer, perhaps reflecting expectations prior to the events of 11 September that official rates were at or near their trough and would remain at that level for some time. Despite this increase in the size of gilt repo, which was large relative to the rise in the size of the interbank and CD markets, spreads between these instruments remained broadly unchanged.

While average daily turnover in gilt repo contracts rose slightly in the quarter to end-August (see Table G), anecdotal evidence suggests that activity in gilt repo and other money market instruments fell substantially in the days following 11 September. Initially, the repo market was affected by a decline in the availability of collateral. Bid-offer spreads widened and trading was said to be mainly limited to closing out short-dated positions, with participants having little appetite for taking on new risk. However, for short sterling futures, turnover remained strong for Q3 as a whole, and for September in particular, perhaps reflecting a flight to liquidity as market participants rapidly reassessed expectations for the path of future official interest rates.

Table G
Turnover of money market instruments

Average daily amount, £ billions

	1999	2000	2001		
			Q1	Q2	Q3
Short sterling futures (a)	54	45	60	66	71.5
Gilt repo (b)	13.6	17.8	15.7	17.9	18.2
Interbank (overnight)	8	10.4	10.3	11.1	9.3
CDs, bank bills and Treasury bills	n.a.	n.a.	11.8	12.4	11.4

n.a. = not available.

Sources: CrestCo, LIFFE, Wholesale Markets Brokers' Association and Bank of England.

(a) Sum of all 20 contracts extant, converted to equivalent nominal amount.
(b) Reporting dates are end-February for Q1, end-May for Q2, end-August for Q3, end-November for Q4 and end-year.

After 11 September, some insurance companies announced their intention to withdraw from equity stock lending activities. The Bank liaised bilaterally with market contacts on the implications of these developments, and also discussed the issue with market practitioners and others at the Stock Lending and Repo

Table F
Sterling money markets

Amounts outstanding: £ billions

		Interbank (a)	CDs (a)	Gilt repo (b)	Stock lending (b)	Eligible bills (a)	Commercial paper (a)	Other (c)	**Total**
2000	Q1	156	132	100	51	14	15	6	**474**
	Q2	159	135	124	54	12	16	7	**507**
	Q3	162	125	127	53	12	16	7	**502**
	Q4	151	130	128	62	11	18	9	**509**
2001	Q1	171	141	126	67	13	19	7	**544**
	Q2	177	131	128	67	12	22	6	**543**
	Q3	187	134	144	52	11	21	6	**555**

(a) Reporting dates are end-quarters.
(b) Reporting dates are end-February for Q1, end-May for Q2, end-August for Q3, end-November for Q4 and end-year.
(c) Including Treasury bills, sell/buy-backs and local authority bills.

Committee (SLRC), chaired by the Bank.[1] In the event only a few firms had withdrawn from the market and they were not major participants; a few press articles suggested that some believed short selling was exacerbating the declines in equity markets occurring in mid-September, and that as stock lending could be used to facilitate short selling, this was said to be a factor in their withdrawal from the market. These concerns were not, however, widely held, and the few withdrawals had no material impact on the overall market, including the fixed-income market.

Stock lending increases liquidity in cash markets by allowing intermediaries and others to take short positions, improves the price discovery process and allows for a more efficient hedging of derivatives and other instruments. This was recognised, for example, in the July 1999 Report of the International Organisation of Securities Commissions (IOSCO) and the Committee on Payment and Settlement Systems (CPSS) *Securities Lending Transactions: Market Development and Implications*. Also, a framework for the orderly conduct of stock lending and borrowing is provided by the Stock Borrowing and Lending Code, a revised code of market good practice produced by the SLRC in 2000.

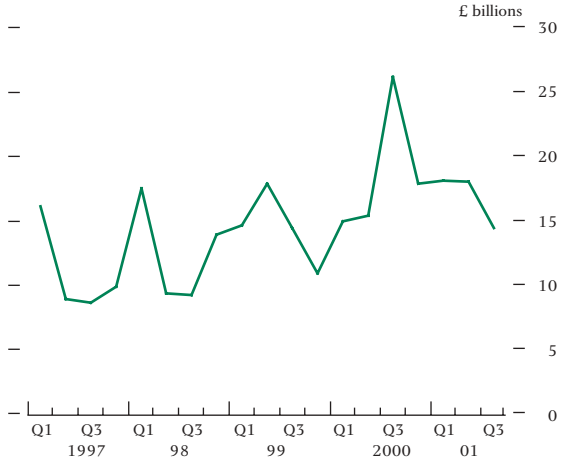
The repo market in 'specials' continued to be dominated by those gilts that are deliverable into the long gilt futures contracts. While such gilts trade at a premium to general collateral (GC) repo, there have been a number of occasions recently when the premium was large enough to warrant a request by the market to open the Debt Management Office's standing repo facility.[2]

Sterling bond issues

The size of the gilt-edged market decreased by £2.8 billion in the third quarter to £283.4 billion, after increasing by £0.5 billion in the first half of 2001. About £7.7 billion of gilt-edged stock was redeemed, and the Debt Management Office (DMO) held two outright and one index-linked switch auction during the quarter (see Table H).

Issuance of non-government bonds denominated in sterling increased in July, but fell sharply in the following two months, leaving issuance for the third quarter as a whole sharply lower. About £15 billion was issued in the sterling-denominated corporate bond market during Q3, down from nearly £18 billion in the previous quarter and a little over £26 billion in 2000 Q3 (see Chart 28). This fall was mainly accounted for by a reduction in fixed-rate issuance, which fell to £8.7 billion, sharply down from £13.3 billion in 2001 Q2. Floating-rate issuance held up better at £6.3 billion in Q3, which was more than the amount issued in Q2, but down from the amount issued in Q2, and issuance remained low in the weeks that followed.

Chart 28
Sterling corporate bond issuance



Fixed-rate borrowing by AAA-rated issuers declined sharply, and this was the main component of the reduction in fixed-rate issuance during Q3; about £12.6 billion has been issued this year up to and including Q3, compared with £30.2 billion and £20.9 billion in 2000 and 1999 respectively. Beyond the possibility that the reduction in AAA-rated issuance reflected short-term fluctuations, it may have reflected a decline in AAA-rated corporate bond yields relative to gilt yields, leading some investors to consider the additional return from holding such bonds compared with gilts insufficient to warrant fresh purchases. With less institutional demand, issuance may have been deterred.

A reduction in corporate merger and acquisition activity may also have contributed to a decrease in borrowing by the private sector during the quarter, since the need to raise funds for cash-financed takeovers was diminished.

(1) See 'The Bank's contacts with the money, repo and stock lending markets', pages 431–33.
(2) For further details on this facility, see 'Response to DMO Consultation Document on 'Special' Gilt Repo Operations', UK Debt Management Office, February 2000.

Table H
Sterling bond issuance in 2001 Q3

DMO gilt auctions (£ millions)

Conventional	Date	Amount issued	Stock		
	26.09.01	2,500	5% Treasury Stock 2025		
Index-linked	Date	Amount issued	Stock		
	25.07.01	500	2% Index-linked Stock 2024		
Switch auction results	Date	Nominal switched	Source stock	Destination stock	Nominal created
	19.07.01	500	2% Index-linked Stock 2006	2½% Index-linked Stock 2016	561
Conversion offer results	Date	Nominal converted	Source stock	Destination stock	Nominal created
	23.07.01	4,958	9% Treasury Stock 2012	5% 2012	6,761

Corporate issuance		Amount (£ billions)			
			By credit rating:		
	Number of issues	Total (a)	AAA	AA/A	BBB and lower
Fixed-rate issues					
UK corporates	12	3.3	0.5	0.8	2.0
UK financials	16	2.4	0.2	1.8	0.5
Supranationals	11	1.3	1.3	0.0	0.0
Overseas borrowers	11	1.6	0.7	1.0	0.0
Total (a)	**50**	**8.6**	**2.7**	**3.6**	**2.5**
Floating-rate notes					
UK corporates	4	0.7	0.4	0.2	0.2
UK financials	16	3.5	2.2	1.3	0.0
Supranationals	1	0.2	0.0	0.2	0.0
Overseas borrowers	22	1.9	0.5	1.3	0.0
Total (a)	**43**	**6.3**	**3.1**	**3.0**	**0.2**

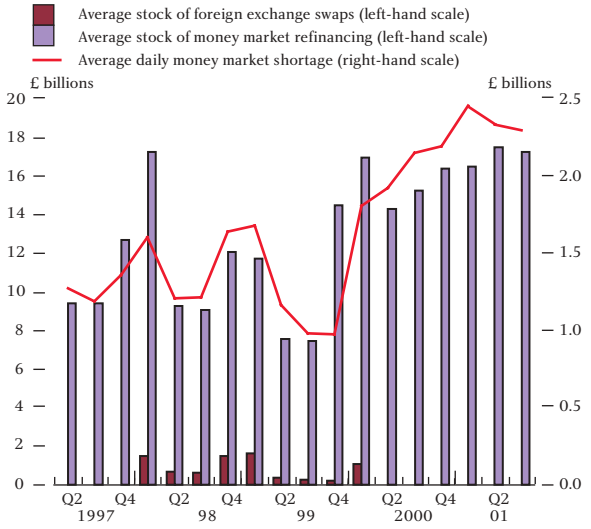
Sources: Bank of England, Debt Management Office, Moody's, and Standard and Poor's.

(a) Totals may not sum exactly due to rounding.

Open market operations

Between August and October, the stock of money market refinancing held on the Bank's balance sheet (which comprises the short-term assets acquired via the Bank's open market operations) averaged £17 billion (see Chart 29). This was broadly unchanged on the previous three-month period, but some £2 billion higher than in the period August to October 2000, mainly reflecting the growth of the bank note circulation (which is the principal sterling liability on the Bank's balance sheet).

Chart 29
Stock of money market refinancing and daily shortages(a)



(a) Calendar quarters.

During the review period, daily money market shortages averaged £2.4 billion, compared with £2.3 billion over the period May to July 2001 (see Table I). This slight rise reflected a slightly increased rate of turnover in the stock of refinancing.(1) Over the review period, the Bank's counterparties refinanced 80% of the daily money market shortages at the 9.45 am and 2.30 pm rounds of operations (which broadly have a two-week maturity) and 20% at the late rounds, on an overnight basis (see Chart 30). In the previous three-month period, 16% of the refinancing had been undertaken on an overnight basis.

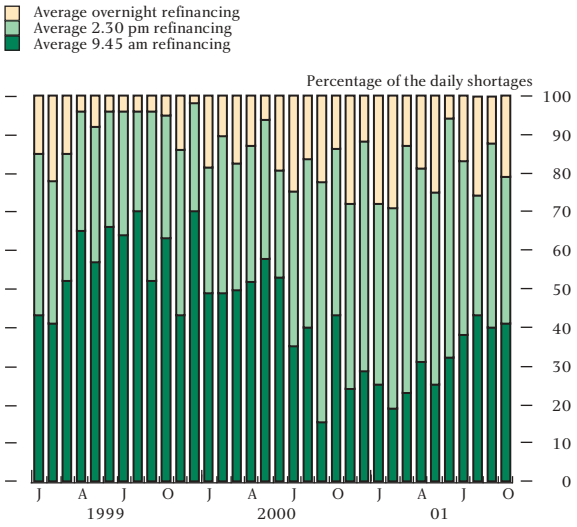
Table I
Average daily money market shortages

£ millions

1996	Year	900
1998	Year	1,400
2000	Year	2,000
2001	Q1	2,500
	Q2	2,300
	July	2,200
	Aug.	2,600
	Sept.	2,100
	Oct.	2,500

(1) Although most of the Bank's open market operations are conducted via two-week reverse repo transactions, the average rate of turnover of the stock is usually around seven to eight working days. This is because the Bank's counterparties can choose to obtain refinancing by selling eligible bills with less than a two-week residual maturity on an outright basis, or can obtain overnight repo refinancing at a penal interest rate if they choose.

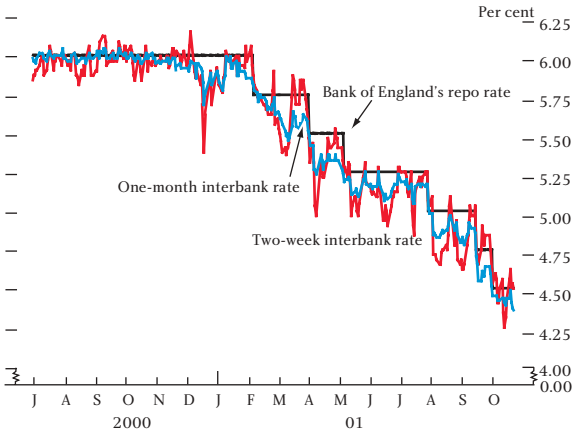
Chart 30
Refinancing provided in the Bank's open market operations



Some of the rise in counterparties' use of overnight refinancing (and consequent increase in the average size of the shortage) can be explained by the fact that there were strong market expectations that the MPC would cut interest rates at its meeting on 4 October. (On the two days prior to this decision the Bank's counterparties chose to take refinancing from the Bank largely on an overnight basis.) When counterparties expect the MPC to reduce the repo rate they may choose to take refinancing from the Bank largely on an overnight basis on the days immediately preceding the MPC meeting, even though this normally entails a short-term rise in their borrowing costs, as overnight refinancing from the Bank incurs a penal interest rate. This leads to a number of larger daily shortages as refinancing is rolled over from day to day. When counterparties choose to obtain a higher proportion of the refinancing on an overnight basis, the turnover of the stock of refinancing increases and, consequently, the average size of the shortages increases.

Chart 31 shows various short-dated money market interest rates and the Bank's repo rate. Counterparties made use of the deposit facility introduced on 27 June 2001 on two days between August and October, totalling £450 million. In order to leave the market square by close of business, on each occasion that the facility was used the Bank increased the amount of refinancing available at the 4.20 pm settlement bank late repo facility by the size of the deposit. The

Chart 31
Bank's repo rate and interbank rates



settlement banks then borrowed the full amount of this increased refinancing.

The deposit facility has continued to fulfil its objective of providing a 'floor' to the interbank overnight rate, and consequently other short-dated market interest rates. During the quarter, the lowest level at which the overnight rate traded in the market up to 3.30 pm (the time at which the Bank offers to take deposits from its counterparties) was 100 basis points below the Bank's repo rate. The Bank's lending operations at 3.30 pm, which are available to square off any remaining market imbalance on an overnight basis, seek to limit the highest level at which the overnight rate trades by providing liquidity at 100 basis points above the Bank's repo rate. The Bank continues to monitor closely the use and effectiveness of the deposit facility and recently discussed it with market practitioners at the Money Market Liaison Group meeting on 5 October.(1)

Since the introduction of the deposit facility on 27 June 2001, the lowest level of the sterling overnight index average (SONIA) rate(2) has been 85 basis points below the Bank's repo rate. By comparison, in the year before the introduction of the facility, SONIA was more than 85 basis points below the Bank's repo rate on 18 days.

In September, the Bank adjusted the amount by which it leaves the market short after the 9.45 am round of operations, even when the available refinancing had been fully bid for by counterparties. As reported in the 'Markets and operations' article in the Autumn 2001 *Quarterly Bulletin*, the previous adjustment had been made on 24 July when the amount had been reduced to

(1) See 'The Bank's contacts with the money, repo and stock lending markets', pages 431–33.
(2) The SONIA rate is a weighted average rate of brokered, unsecured overnight deals transacted between midnight and 3.30 pm (4.15 pm from 1 November 2001).

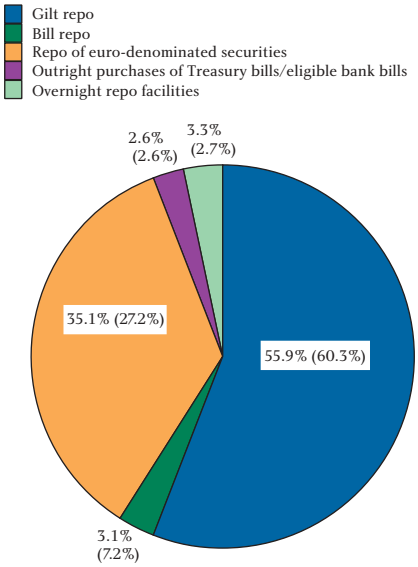
£600 million. In the wake of the terrorist attacks in the United States, the Bank sought to aid the transmission of liquidity to the sterling money market by reducing this amount to £200 million. However, there were insufficient bids from counterparties at the 9.45 am rounds of operations for this new level to fully take effect until 26 September, when £1,550 million was allotted at 9.45 am out of a total liquidity shortage of £1,750 million. This lack of demand for refinancing at the 9.45 am round was, in itself, an indication of the absence of strains in the sterling money market in the wake of the terrorist attacks.

Gilts accounted for around 56% of the stock of collateral taken by the Bank in its open market operations during August, September and October (see Chart 32). Euro-denominated eligible securities(1) (issued by EU governments and supranational bodies) accounted for around 35% of the collateral, up from a level of 27% in the three months to end-July.

HM Treasury and Bank of England euro issues

The Bank of England continued to hold regular monthly auctions during August, September and October of €1 billion of Bills, comprising €200 million of one-month, €500 million of three-month and €300 million of six-month Bank of England Bills. The stock of euro Bills outstanding was therefore maintained at €3.5 billion throughout the period. The auctions continued to be oversubscribed, with issues being covered an average of 4.99 times the amount on offer over the three-month period; Bills were allocated at average yields of between euribor minus 10 and 12.5 basis points for the relevant maturity.

Chart 32
OMOs—instrument overview(a)



(a) This chart shows the average shares of the various instruments held by the Bank as collateral for open market operations from August to October 2001. Figures in brackets relate to May to July 2001.

The Bank reopened the Bank of England Euro Note maturing on 29 January 2004 with a final auction for €500 million on 16 October, raising the amount of this Note outstanding with the public to €2.0 billion. Cover at the auction was 9.43 times the amount on offer and accepted bids were in a range of 3.606%–3.624%.

UK gold auctions

The programme of gold auctions held by the UK government continued in the period under review. Twenty tonnes of gold were sold at the auction on 12 September; a price of $280.00 per ounce was achieved and the auction was covered 4.3 times. The next auction will be held on 27 November 2001.

(1) A list of eligible securities is available on the Bank's web site at www.bankofengland.co.uk/markets/money/eligiblesecurities.htm

The external balance sheet of the United Kingdom: implications for financial stability?

By Stephen Senior of the Bank's G10 Financial Surveillance Division and Robert Westwood of the Bank's Monetary and Financial Statistics Division.

In 2000, UK gross external assets and liabilities grew by more than 20%, boosted particularly by international mergers and acquisitions and international banking activity. In net terms, UK external liabilities fell moderately but remained substantial, at about 13% of annual GDP. This fall was associated with changing nominal values of UK external assets: the currency denomination of UK external assets and liabilities means that, other things being equal, a lower exchange rate reduces UK net external liabilities via revaluation changes. As reported in last year's article in this annual series, the UK net liability position may be misleading: UK net external assets are probably underestimated because of the way foreign direct investment is calculated. Policy-makers in the international community have focused on identifying key tools that could be useful for monitoring and analysing external balance sheet vulnerabilities. The second section of this article looks at the extent to which the United Kingdom can compile and assess the IMF's set of key indicators of external vulnerability.

External balance sheets and monitoring financial stability risks

External balance sheets are an important tool for monitoring financial stability risks in both emerging market and industrial economies.(1)(2) For some countries, the structure of their external balance sheet may significantly affect their ability to withstand external shocks. For example, an economy with a large foreign currency exposure carries a risk of loss (or profit) from sudden changes in exchange rates. Similarly, a country with large short-term net external liabilities is exposed to refinancing risk, and could, in the extreme, suffer a liquidity crisis.

For the United Kingdom, the risks of a refinancing or liquidity crisis are probably very low. However, sectors and institutions can still suffer significant welfare losses from foreign currency, global interest rate or business cycle shocks. Changes in the external balance sheet might also indicate current account imbalances.

However, aggregate external balance sheets alone are not adequate diagnostic indicators. Recent financial crises have shown that balance sheet pressures do not arise

What is an external balance sheet?

An external balance sheet is a summary of a country's financial relationship with the rest of the world. For the United Kingdom, it combines the stock of UK residents' financial investments in the rest of the world (assets) and the stock of financial investments into the United Kingdom from abroad (liabilities). External assets and liabilities include direct investment, cross-border holdings of equities bonds and money market instruments, and international bank lending. The external balance sheet of the United Kingdom is published annually by the Office for National Statistics (ONS) as part of the *United Kingdom Balance of Payments Pink Book*—the latest issue of the *Pink Book* was published on 5 November 2001, showing data up to end-2000.(1)

(1) Quarterly estimates of the UK external balance sheet are published in addition to annual data. However, these quarterly data are generally of lower quality because some quarterly levels data are estimated imperfectly using cumulative financial flows and revaluing the result using relevant price indices. The latest quarterly data are for 2001 Q2 and are used in this article where appropriate to give an indication of the most recent trends in the UK external balance sheet.

(1) See 'The external balance sheet of the United Kingdom: implications for financial stability?', Senior, S and Westwood, R, *Bank of England Quarterly Bulletin*, November 2000, pages 351–64.
(2) Problems with the structure of external balance sheets were important in a number of recent financial crises, including Mexico (1994), Korea and Indonesia (1997), Russia (1998), and Brazil (1999). See 'Improving the stability of the international financial system', Drage, J and Mann, F, *Bank of England Financial Stability Review*, June 1999, pages 40–77.

only from the external sector. The risk of domestic capital flight can be high in times of crisis. And it is important to remember that balance sheets are an aggregation of the positions of many institutions and households. At the micro level there may be currency or liquidity mismatches that are not visible in aggregates. The relationships between economic sectors and with the rest of the world are complex. This article looks at some of the challenges associated with analysis of the external balance sheet, specifically where data changes may occur for accounting reasons, not just economic ones.

Although the UK National Accounts are defined on a residency basis, the activities of institutions located within the United Kingdom do not all pose the same set of risks for the UK economy or stability of the UK financial system. Foreign banks and securities dealers operating in London are one example. Business booked by these institutions in London will affect the UK external balance sheet even if they are intermediate financial transactions between overseas entities. This is not to say that international banking activity is irrelevant for UK financial stability. The Bank of England's financial stability role extends to monitoring international as well as specifically domestically-sourced. However, the analysis of risks to the financial stability of international financial markets needs a set of tools additional to an 'external balance sheet analysis'.

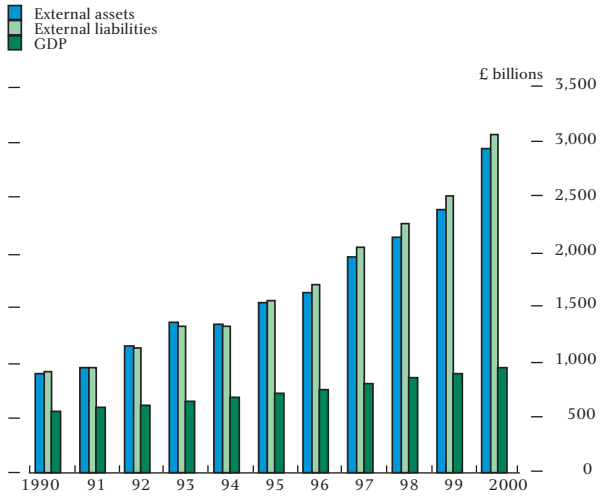
Recent developments in the UK external balance sheet

Gross external assets and liabilities

In 2000, the UK external balance sheet grew at its fastest rate for more than ten years. At the year-end, UK gross external assets were just under £3 trillion, an increase of nearly 25% since end-1999 (see Chart 1).

Over the past decade, UK gross external assets have grown at an average annual rate of more than 12%, easily outstripping the 5.4% average annual growth rate of nominal UK GDP over the same period. Furthermore, the pace of growth has itself been increasing: the average annual rise of external assets during the past three years was over 14%. UK gross external liabilities grew only marginally more slowly than external assets in

Chart 1
UK gross external assets and liabilities



Source: Office for National Statistics (ONS).

2000, increasing by around 22% to more than £3 trillion. The strong growth in assets and liabilities illustrates how the expansion in capital markets is not constrained by the underlying growth rates of the UK economy or the world economy.(1)

Margin for error

The compilation of the UK external balance sheet involves drawing together data from many censuses and sample surveys, covering all aspects of the economy. Inevitably, this can result in a degree of approximation, which may be sizable because UK gross assets and liabilities are so large. For example, with external assets of nearly £3 trillion, a 1% measurement error amounts to a difference of close to £30 billion. So it is important not to place too much emphasis on precise figures or small changes over time.(2) Indeed, it is possible that there are systematic measurement problems in the UK external balance sheet that may persist over a long period. The box on page 390 looks at the difficulties associated with assigning a value to direct investment and the possible impact that these could have on the interpretation of the UK external balance sheet.

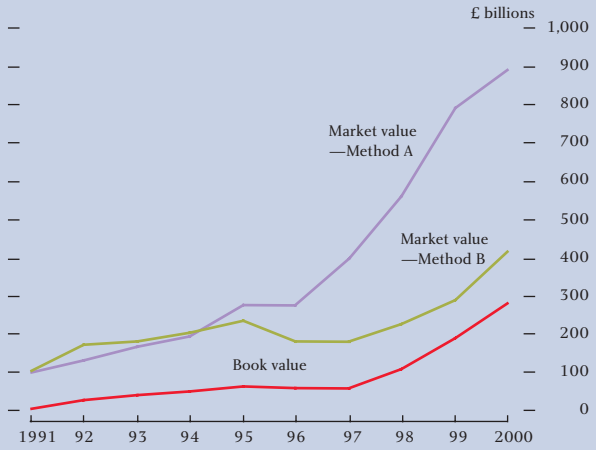
The estimation problem associated with gross figures is amplified for net numbers. Given the size of gross external assets and liabilities, small errors to both can be sufficient to change the sign on the net external asset position. This is not a theoretical point. Chart 2 shows

(1) According to the IMF, world trade grew at an average rate of 7.1% for the period 1993 to 2002 (data for 2001 and 2002 are projections).
(2) As the data have a survey-based component it is important to allow for the approximations involved in this process. The point estimates produced by sample surveys should be understood as an anchor around which upper and lower bounds can be established. The best that can then be done is to state a probability that the true figure—for the full population from which the sample is drawn—will lie within these bounds.

Estimating market values for FDI

The November 2000 *Quarterly Bulletin* article on the UK external balance sheet contained estimates of direct investment at market value based on an update of a study by Pratten.(1) In this article, we update last year's approach (Method A) and offer an alternative method for estimating market values for direct investment (Method B).

Chart A
Estimated market values of UK net direct investment assets



Sources: Bank of England, ONS.

Method A

For Method A, we used Pratten's results for 1991 to generate time series for direct investment at market value through the 1990s.(2) The time series were generated by assuming subsequent market values of direct investment had risen each year in line with domestic and international equity markets (plus the impact of exchange rate changes). Updating this approach suggests that UK net direct investment assets on a market value basis might be as high as £900 billion at end-2000, compared with less than £300 billion on a book value basis.

Method B

An alternative approach used economic growth as a proxy for changing values of direct investment.

A country typically exports goods and services for which it has a comparative advantage in factors of production, and imports goods and services for which it has a comparative disadvantage. Similarly, direct investment will tend to flow into a country that has a comparative advantage in resources and/or where the local companies are at a comparative disadvantage in terms of market position (eg inferior access to capital markets/technology/ distribution networks etc). For example, a UK oil exploration company might make a direct investment in a country which has plentiful oil reserves but where the local companies are not strong enough financially to have access to the full range of technology necessary to exploit the oil. (In effect direct investment could be seen as substituting for imports/exports and is therefore probably driven by different factors than those behind portfolio investment.)

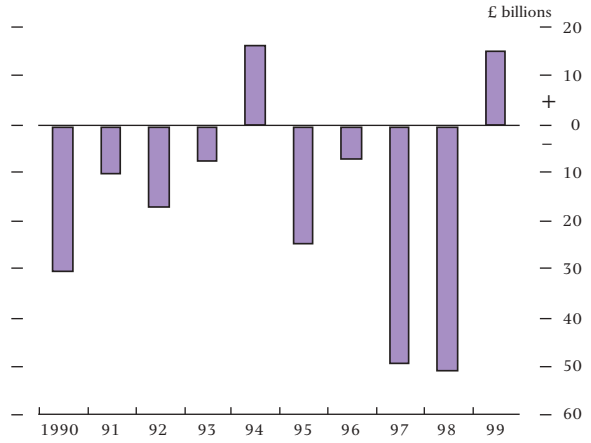
It may therefore be reasonable to characterise direct investment as part of the economy of the country in which the investment is made. This suggests that the book value of direct investment could be adjusted using growth rates of the sector of the economy receiving the investment. However, as it has not been practical in this study to disaggregate to the level of economic sector, it has been assumed that aggregate direct investment will broadly reflect the make-up of the economies in which it takes place. This allows us to use nominal GDP growth as our factor.

On this second adjusted-market-value basis the United Kingdom had net direct investment assets of more than £400 billion, compared with less than £300 billion on a book value basis. This is much lower than the £900 billion net market value position using the first estimate, but still sufficient to swing the overall UK external position from one of net liabilities to one of net assets.

(1) 'The valuation of outward and inward direct investment: a report for the CSO', Pratten, C, Department of Applied Economics, University of Cambridge, 1994. The CSO was the predecessor to the ONS.
(2) Pratten found that in 1991 the market value of outward direct investment was 2.05 times book value, and 1.25 times book value for inward direct investment.

that the difference between the first and second estimates of net external assets, published in consecutive *Pink Books*,[1] has ranged from -£50.6 billion to £16.2 billion.

Chart 2
Revisions to net external assets between first and second *Pink Book* estimates



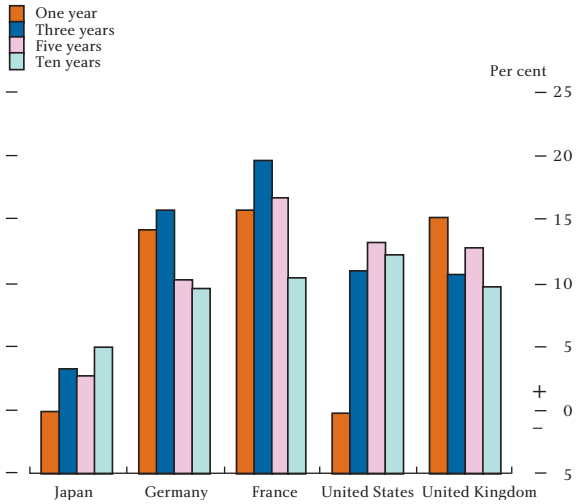
Source: ONS.

As a share of nominal GDP, UK external assets and liabilities are large by international standards. At end-2000, UK external liabilities were close to 325%, compared with 145% for Germany, 135% for France, 94% for the United States and just 39% for Japan. However, the recent growth rates of the UK external balance sheet have not been exceptional (see Chart 3). The United States has the highest ten-year growth rate for gross external assets, and France has the fastest growth rate over the past three and five years. Only Japan's external assets have grown at a substantially slower pace. (But in the1980s, Japanese gross external assets grew at an annual average rate of 28%.)

Net balance sheet position

The United Kingdom's net external liability position has stabilised somewhat in the past couple of years, having fallen sharply in the late 1990s. At end-2000, the United Kingdom had net external liabilities of around £120 billion (some 13% of GDP), a decrease from end-1999 (see Chart 4). The net liability position has narrowed modestly over the past two years, having peaked in 1998. The United Kingdom generally had positive net external assets during the first 30 years for which data are available, but between 1996 and 1999

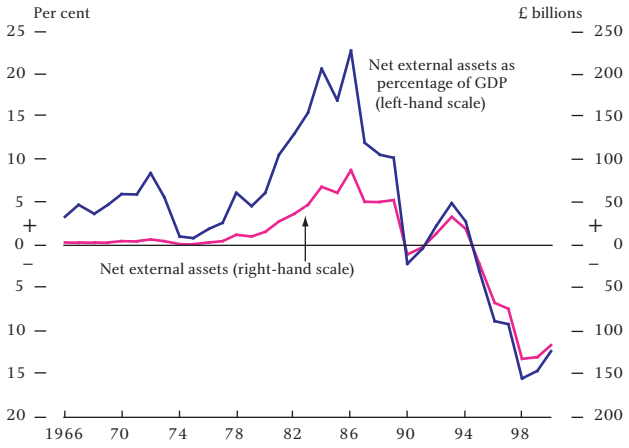
Chart 3
Annual growth rates of gross external assets[(a)]



(a) Assets valued in US dollars.

Source: IMF.

Chart 4
UK net external assets



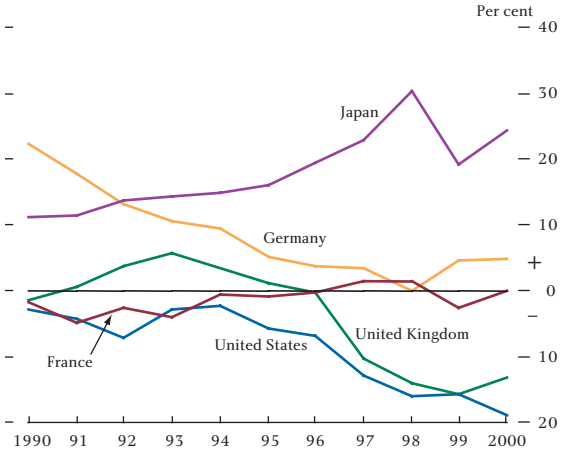
Source: ONS.

there was a sharp shift in the balance from net external assets to net external liabilities.

Chart 5 shows the ratio of net external assets to nominal GDP for a number of developed economies. Over the past decade, the United Kingdom, the United States and Germany have all experienced declines in net external assets (relative to nominal GDP) of roughly similar magnitude. In contrast, Japan has seen a steady increase in net external assets on account of its persistent, large current account surpluses. (The weakness of nominal Japanese GDP growth during the period also tended to push up the ratio.)

(1) The annual ONS *Pink Book* contains estimates of the balance of payments of the United Kingdom. The figure for 1999 is the estimate in the 2000 *Pink Book* minus the estimate in the 2001 *Pink Book*. (The first *Pink Book* estimate is based on quarterly flows data that are cumulated to give levels. The second comes from directly observed annual levels taken from a survey with a sample size roughly double that used to produce the first. Revisions in subsequent years are generally significantly smaller.)

Chart 5
Net external assets as a percentage of nominal GDP



Sources: ONS, IMF.

Balance of payments

Trends in a country's net external position often reflect developments in its current account balance. This is because the financial account (capital flows that increase or decrease a country's external assets and liabilities) plus the much smaller capital account are the counterpart to the current account.(1) In order to finance a current account deficit, domestic residents take in funds from non-residents or run down external assets (or some combination of the two) and in so doing raise their net external liabilities.

The relationship between current account balances and changes in external balance sheets is not, however, straightforward. Over the past decade, the United States has had a cumulative current account deficit of $1,600 billion, and net external liabilities have increased by a similar $1,700 billion (see Table A). But for Japan and Germany the relationship is less clear, and for France there seems to be no correlation between its cumulative current account surplus (+$180 billion) and the changes to its net external position (+$20 billion).

Table A
Comparison of current accounts and changes in net external assets since 1990

US$ billions

	Cumulative change in current account balance	Cumulative change in net external assets
United Kingdom	-171	-166
United States	-1,600	-1,700
Japan	1,060	830
Germany	-145	-245
France	180	20

Sources: ONS, IMF.

For the United Kingdom, the cumulative current account deficit since 1990 is close to the increase in net external liabilities. However, this seems to be partly a matter of chance. Over the past five years (as opposed to the ten years covered by Table A), UK net external liabilities increased by £95 billion, nearly double the cumulative current account deficit during this period. Indeed, on an annual basis, the UK net external position has often moved in the opposite direction to that implied by the current account deficit/surplus. While some of this discrepancy may be attributable to errors and omissions, the majority is due to revaluations of the existing stocks of assets and liabilities.

Table B
UK external balance sheet

£ billions

	1970		1980		1990		2000		2001 H1	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Direct investment	9	5	33	27	122	121	618	349	646	390
Portfolio investment										
Debt	n.a.	n.a.	6	25	106	130	466	396	494	427
Equity	n.a.	n.a.	13	4	101	59	406	612	417	582
Other investment	n.a.	n.a.	n.a.	n.a.	550	604	1,431	1,711	1,615	1,913
Reserve assets	1		13		22		29		27	
Total	**35**	**32**	**228**	**214**	**902**	**914**	**2,951**	**3,068**	**3,200**	**3,311**
Memorandum items:										
Current account		0.8		1.6		-22.2		-18.4		-5.0
Capital account		-0.0		-0.0		0.5		2.0		1.3
Financial account		-0.8		-2.2		15.1		26.4		8.3
Errors and omissions		0.0		0.5		6.7		-9.9		-4.6

n.a. = not available.

Columns may not sum to totals because of rounding.

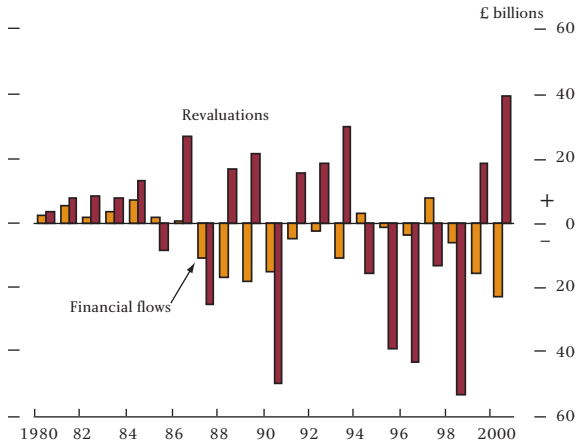
Source: ONS.

(1) In the UK National Accounts, any difference between the financial, capital and current accounts is attributed to 'errors and omissions'. Errors and omissions can often be large (in absolute terms averaging some £5½ billion annually over the past ten years), highlighting the caution with which all National Accounts data should be treated. According to the ONS, errors and omissions are most likely to reflect misreporting in the financial account.

Revaluations

Revaluations often have a major impact on changes in UK net external assets, and have been larger than net financial flows in all but of one of the past 20 years.

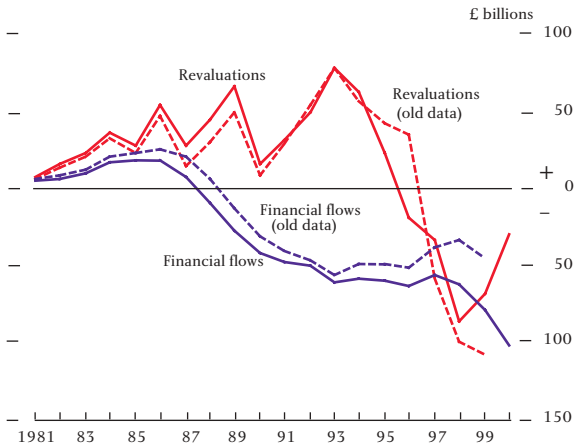
Chart 6
Changes in net UK external assets broken down into financial flows and revaluations



Source: ONS.

Cumulating since 1980 highlights how revaluations have had a varying impact on the net external balance sheet over time (see Chart 7).

Chart 7
Cumulative financial flows and revaluations since 1980: current and previous data



Source: ONS.

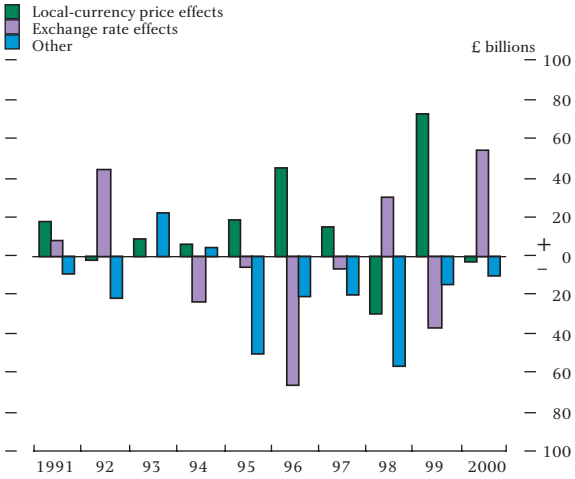
Revaluations in 1999 and 2000 have had a positive impact on the UK external balance sheet position (total £57 billion). These have helped to 'offset' the financial inflows (total £39 billion) associated with the recent current account deficits.

The relationship between estimated financial flows and revaluations shown by the latest *Pink Book* data differs quite substantially from the picture available before. This reflects a series of revisions incorporated in the 2001 National Accounts (the background to these revisions is discussed in the box on pages 394–95). There were significant changes to some balance of payment components. In the new dataset, the cumulative financial inflows to the United Kingdom from 1980 to 1999 are estimated to have been more than £50 billion higher than previously thought (mirroring revisions to the UK current account balance). In contrast, the revisions to stocks data—and the UK net external balance sheet position—were minimal (see Chart A in the box on pages 394–95). Most of the higher inflows identified by the revised data had already been captured in the old stocks data. Previously, these flows had been unidentified and had therefore been classified as 'revaluations'. Revaluations have been correspondingly revised down to offset the higher financial flows figure.

Decomposing revaluations

Changes in the value of sterling are often the most important cause of revaluations to the UK external balance sheet.

Chart 8
Revaluations decomposed



Source: ONS.

Of the total revaluation in 2000 of £39 billion, decomposition suggests that this is more than accounted for by £53 billion of currency revaluations.(1) These currency revaluations mainly reflected the 8% decline of sterling against the US dollar, and the smaller (2%) depreciation against the euro.

(1) Using various assumptions, revaluations can be decomposed into exchange rate effects, local-currency price effects and other effects (see Chart 8). This process is not exact: the residual 'other' can sometimes be large, but it does give an indication of the relative size and direction of the factors driving revaluations.

Methodological changes in the 2001 *Pink Book*

The ONS programme to bring UK National Accounts and balance of payments into line with the European System of Accounts 1995 (ESA95) is now broadly complete. (The remaining change in the balance of payments concerns the treatment of gold held as a financial asset by the private sector, for which the United Kingdom has a derogation until 2005.) The required changes have been incorporated in this year's *Blue Book*,(1) along with long-run data revisions. This review of sector and financial accounts was taken as an opportunity to look at sources and methodology for the 2001 *Pink Book*. As a result a number of changes have been made to the latter, as outlined below.

Financial derivatives have been included for the first time. Interest rate swaps (IRSs) and forward-rate agreements (FRAs) have been reclassified from the current to the financial account. This follows an amendment to the IMF Balance of Payments Manual (BPM5)(2) and imminently to ESA95.(3) During the period in which BPM5 and ESA95 were being written, IRSs and FRAs were largely used to change the effective cash flows faced by borrowers and lenders. Consequently the related settlement flows were classified as interest, a component of the balance of payments current account. (The settlement flows of other derivatives were and continue to be classified as the realisation of a holding gain or loss and are therefore a constituent of the financial account.)

As a result of financial markets development during the second half of the 1990s, the bulk of outstanding positions on IRSs and FRAs are now made up of risk management or trading positions of financial intermediaries.(4) Only a relatively small proportion of outstanding positions is now established in conjunction with the issuance of debt instruments. The result is that pressure has increased to bring the treatment of IRSs and FRAs into line with that of other financial derivatives.

A further problem with the original treatment is that even in those minority cases where an IRS is directly associated with the issuance of a debt instrument, the counterparty may not be in the same institutional unit as that of the purchaser of the debt. For example, central government may issue foreign currency debt to non-residents and swap its future coupon and redemption liabilities back into sterling through a domestic intermediary. National

(1) The annual ONS *Blue Book* contains estimates of the domestic and national product, income and expenditure of the United Kingdom.
(2) *Financial derivatives: a supplement to the balance of payments manual*, IMF (2000).
(3) As ESA95 is a legally binding document, it requires a co-decision of the European Parliament and the European Council to ratify the change. We understand that this will take place shortly.
(4) In October 2001, the BIS published a study, 'Central bank survey of foreign exchange and derivatives contracts outstanding in April 2001: preliminary global data'. The report shows that approximately 65% of IRS/FRA business is inter-dealer and therefore not linked directly to the raising of capital. For the United Kingdom the proportion is closer to 80%. For a discussion of related topics see 'The foreign exchange and over-the-counter derivatives markets in the United Kingdom', Wharmby, S, pages 417–30 of this report.

Depreciation in the value of sterling led to positive revaluations of UK net external assets, because the majority of UK external liabilities are denominated in sterling and the majority of external assets are denominated in foreign currency.(1) A fall in the external value of sterling (other things being equal) tends to lead to a rise in the sterling value of UK external assets, while the value of UK external liabilities tends to remain largely unchanged. Thus the depreciation of sterling in the early 1990s following the United Kingdom's exit from the exchange rate mechanism (ERM) led to large positive revaluations of net UK external assets. In contrast, the strong appreciation of sterling in the latter part of the 1990s led to sharp negative currency revaluations and can be seen as one of the main reasons for the UK position changing from one of net external assets to one of net external liabilities during this period.

In having most of its debt contracts denominated in domestic currency, the United Kingdom is typical of many industrial countries. By contrast, many emerging market economies (EMEs) often have debt contracts denominated in foreign currencies. Mishkin (1998) argues that this is one of the major institutional differences in financial markets and that as a result financial instability tends to be propagated differently in industrial countries and EMEs. The second major difference is that debt contracts in industrial countries

(1) Excluding cross-border interbank lending, which, it is argued later, is largely currency matched.

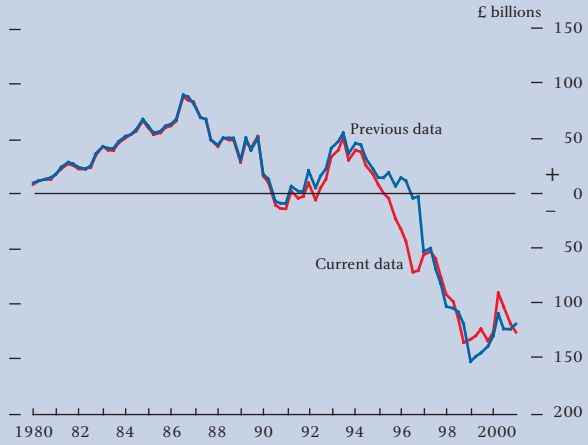
accounting rules would record interest rate flows between the central government and the domestic intermediary despite there being no associated liability to the domestic intermediary. This can affect the coherence and interpretation of the National Accounts. Finally, the inclusion of large and often volatile settlement flows in the current account has tended to mask underlying developments in recent years.

While the reclassification of IRSs and FRAs is the major methodological change to the data included in this year's *Pink Book*, several additional adjustments have been introduced. Of these, a recalculation of adjustments made for the exclusion of the Channel Islands and the Isle of Man from the definition of the United Kingdom has caused the largest revisions.(5) Although these changes have reduced both investment income credits and debits, the net effect has been to increase the current account deficit.

Also, in accordance with the ESA95, trade in goods has been revised to include estimates of smuggling in alcohol and tobacco, inflating imports. Finally, the ONS has used a new business register for the collection of direct investment data. This has revealed higher levels of both assets and liabilities than the previous register. Consequently both corresponding flows and income streams have been revised upwards.

Chart A compares the estimated development of the total net external position under the previous and current datasets. The major difference is that the current data show that the shift from net external assets to net external liabilities starting in 1994 was both slightly smaller in magnitude and more evenly paced than had been previously thought. The smoother incorporation of the 1997 Share Register Survey results—in which previously unrecorded non-resident UK equity holdings were discovered and put in the 1997 liabilities, which have now been distributed over the 1995–97 period—largely explains the steadier decline in the new series.

Chart A
UK net external balance sheet position on the current and previous bases



Source: ONS.

(5) Excluded following the adoption of ESA95 in 1998, which contained the redefinition of UK territorial coverage for statistical purposes.

are typically of longer maturity and duration than debt contracts in EMEs.

Price revaluations (in local currencies) were modest in 2000, at -£3 billion. However, between 1995 and 2000, price revaluations increased UK net external assets by £99 billion. This largely reflected US and continental European equity markets rising more than UK equity markets. The section on portfolio holdings of equities (portfolio-equity) below looks in more detail at some of the effects that equity price changes can have on the UK external balance sheet.

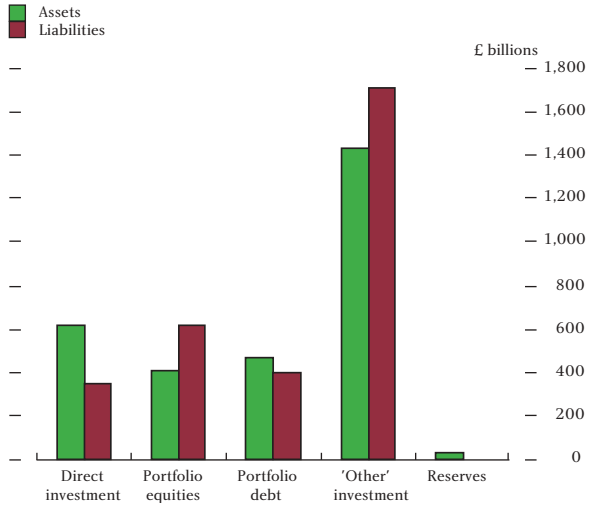
The 'other' revaluation effects component has been negative in each of the past six years. This suggests that it may be picking up a systematic measurement problem in the data, such as the non-resident holdings of UK equity identified in the 1997 ONS triennial Share Register Survey. The persistence of the negative 'other' effects in 1998–2000 suggests that the problem of under-recording inward portfolio-equity flows may still be an issue. The Bank and the ONS are working together on a project to improve the quality of portfolio investment data.

Disaggregating the external balance sheet

Insights into possible stability risks can be gained from disaggregating UK external balance sheet data by financial instrument (see Chart 9).

In net terms, the United Kingdom was 'long' direct investment and portfolio holdings of debt securities

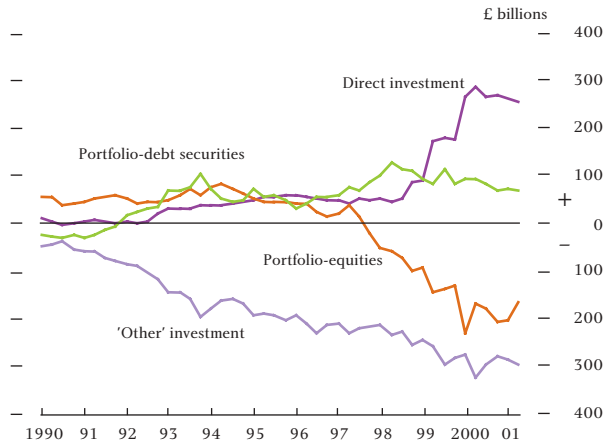
Chart 9
UK gross external assets and liabilities by instrument type (end-2000)



Source: ONS.

(portfolio-debt), but 'short' portfolio holdings of equities (portfolio-equity) and 'other' investment (basically international banking) at end-2000. The long position in direct investment and the short position in portfolio-equity both increased significantly in the late 1990s and the first part of 2000 (see Chart 10). In contrast, the large short position in 'other' investment has grown steadily since the early 1990s.

Chart 10
UK net external assets by instrument type



Source: ONS.

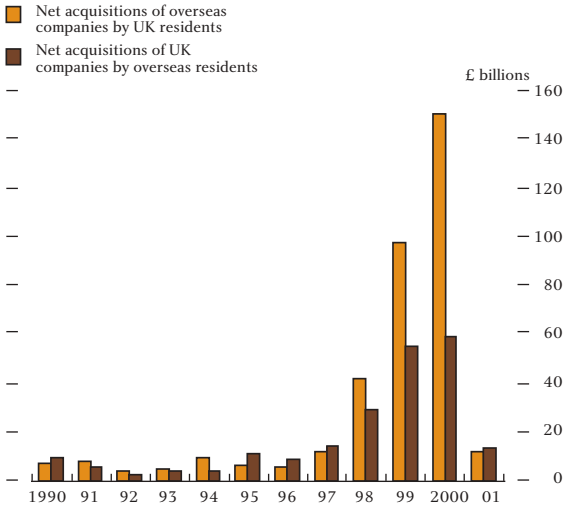
Direct investment

International mergers and acquisitions (M&A) activity has driven UK direct investment substantially higher in recent years.

UK direct investment assets increased by 42% in 2000 to £618 billion. UK direct investment liabilities also rose strongly during 2000, up 35%. The UK net direct investment position stood at £269 billion at end-2000 compared with £176 billion at end-1999.

These developments largely reflected recent international 'mega-mergers' involving UK companies. The largest was the Vodafone-Mannesmann deal in early 2000, valued at more than £100 billion. However, since the middle of 2000, M&A activity has fallen (see Chart 11). The total gross value of international deals involving UK companies was £59 billion in 2001 H1, a third of the total in 2000 H1. This fall-off in activity reflects wider developments in world financial markets. Increased asset volatility has meant that it has been harder to value deals accurately, or for companies to organise the financing necessary to complete deals.

Chart 11
Net international mergers and acquisitions involving UK companies(a)



Source: ONS.

(a) 2001 figure for H1 only.

Valuing direct investment

Although international practice recommends that all external financial assets and liabilities are measured at current market prices, many countries, including the United Kingdom, depart from this when estimating direct investment.(1) Instead, book values from the balance sheets of direct investment enterprises (or the direct investors) are often used to determine the value of the stock of direct investments. With asset prices

(1) Balance of Payments Manual 1993, 5th edition (BPM5), published by the IMF. The aim of BPM5 is '…developing and promulgating appropriate international guidelines for the compilation of sound and timely balance of payments statistics'.

generally rising over time (at least in the medium term), it is almost certain that these book values underestimate the corresponding market values. Where direct investment assets significantly exceed direct investment liabilities, as in the case of the United Kingdom, this could have a significant impact on the overall net external position. The box on page 390 looks at two methods of estimating market values for UK direct investment, which suggest that UK net direct investment assets could be sufficient to reduce significantly or even reverse the apparent overall UK net external liability position.

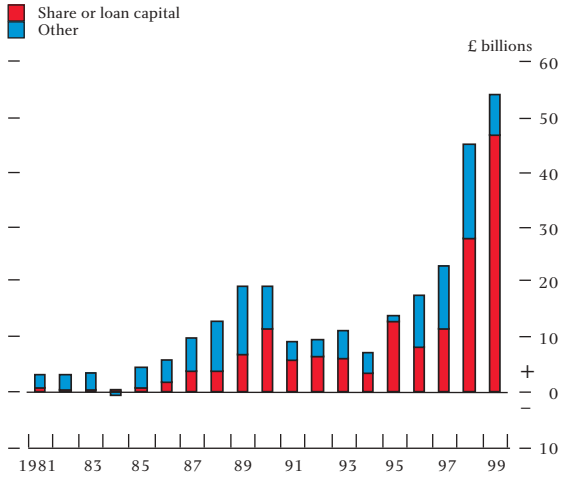
Physical and portfolio direct investment

Foreign direct investment is often thought of in terms of an overseas company building a factory or establishing an office in the United Kingdom. However, in the National Accounts, direct investment covers any lasting interest of a resident entity in one country in an entity resident in another economy, and ranges from the purchase of a large tranche of share capital (10% and above constituting the threshold at which an investment is considered direct rather than portfolio) to the building of a factory.(1)

Inward and outward direct investment flows can be broken down into three components: acquisitions and disposals, changes in inter-company and branch/head office loans, and unremitted profits.(2) Chart 12 shows that, in general, the major constituent of UK inward direct investment is the acquisition of the share or loan capital of the direct investment enterprise (a similar pattern is true for UK outward direct investment). This contrasts with the common perception (which was probably true up to the 1990s) that direct investment is, in the main, used to fund the construction/fitting out of factories and offices.

Direct investment may affect aggregate demand and supply in a country's economy, but the implications for financial stability of large net or gross positions in direct investment are less clear. In the unlikely event of there being a sudden loss of confidence in the UK economy, foreign direct investors might attempt to withdraw their investments. However, whereas liabilities such as banking deposits can be quickly withdrawn from a country, capital embodied in equity cannot be transferred unless a buyer is found. Equity prices could be put under pressure, eroding collateral values and

Chart 12
Composition of direct investment flows into the United Kingdom



Source: ONS.

increasing the costs of capital, but the risks of a major liquidity crisis are lower.

A simple scenario analysis can help to illustrate some of the issues. For example, a French company is building a £100 million factory to export goods solely to the United Kingdom, and it decides to build the factory in Kent rather than Calais. To what extent is the exposure of the United Kingdom higher than if the factory is built in Calais? If it builds in Kent, UK external liabilities will increase by £100 million. If it builds in Calais, UK external liabilities will remain unchanged (though they might be expected to grow over time as the United Kingdom imports the goods from the French factory). But for UK financial stability purposes the two are little different. Financial stability concerns are likely to arise only when the question of finance is raised. For example, if a company borrowed in foreign currency to finance investment that is likely to generate a sterling income stream (or *vice versa*), and if they did not hedge this risk, then they could be susceptible to large or sudden changes in exchange rates.

Portfolio holdings of equities

The United Kingdom has a large net liability position in portfolio-equity, which has grown rapidly in recent years (see Chart 10).

The increase in net portfolio-equity liabilities can be seen partly as a counterpart to the growth in direct investment abroad discussed above. International M&A

(1) See paragraph 177, BPM5.
(2) See ONS Business Monitor MA4 (overseas direct investment).

activity typically affects external balance sheets in two places. For the United Kingdom, the acquisition of an overseas company will be recorded as direct investment abroad. However, when the purchase is paid wholly or partly with equity (and the equities are held), the acquisition will also increase overseas portfolio holdings of UK equities.

International M&A activity will boost overseas holdings of UK equities only to the extent that overseas investors in aggregate are willing to retain their increased exposure to the UK economy and corporate sector. So far, the evidence suggests they have been willing to do so. Inflows to the UK equity market have continued to be positive, with net purchases totalling £24 billion in the year to 2001 Q2, despite the FTSE All-Share index falling by 10%. As at end-2000, overseas residents held some 33% of the UK market, up from 28% in 1999 and less than 15% in 1990. This overseas participation in the UK equity market is high by international standards—only around 7% of US equities are held by non-US residents.

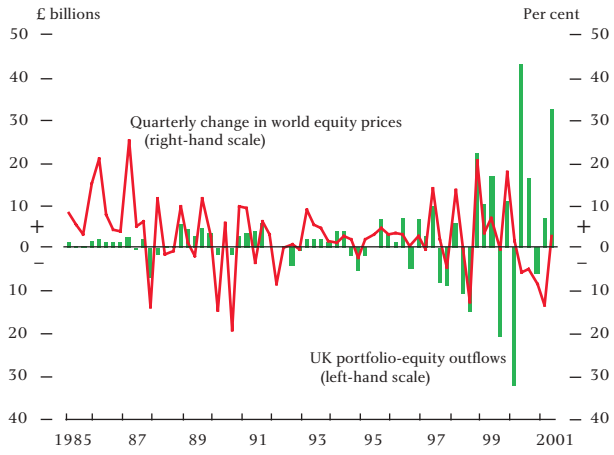
Portfolio inflows into UK equity markets have been relatively steady over the past 15 years despite periods of equity market weakness and volatility. In only one quarter during the past 15 years (1999 Q3) were overseas residents net sellers of UK equities, and even then, net sales totalled just £0.2 billion. In contrast, UK portfolio purchases of overseas equity markets have been more variable. UK residents have been net sellers of overseas equities in just under a third of all quarters since 1985, and many of these quarters of net sales have coincided with periods of global equity market weakness (see Chart 13).

The correlation between quarterly changes in world equity prices and net purchases of overseas equity by UK residents during the period 1985 Q1 to 1999 Q4 was 0.5, suggesting that the two may be related. This relationship seems most likely to reflect the appetite of UK investors for overseas equities falling during periods of equity market weakness.(1)

Equity revaluations

A large net liability position in portfolio holdings of equities can mean that rises in global equity prices increase a country's net external liabilities through revaluation effects.

Chart 13
Net purchases of overseas equities by UK residents compared with changes in world equity prices



Sources: ONS, Thomson Financial Datastream.

For example, Table C shows what might happen to the UK net position in portfolio-equity given a 15% rise in domestic and overseas equity markets. From the UK net position at end-2000 (all else being equal), UK net portfolio-equity assets would fall by some £30 billion. In contrast, worldwide falls in equity prices of 15% would boost the UK net asset position by some £30 billion. Such anomalies highlight the difficulty of interpreting trends in external balance sheets—a net asset position cannot simply be regarded as 'good', and a net liability position as 'bad'.

Table C
UK portfolio holdings of equities

£ billions

	Level at end-2000	Equity market change +15%	Equity market change -15%
Assets	406	467	345
Liabilities	612	704	520
Net assets	-206	-237	-175
Change in net assets		**-31**	**+31**

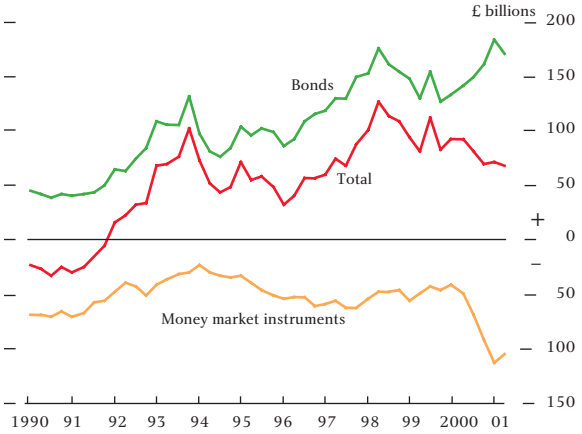
Portfolio holdings of debt securities

Like other parts of the external balance sheet, UK portfolio-debt assets and liabilities have grown rapidly over the past year (both up more than 20% in 2000). The United Kingdom has had net debt security assets since 1992, which have stayed relatively close to £100 billion over much of this period. However, this hides underlying developments in the composition and type of debt securities held.

(1) When the correlation is extended to up to 2001 Q2 (ie 1985 Q1 to 2001 Q2), the relationship is weaker. However, this may reflect the unprecedented size of a few acquisitions and disposals involving UK companies during this period, rather than a change from the previous trend.

Chart 14 shows that UK residents have consistently been net holders of bonds but net issuers of money market instruments (MMI) during the past ten years. The net MMI liability position had been relatively flat through most of the 1990s (and so declining as a share of nominal GDP) but has increased noticeably in the past 18 months. Breaking down the data shows that this largely reflects increased overseas holdings of certificates of deposit issued by UK banks.(1) In contrast, net holdings of bonds have risen relatively steadily over the past decade.

Chart 14
UK net debt-portfolio assets



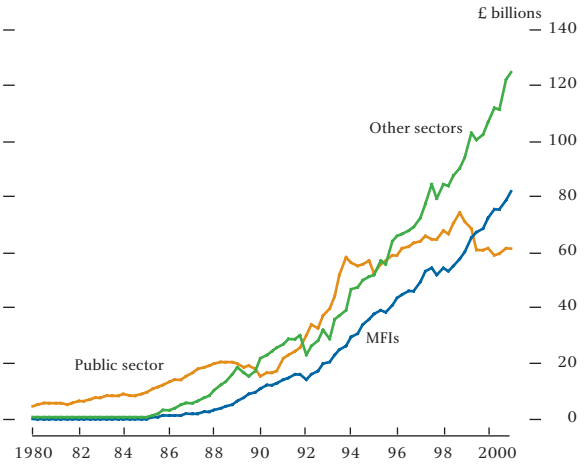
Source: ONS.

Overseas holdings of gilts and non-gilts

Overseas holdings of bonds issued by the non-public financial and corporate sectors have been growing in importance over the past 15 years (see Chart 15).

Until the 1980s, overseas residents held few non-public-sector UK bonds. This largely reflected tax rules, which, prior to 1984, gave UK companies an incentive to access overseas investors via indirect placements in eurobond markets through issues by overseas subsidiaries. From 1985, holdings of bonds issued by both monetary and financial institutions (MFIs) and other sectors (mainly non-bank corporates) began to grow rapidly, together outstripping holdings of gilts by the late 1980s, and by 2000 accounting for more than 70% of total holdings. Overseas holdings of gilts also increased markedly in the late 1980s and early 1990s, both in nominal terms and as a percentage of the total gilt market.(2) However, since 1994, nominal

Chart 15
Overseas holdings of UK bonds by sector of issuer



Source: ONS.

holdings of gilts by overseas residents have been largely flat (at around £65 billion).

These trends reflect wider patterns of bond issuance in UK debt markets. The amount of UK government stock in issuance levelled off in the mid-1990s and has been falling gently in recent years. In contrast, the outstanding stock of non-government bonds has consistently risen.

'Other' investment

'Other' investment is the largest component of the UK external balance sheet. UK 'other' investment assets and liabilities were £1.4 trillion and £1.7 billion respectively at end-2000, around double nominal UK GDP.

'Other' investment includes bank lending and deposits between UK residents and non-resident banks, and between banks in the United Kingdom and non-residents.(3) By far the largest component is the external business of UK banks, which accounted for

Table D
UK 'other' investment by sector (end-2000)(a)

£ billions

	Assets	Liabilities	Net
Banks (b)	1,055	1,266	-210
Public sector	11	4	7
Securities dealers	206	296	-90
Other sectors	159	145	14
Total	**1,431**	**1,711**	**-280**

Source: ONS.

(a) Split between securities dealers and 'other sectors' is estimated.
(b) Includes building societies and other monetary and financial institutions.

(1) Overseas residents held more than 40% of the total stock of UK banks' CDs at end-June 2001, up from 28% at end-1999.
(2) Overseas residents' holdings of gilts as a share of total gilt issuance increased from less than 10% in 1986 to more than 20% in 1992. At end-2000 the share stood at around 17%.
(3) Plus corporate-to-corporate trade credit.

around three-quarters of UK 'other' investment liabilities.

UK 'other' investment assets and liabilities have grown strongly over the past decade, and particularly during the past 18 months. The recent rise partly reflects a rebound following the period up to end-2000, when interbank positions were wound down.

The United Kingdom has large net 'other' investment liabilities—some £280 billion at end-2000. This deficit was more than accounted for by the banking sector and securities dealers (£300 billion). 'Other sectors' (which includes households, private non-financial corporations and other financial institutions) had net 'other' investment assets; £14 billion at end-2000.

International banking business dominates both gross and net 'other' investment. It is important for financial stability purposes because it includes the most liquid forms of investment. Furthermore, financial institutions are usually highly geared and are often exposed to maturity and other mismatches. However, for the United Kingdom, the financial stability risks associated with international banking assets and liabilities are difficult to assess because of London's role as a major international financial centre. The following section looks in more detail at UK international banking drawing on additional data published in *Bank of England Monetary and Financial Statistics*.(1)

UK international banking and financial stability

For a country with a large international financial centre such as the United Kingdom, it can be misleading to interpret the majority of movements across the external balance sheet as directly relating to the UK economy. The United Kingdom is host to hundreds of international banks, many of which conduct large amounts of wholesale banking and financial operations through their London offices. Funds that originate perhaps in an international bank's home country may flow via the United Kingdom to a third country. The assets and liabilities will show on the UK external balance sheet.

A simple scenario helps to illustrate the issue. A German bank receives €200 million (£125 million sterling equivalent) in deposits in Germany and decides to invest it in US Treasury bonds. If it carried out this transaction directly from the German head office it would have no impact at all on the UK external balance sheet (Scenario A). However, if it decided to carry out the transaction via its wholesale banking office in London (Scenario B), the UK external balance sheet would show net 'other' investment foreign currency liabilities of £125 million, and net portfolio-debt foreign currency assets of £125 million (see Table E).

Table E
UK external balance sheet scenarios

Scenario A: Frankfurt

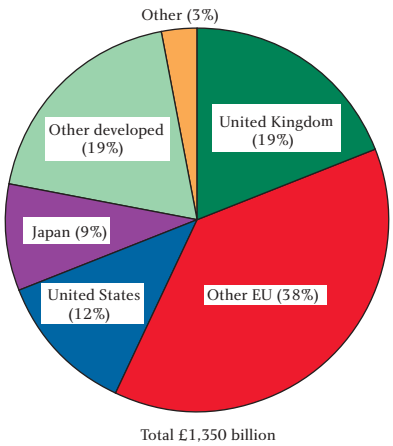
£ millions	Assets		Liabilities	
	£	FC	£	FC
Direct investment				
Portfolio investment equity				
Portfolio investment debt				
Other investment				

Scenario B: London

£ millions	Assets		Liabilities	
	£	FC	£	FC
Direct investment				
Portfolio investment equity				
Portfolio investment debt		125		
Other investment				125

The dominance of foreign-owned banks in the external business of the UK banking sector is illustrated by Chart 16. Only some £260 billion of overseas deposits placed with banks in the United Kingdom were placed with UK-owned banks. This compares with nearly £1.1 trillion placed with foreign-owned institutions. UK-owned banks account for only 15% of foreign currency borrowing from overseas, and even in sterling borrowing account for less than half of the total (42%).

Chart 16
Gross external borrowing by the UK banking sector (by nationality of bank; end-2000)



(1) These data are broadly consistent with data published in the *Pink Book*.

This certainly does not mean that activity in international banking markets is irrelevant for UK financial stability: attention needs to be paid to international as well as specifically domestic risks. And interlinkages between UK-owned and foreign-owned banks are many. Foreign-owned, particularly other European-owned banks, are major counterparties (including exposures from loans and advances, leases, discounted bills, paper and margins held, the mark-to-market value of over-the-counter derivatives, settlement and transaction claims, and so on) for both large and small UK banks.

Net borrowing

Looking at net borrowing by UK banks from overseas highlights the extent to which banks in the United Kingdom use non-resident institutions for funds. Net UK bank borrowing from abroad was £210 billion at end-2000; of this, some £80 billion was denominated in sterling and £130 billion denominated in foreign currencies.

The £80 billion sterling net borrowing by the UK banking sector can be partly linked to the UK current account deficit. This is because domestic residents often, in effect, finance current account deficits either through direct borrowing from overseas or indirectly through the domestic banking system. As many smaller firms and households are likely to have limited access to overseas financial markets, they will tend to rely more on the banking sector. Hence net borrowing from non-residents by the UK banking sector will tend to increase with the current account deficit.

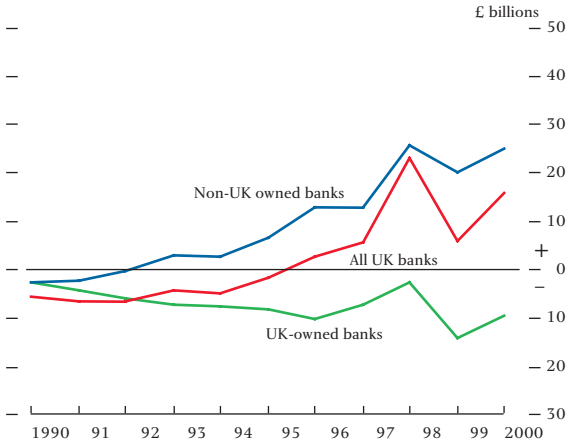
In contrast to sterling, foreign currency borrowing appears to be less directly related to the UK economy. The data suggest that it is largely redirected abroad. UK-resident banks are substantial net borrowers from abroad in foreign currency but also net investors in overseas debt securities. Including holdings of debt securities (both non-resident holdings of UK bank debt securities and UK banks' holdings of debt securities issued by non-residents), UK banks had in effect a flat position in foreign currency denominated instruments.

Foreign currency risk

Although the concept of external lending is useful for analysing the banking sector, it is also interesting to look at the foreign currency position of the UK banking sector irrespective of whether the foreign currency liabilities are to UK residents or overseas residents.

As shown in Chart 17, in aggregate the UK banking sector typically has modest net foreign currency assets (£15 billion at end-2000, compared with £1.7 trillion gross foreign currency liabilities). Splitting these data into UK-owned and non-UK-owned banks shows that UK-owned banks typically have net foreign currency liabilities. However, at just £10 billion, these are small compared with total and/or foreign currency assets. These data do not, however, give a complete indication of the open foreign currency position of the banking sector, since they take no account of financial derivative positions. And they relate only to banks' business carried out in the United Kingdom, whereas most banks will be transacting in foreign currency via international offices.

Chart 17
Net foreign currency balance sheet assets of the UK banking sector



Reserves and the public sector

The final element of the external balance sheet is the public sector. The public sector's main external assets are the foreign currency reserves. By international standards, the United Kingdom has relatively low foreign currency reserves, £29 billion as at end-2000, just over 3% of annual GDP. However, overall, the financial stability position of the UK public sector is very strong. The UK public sector has little external debt, foreign currency debt or short-term debt. This means that the structure of UK public sector debt is unlikely to be a source of vulnerability.

A more detailed assessment of financial stability risks associated with the public sector balance sheet is featured in the article 'Public sector debt: end-March 2001', see pages 406–16.

Tools for UK external balance sheet analysis

The analysis set out above (and in last year's *Quarterly Bulletin* article) represents part of the Bank of England's efforts to take on board the lessons about national balance sheet monitoring drawn following the 1997–98 financial crises. In the same spirit, the Bank has assessed the extent to which it can compile and assess key indicators of financial fragility identified by the IMF.(1) The IMF measures are based around two main themes—reserves-based indicators and debt-based indicators—and cover both aggregate balance sheet positions and those of major sectors (public sector, banking sector and corporate sector).

For an industrial country such as the United Kingdom, analysing each of the indicators can help to highlight potential risks in aggregate or sectoral balance sheets, or at least help to identify areas of the balance sheet that require further investigation and understanding. Furthermore, carrying out the exercise may highlight weaknesses in national data collection systems.

Table F details each of the IMF-recommended indicators, identifying which indicators can be calculated for the United Kingdom using official data sources.

The United Kingdom is able to produce all the reserve-related indicators but only some of the debt-related and sectoral indicators. This reflects a number of gaps in UK data coverage. A full sterling/foreign currency split of UK external debt is available for only the banking and public sectors. There are limited data on the maturity structure of UK external debt, except for the public sector. And no breakdowns are currently published with which to make robust estimates of the average maturity of private sector UK external debt. Off-balance-sheet data are also an area of difficulty. Although mark-to-market values of derivatives positions are included in the National Accounts,(2) these data do not indicate the size and direction of open positions in foreign currency (which are important factors in assessing foreign currency risk).

At a sectoral level, the range of data collected on the UK public sector is wide and of a high quality. The availability and quality of information on the banking sector is also generally good, though only estimates are available of the maturity structure of UK banks' balance sheets.

As in many countries, the availability and quality of data for the UK corporate sector are generally thinner than for the banking and public sectors. Aggregate data are published on some standard measures of corporate sector health—such as leverage and return on assets. Similarly, data on short-term debt in relation to total debt are available. However, splits separately identifying foreign currency debt are not collected.

Table F
Debt and reserve-related indicators of financial stability

Indicator	Underlying data published for the United Kingdom?
Net external assets over GDP	Yes
Reserve-related indicators	
Reserves over short-term external debt	Yes
Reserves over imports	Yes
Reserves over broad money	Yes
Debt-related indicators	
External debt over exports	Yes
External debt over GDP	Yes
Average interest rate on external debt	Yes
Average maturity of external debt	No
Share of foreign currency external debt in total external debt	No
Public sector indicators	
External public sector debt service over exports	Yes
Public sector debt over GDP or tax revenues	Yes
Average maturity of non-concessional debt	Yes
Foreign currency debt over total debt	Yes
Financial sector indicators	
Open foreign exchange position	No [on-balance sheet only]
Foreign currency maturity mismatch	No
Foreign currency quality mismatch	No
Gross foreign currency liabilities	Yes
Corporate sector indicators	
Net foreign currency cash flow over total cash flow	No
Interest over cash flow	Yes
Leverage	Yes
Short-term debt over total debt	Yes
Net foreign currency debt over equity	No
Return on assets (before tax and interest)	Yes

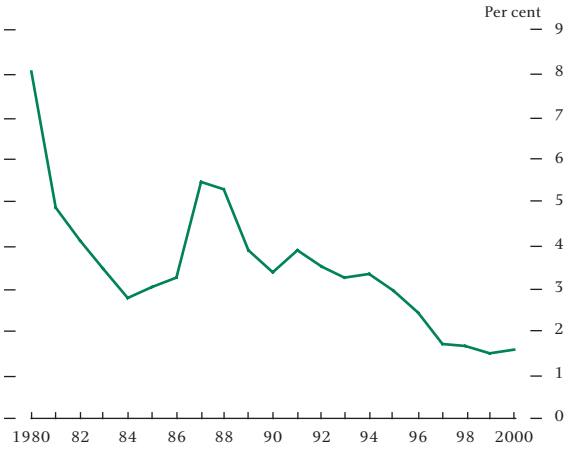
UK indicators

As part of the exercise, the Bank has also looked at what the IMF-recommended indicators show for the United Kingdom. The first IMF indicator—the ratio of net external assets of GDP—has already been discussed in Section 1 (see Chart 4). Charts 18 to 21 give further examples of UK time series for the IMF aggregate balance sheet and sectoral indicators.

(1) See 'Debt and reserve-related indicators of external vulnerability', IMF, 23 March 2000. Available at www.imf.org/external/np/pdr/debtres/index.htm

(2) Table FD on page 113 of the 2001 *Pink Book* gives a partial sectoral breakdown of derivatives assets/liabilities for end-1998 to end-2000 inclusive. The ONS states that '[they] are not included in the main aggregates of the UK's international investment position as the data are developmental.'

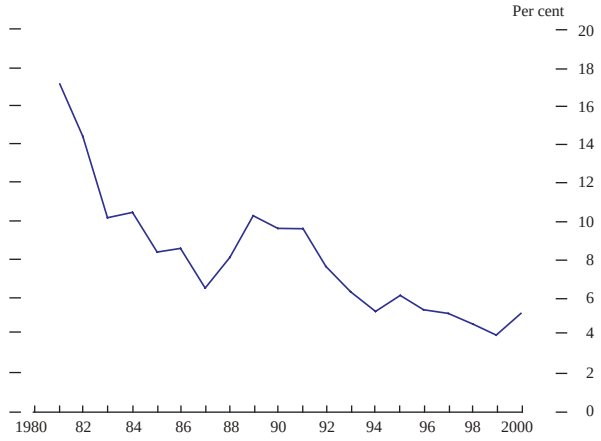
Chart 18
UK reserves as a percentage of short-term external debt



Source: ONS.

Chart 18 shows that UK foreign currency reserves are a relatively small share of total short-term external debt—less than 2% in 2000, compared with more than 8% in 1980. In some circumstances, such a low ratio might be cause for concern. However, there are good reasons why this is not the case for the United Kingdom. First, the UK Government and many UK companies are likely to have reliable access to international financial markets in most circumstances, whereas this is not the case for many countries. Second, reserves are much more important for countries that have a fixed exchange rate, which is not the case in the United Kingdom. Third, a relatively high proportion of UK external debt is denominated in sterling.(1) Finally, UK short-term external debt is dominated by interbank business carried out by foreign-owned banks.

Chart 19
Average interest rate on external debt

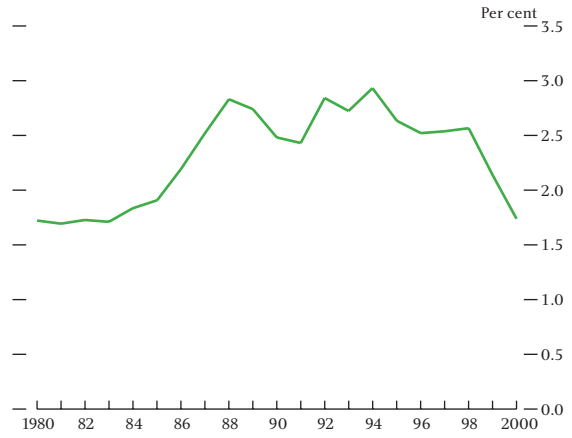


Source: ONS.

As Chart 19 shows, the average interest rate on UK external debt has fallen relatively steadily since 1980 to around 5%, as nominal interest rates have fallen in the United Kingdom and elsewhere.

The public sector indicators look at the internal and external solvency of the public sector and potential liquidity and foreign currency risks. Chart 20 shows the ratio of external public sector debt service to exports, which gives an indication of the capacity of a country to earn external revenue in order to finance its external public sector debt. This ratio is very low in the United Kingdom, reflecting the relatively low holdings of UK public sector debt by overseas residents, in turn reflecting the low total UK public sector debt.

Chart 20
Ratio of UK external public sector debt service to exports

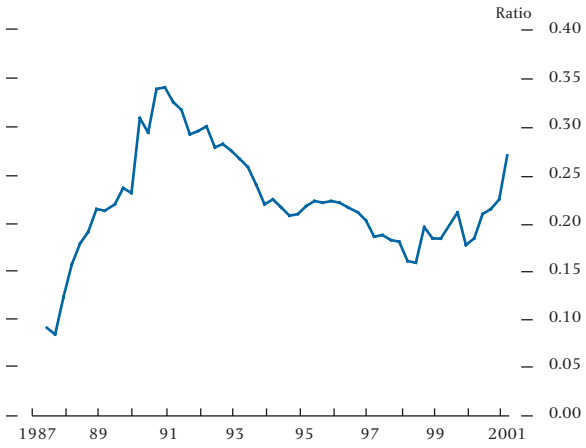


Source: ONS.

The indicators for the banking sector focus on currency and liquidity risks and have already been discussed in detail in the previous section. For example, Chart 17 shows the net foreign currency position of the UK banking sector. The corporate sector indicators focus on the currency risks of the corporate sector and more general measures of corporate sector health and robustness, such as leverage and interest rate cover. Chart 21 shows that the leverage of the UK corporate sector has been rising since 1998, but is below its peak in the early 1990s. Risks associated with the UK corporate and banking sectors are discussed in more detail in the Bank's *Financial Stability Review*.(2)

(1) That is UK debt once the foreign currency business of foreign-owned banks has been excluded.
(2) See *Financial Stability Review* June 2001 and the forthcoming December 2001 issue.

Chart 21
Private non-financial corporate debt over equity(a)



Source: ONS.

(a) Calculated as net debt divided by total equity at market value.

Implications for financial stability?

Although UK net external liabilities have fallen back slightly over the past few years, they remain sizable relative to GDP. The large net liability figure mostly reflects cumulative current account deficits over the past 20 years. Indeed, UK net external liabilities would have increased further in 2000 but for the positive impact of revaluations.

One important feature of the UK balance sheet is that the United Kingdom is 'long' foreign currency and 'short' sterling assets. So a fall in the exchange rate would (other things being equal) tend to boost the net external position. In consequence, if the exchange rate were to fall because of a portfolio shift away from UK assets, the process should not be exacerbated by fears of increasing net UK external liabilities. (Any positive impact on the UK current account of a sharp depreciation might result in a second boost to the value of UK external assets.)

This article has highlighted some of the difficulties in interpreting external balance sheets. First, the margin of error on the data on the net external balance sheet position is significant. For example, the box on pages 394–95 discusses revisions to UK National Accounts introduced this year, some of which have been backdated 50 years. And the box on page 390 highlights how UK net external assets may have been significantly underestimated because of difficulties calculating the market value of direct investment. Second, increases in net liabilities should not automatically be regarded as 'bad for financial stability'. For instance, given the pattern of UK portfolio-equity

Estimating a national balance sheet

Reliance on the net external balance sheet position to give an indication of the overall UK financial standing relative to the rest of the world has potential shortcomings. A different perspective may be provided by looking at the external balance sheet as a component of the national balance sheet.(1) The asset side of the latter would include (along with external assets) the likes of: human capital, land/water bodies, dwellings/other structures, financial assets, equipment, inventories, consumer durables, subsoil assets, intangibles (patents, copyrights, etc), biodiversity (clean air/water, stable climate), forests, livestock, fish stocks, accrued income, national monuments/scenery, precious metals/stones and collectibles.

It is obvious from this list that the valuation of a number of these components is difficult. In order to avoid the problems associated with any bottom-up national balance sheet valuation, an alternative is to employ a top-down approach. This involves characterising the United Kingdom as a conglomerate and regarding nominal GDP as the dividend paid. The dividend yield on the FTSE All-Share can then be used to calculate an approximate value for the asset side of the UK national balance sheet.(2)

Over the past ten years, UK net external liabilities have increased by £105 billion, to £118 billion. Over the same period, nominal GDP rose from £587 billion to £943 billion. Using the average dividend yield over the period (3.5%), national balance sheet asset values rose from £16.8 trillion in 1990 to £26.9 trillion in 2000.(3)(4) The improvement in the asset side of the UK national balance sheet over the past ten years was therefore close to one hundred times the size of the increase in UK net external liabilities.

(1) See 'Comparative national balance sheets: a study of 20 countries', Goldsmith, R W (1985), University of Chicago Press.
(2) There are a number of caveats to this method. The dividend yield depends to some extent on the incentives to retain or distribute earnings. Also, the yield on the companies in the FTSE All-Share reflects the activities of these companies both inside and outside the United Kingdom.
(3) National balance sheet asset value = money GDP/dividend yield.
(4) Using the dividend yields at the start and end of the period (rather than the average) gives an even larger increase in balance sheet asset values.

holdings, rising UK equity prices could lead to an increase in net UK external liabilities. Trends in direct investment should also be interpreted carefully. Financial stability risks are more likely to occur in the financing of direct investment, than in direct investment itself.

It is, perhaps, most useful to focus on risks associated with specific aspects of the balance sheet—such as foreign currency risks. However, assessing these risks is made more difficult by gaps in the UK data collection system. Important risks that should be assessed include the gross and net foreign currency exposure of UK residents. A full foreign currency breakdown of the UK external balance sheet is not currently available. Nor is there full information on off-balance-sheet positions, which would significantly affect any interpretations of foreign currency exposures. Another key area of interest is liquidity risk. However, again, little information is available on the maturity structure of most of the UK external balance sheet other than, at best, a simple short-term/long-term split.

The key to any financial stability risks inherent in the UK external balance sheet lies in the banking sector. UK external debt is large but this reflects the specialisation of the UK economy in international banking activities. Ultimately the financial stability risks posed by the banking sector depend on the health of the institutions themselves, on their risk management policies and practices, on market discipline, and on effective prudential regulation.

Glossary

Balance of payments: A record of the transactions between the residents of a country and the rest of the world over a specified period of time.
Capital account: The account of capital transfers and acquisition/disposal of non-produced, non-financial assets (ie copyrights).
Current account: The record of transactions in respect of trade in goods and services, income and current transfers.
Direct investment: When residents of one country gain a lasting interest in the activities of a subsidiary or associated company in another country. (Defined in the 1993 IMF Balance of Payments Manual, 5th edition, as a stake of 10% or more of the equity capital.)
Financial account: The account of transactions in external assets and liabilities, including direct investment, portfolio investment, other investment and reserve assets.
International investment position: The record of end-period balance sheet levels of a country's external assets and liabilities.
'Other' investment: All investment other than that defined as portfolio or direct. The major components are deposits and loans.
Portfolio investment: Investment in equity and debt securities issued by overseas companies, other than that classed as direct investment, plus equity and debt issued by overseas governments. Debt securities includes bonds and notes, certificates of deposit, commercial paper and Treasury bills.

Sources:
IMF *Balance of Payments Manual (5th edition)*; Office for National Statistics, the *Pink Book* 2001.

Public sector debt: end-March 2001

By Bruce Devile of the Bank's Monetary and Financial Statistics Division and Stephen Senior of the Bank's G10 Financial Surveillance Division.

The nominal value(1) of public sector net debt outstanding fell by 9.9% during the financial year to end-March 2001. At end-March 2001, the net debt represented 31.6% of GDP, the lowest figure since 1992 and 5 percentage points lower than at end-March 2000. This article analyses the financial liabilities of the public sector, and considers the implications of the current level and structure of UK government debt, including in the context of analysing the national balance sheet as part of the Bank's financial stability assessments.

Government debt is important to the sustainability of fiscal policy and has the potential to impinge on monetary conditions. It is a key part of the collateral used in financial markets, and as such plays an important role in the Bank's operations to implement monetary policy and maintain money market liquidity. In addition, the structure, size and liquidity of the government debt market may influence the liquidity and performance of other non-government securities markets.

The UK government follows a sustainable investment rule, which states that public sector net debt as a proportion of GDP will be held at a stable and prudent level over the economic cycle. Other things being equal, policy is for net debt to be maintained below 40% of GDP over the economic cycle. The government also has a second fiscal rule known as the golden rule, which states that, over the economic cycle, the government will borrow only to invest and not to fund current spending. Achieving targets for general government debt and deficits are among the criteria for entry to the European single currency specified in the Maastricht Treaty. Along with inflation, the exchange rate and bond yields, the fiscal position of individual governments is seen as being an important indication of a country's degree of economic convergence with other countries in the euro area.

Total stock of outstanding public sector debt

Public sector net debt(2) (PSND) fell by almost £34 billion (9.9%) in the 2000/01 financial year, from £340 billion to £306 billion at nominal value (see Table A). This is the largest fall since records began. As a percentage of GDP, it fell from 36.7% in March 2000 to 31.6%, the lowest ratio since 1992 (see

Table A
Public sector net debt

£ millions, nominal values (a); *percentages or percentage points (pp) in italics*

End-March	1999	2000	2001	Change 2000/01
Central government gross debt	**392,379**	**387,688**	**376,795**	**-10,893**
as a percentage of GDP	*44.7*	*41.9*	*39.0*	*-2.9pp*
Local government				
Total gross debt	52,742	51,402	52,312	910
less holdings of other public sector debt:				
Central government holdings of local government debt	45,273	46,791	48,020	1,229
Local government holdings of central government debt	273	77	31	-46
General government consolidated gross debt	**399,473**	**392,222**	**381,056**	**-11,166**
as a percentage of GDP	*45.5*	*42.4*	*39.4*	*-3.0pp*
Public corporations				
Total gross debt	26,775	26,812	27,740	928
less holdings of other public sector debt:				
Central government holdings of public corporation debt	26,440	26,453	27,181	728
Local government holdings of public corporation debt	4	123	124	1
Public corporation holdings of central government debt	6,528	6,301	6,363	62
Public corporation holdings of local government debt	780	121	106	-15
Public sector consolidated gross debt	**392,496**	**386,036**	**375,022**	**-11,014**
as a percentage of GDP	*44.7*	*41.7*	*38.8*	*-2.9pp*
Total public sector liquid assets	**43,847**	**46,402**	**68,993**	**22,591**
as a percentage of GDP	*5.0*	*5.0*	*7.1*	*2.1pp*
Public sector net debt	**348,649**	**339,634**	**306,029**	**-33,605**
as a percentage of GDP	*39.7*	*36.7*	*31.6*	*-5.1pp*

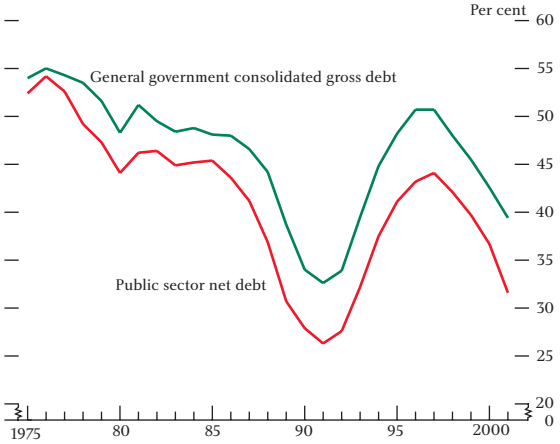
(a) Figures shown may not sum to totals because of rounding.

(1) For the purposes of measuring public sector debt, marketable debt instruments are conventionally valued at nominal (ie face) value. In this article all figures are given at nominal value except where valuation at current market value is otherwise stated.

(2) Defined as gross financial liabilities at nominal value less short-term financial assets.

Chart 1). The fall mainly reflected payments for licences to use the spectrum for third-generation mobile phones by telecommunication companies (£22.5 billion). These cash receipts have generally been used to reduce net debt, including investment in short-term assets.

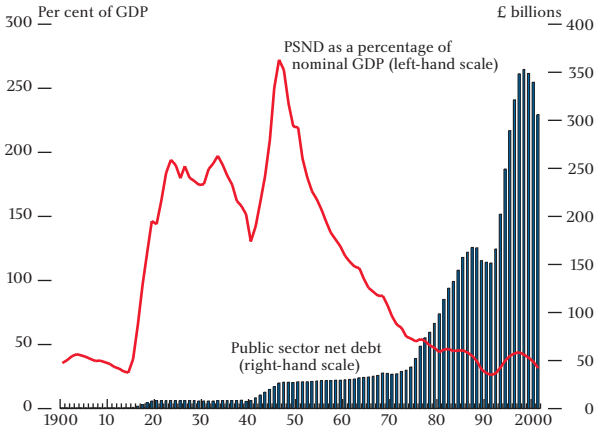
Chart 1
Measures of public sector debt as percentages of GDP: 1975–2001(a)



(a) At end-March each year.

Though in nominal terms public sector net debt is high, the current debt ratio (PSND to GDP) is low by historical standards (see Chart 2). This reflects the fact that nominal GDP has risen much faster than the level of debt on average since 1945. In the past two decades, the ratio has been closer to that in the years prior to 1914 than at any time in between, perhaps reflecting a drawn-out adjustment to the effects of the twentieth-century's two World Wars.(1)

Chart 2
Public sector debt: 1900–2001



Source: HM Treasury.

Analysis of public sector debt components

Total public sector gross debt (ie PSND before short-term financial assets are deducted) consists almost entirely of central government gross debt (CGGD) (see Table A). This is despite significant levels of local government and public corporations' gross debt (£52 billion and £28 billion respectively at end-March 2001); the vast majority of this is borrowed from central government and is thus netted out when calculating the consolidated figure. Additionally, although more than £4 billion of local government debt is not held by central government, this is offset in the public sector debt figures by a similar level of central government debt held by public corporations, such as the Post Office.

British Government Stocks (gilts)

Gilts are the main component of the outstanding stock of government debt, accounting for 73% of CGGD at end-March 2001 (see Table B and Chart 3). This proportion was only slightly lower than in the previous year; the outstanding stock of gilts fell during the financial year by £10 billion to £275 billion.

Table B
Central government gross debt

£ millions, nominal values; *percentage of total in italics*

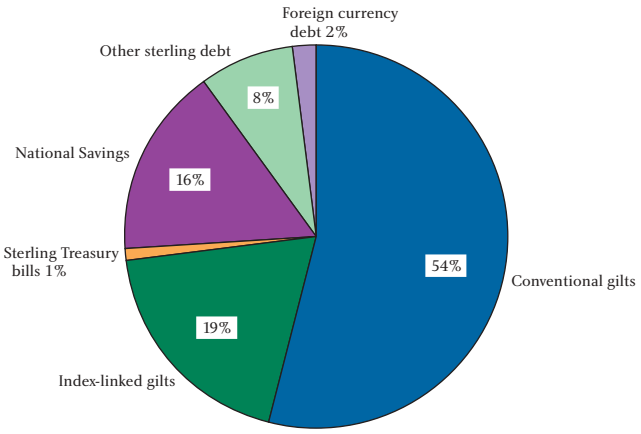
End-March	2000		2001	
British Government Stocks	284,427	*73.4*	274,609	*72.9*
of which: index-linked (a)	*65,740*	*17.0*	*70,316*	*18.7*
conventional	*218,687*	*56.4*	*204,293*	*54.2*
Sterling Treasury bills	4,453	*1.1*	3,521	*0.9*
National Savings	62,545	*16.1*	62,165	*16.5*
Certificates of tax deposits	535	*0.1*	491	*0.1*
Other sterling debt	26,774	*6.9*	28,308	*7.5*
Central government sterling gross debt	**378,734**	***97.7***	**369,094**	***98.0***
North American government loans	359	*0.1*	286	*0.1*
US$ floating-rate notes	1,254	*0.3*	1,407	*0.4*
US$ bonds	3,135	*0.8*	3,517	*0.9*
Euro 9¹/₈% 2001 bonds	1,500	*0.4*	0	*0.0*
Euro Treasury notes	2,701	*0.7*	2,486	*0.7*
Debt assigned to the government	5	*0.0*	5	*0.0*
Central government foreign currency gross debt (a) (b)	**8,954**	***2.3***	**7,701**	***2.0***
Total central government gross debt	**387,688**	***100.0***	**376,795**	***100.0***

(a) The nominal value of index-linked gilts has been raised by the amount of accrued capital uplift.
(b) Sterling valuation rates:
31 March 2000: £1 = US$ 1.5952, Can$ 2.3146, €1.6662
31 March 2001: £1 = US$ 1.4217, Can$ 2.2385, €1.6090

The stock of index-linked gilts continued to rise. Including capital uplift (the accrued inflation-linked valuation adjustment), the total held outside central

(1) See 'Monetary policy and debt management in the United Kingdom: some historical viewpoints', by Goodhart, C, in *Government debt structure and monetary conditions*, a conference organised by the Bank of England on 18–19 June 1998.

Chart 3
Composition of central government gross debt by instrument: end-March 2001



government rose by £4.6 billion during 2000/01 to £70.3 billion by end-March 2001, a 7% increase. This was more than offset by a fall of £14.4 billion in market holdings of conventional gilts.

The average remaining life(1) of market holdings of gilts at end-March 2001 was 10.4 years (see Table C). The rise from 9.9 years in 2000 reflects the Debt Management Office's issuance strategy towards long-dated stocks, which more than offset the shortening in maturity of outstanding stocks.

Table C
Average remaining life of dated stocks in market hands(a)

Years to maturity at end-March

	1995	1996	1997	1998	1999	2000	2001
Latest possible redemption							
All dated stocks (b)	10.4	10.1	10.1	10.2	10.0	9.9	10.4
Excluding index-linked stocks	9.1	8.8	8.8	9.0	8.9	8.9	10.1
Earliest possible redemption date							
All dated stocks	10.2	9.9	9.9	10.0	9.9	9.9	10.5
Excluding index-linked stocks	9.1	8.8	8.7	8.9	8.8	8.8	10.1
Modified duration							
All dated stocks	6.3	6.1	6.3	6.9	7.4	7.4	7.0
Excluding index-linked stocks	5.5	5.3	5.5	6.1	6.4	6.3	6.4

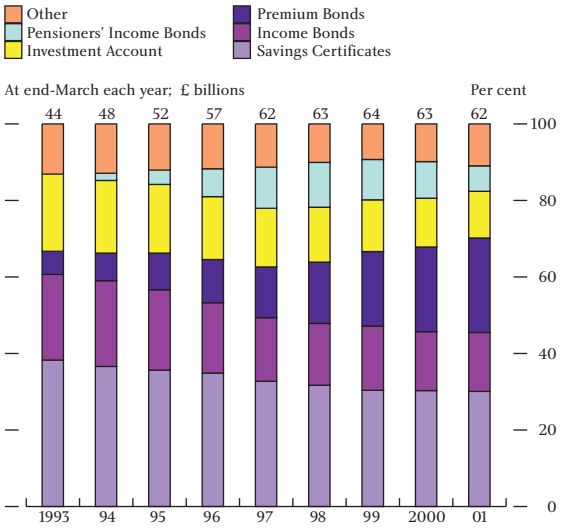
(a) These data are based on the nominal value of dated stocks held by the market at 31 March each year.
(b) Index-linked stocks are given a weight reflecting capital uplift accrued to 31 March.

National Savings instruments

The outstanding balance of National Savings instruments at end-March 2001 was £62.2 billion, £0.4 billion lower than a year earlier. During 2001/02 the balance is forecast to fall by a further £0.7 billion as redemptions of Income Bonds, Pensioners' Guaranteed Income Bonds and savings certificates are expected to exceed gross sales (ie sales and deposits including accrued interest).

National Savings instruments accounted for 16.5% of central government gross debt at end-March 2001, in line with a year earlier. The proportion of National Savings held in Premium Bonds has now risen for nine consecutive years, to 25% in March 2001 from 6% in March 1993 (see Chart 4).

Chart 4
Composition of National Savings by product



Source: Department for National Savings.

Sterling Treasury bills

Sterling Treasury bills accounted for 0.9% of central government gross debt at end-March 2001. At £3.5 billion, this was £0.9 billion lower than a year earlier. The proceeds from the payments for licences to use the spectrum for third-generation mobile phones resulted in a reduction in planned issuance of Treasury bills by the Debt Management Office (DMO). The DMO announced in April 2001 that they were, however, planning to increase the stock of outstanding Treasury bills to £8.3 billion by the end of March 2002.

Foreign currency assets and liabilities

The sterling value of foreign currency denominated public sector debt outstanding at end-March 2001 was £7.7 billion, £1.3 billion lower than in 2000 (see Table B). This fall was almost entirely the result of the redemption of a single euro-denominated bond.

The government's foreign currency reserves are an important component of the liquid assets of the public sector (see Table D). At end-March 2001 reserves (at market value) totalled £30.4 billion, of which £9.7 billion was held in US dollars, £9.8 billion in

(1) Excludes undated stocks.

euro and £4.9 billion in yen. Holdings of gold within this totalled £2.5 billion.

Table D
Public sector liquid assets

£ millions, nominal values

End-March (a)	1999	2000	2001	Change 2000/01
Central government				
Official reserves	22,147	21,498	30,423	8,925
Other short-term assets	1,762	6,635	18,445	11,810
Total central government liquid assets	**23,909**	**28,133**	**48,868**	**20,735**
Local government				
Bank deposits	8,040	6,080	7,443	1,363
Building society deposits	4,235	4,141	4,071	-70
Other short-term assets	4,334	5,465	5,756	291
Total local government liquid assets	**16,609**	**15,686**	**17,270**	**1,584**
Public corporations				
Bank and building society deposits	2,029	1,455	1,643	188
Other short-term assets	1,300	1,128	1,212	84
Total public corporation liquid assets	**3,329**	**2,583**	**2,855**	**272**
Total public sector liquid assets	**43,847**	**46,402**	**68,993**	**22,591**

(a) Data from 1976–2001 are published in the *Bank of England Statistical Abstract 2001*, Part 1, Table 15.1.

Government balance sheet

The government's debt measured at nominal value closely reflects its financial liabilities, measured at current market value. (See Table E, which also shows the asset side of the government balance sheet.)[1] The government sector is a net borrower, with financial assets falling short of financial liabilities by some £318 billion at end-2000. However, with non-financial assets, including buildings and infrastructure, currently valued at £360 billion, the net 'worth' of the general government sector was valued at a positive £43 billion at end-2000. Short-term assets, which are taken into account in calculating nominal net debt, represent a relatively small proportion of the total general government assets figure of £571 billion. During 2000, the Office for National Statistics (ONS) reclassified local authority housing as an asset of public corporations, so that it is no longer included in general government assets. This means that general government residential buildings assets are recorded as being lower than published in previous years.

Table E
General government balance sheet

£ billions

31 December	1998	1999	2000
Non-financial assets			
Tangible assets			
Residential buildings	2.0	1.6	1.4
Agricultural assets	1.9	2.0	2.1
Commercial, industrial and other buildings	110.4	113.3	116.8
Civil engineering works	182.4	182.9	191.1
Plant and machinery	34.2	36.0	38.1
Vehicles, including ships and aircraft	3.4	3.3	3.3
Stocks and work in progress	7.8	7.5	7.4
Total tangible assets	**342.1**	**346.6**	**360.2**
Total intangible assets	**0.9**	**1.0**	**1.1**
Total non-financial assets	**343.0**	**347.6**	**361.3**
Total financial assets	**166.7**	**175.6**	**210.1**
Total assets	**509.7**	**523.2**	**571.4**
Total liabilities	**525.6**	**504.7**	**528.2**
Net worth	**-15.9**	**18.5**	**43.2**

Source: ONS, *Blue Book*.

HM Treasury publishes a more comprehensive breakdown of assets in the annual National Asset Register (NAR).[2] This is a list of assets owned by Government departments and their sponsored bodies. The NAR includes all tangible fixed assets (including military and heritage assets), intangible fixed assets (such as intellectual property rights) and fixed asset investments (such as share holdings) owned by departments. In deciding which assets to include, government departments have to follow normal accounting rules for the recognition of assets. It could also be argued that contingent assets and liabilities should be taken into account, eg commitments to pay out public sector pensions.

The public sector as part of national balance sheet monitoring

HM Treasury's initiative over the past few years in developing a set of public sector balance sheet accounts can be viewed as one important element of the emphasis which the international community has been placing on national balance sheet monitoring. The roots of that broader exercise lie in the various international financial crises, principally in emerging market economies, since the mid-1990s.[3]

In its financial stability work, the Bank of England has been assessing the *external* balance sheets of a range of potentially vulnerable economies.[4] It has also developed its analysis of the United Kingdom's own external balance sheet, reported in 'The external balance sheet of the United Kingdom: implications for financial stability?' on pages 388–405. One of the crucial caveats about that work is that information is lost through the

(1) More details are given in *Blue Book 2000*, Office for National Statistics, September 2001.
(2) Available at www.hmt.gov.uk/docs/2001/national_assetreg/index.html
(3) See 'Report on the working group on capital flows', Financial Stability Forum, 5 April 2000.
(4) See *Bank of England Financial Stability Review*, June 2001.

process of aggregation. It is, in particular, important to look also at sectoral balance sheets—key elements being the banking, corporate and household parts of the private sector, and of course the public sector. This article therefore applies some balance sheet analysis tools to the UK public sector (which is clearly in a very strong position).

For all countries, the challenge of public sector debt management is to ensure that a government's financing needs and payment obligations are met at the lowest possible cost over the long run. An important part of this process is to minimise any costs to the economy from financial crises resulting from or magnified by imprudent debt management policies, given the severe macroeconomic consequences of sovereign debt default and the magnitude of output losses that could ensue—points emphasised in recent work by the IMF collaborating with debt management and financial stability experts around the world.(1)(2)

For all governments, prudent risk management includes avoiding debt structures and strategies that increase the risk of funding crises. Although the risks faced by industrial countries, such as the United Kingdom, that have deep and liquid markets for their government securities may differ in scale from the risks faced by countries with less developed domestic debt markets, the *types* of risks tend to be broadly similar.

For example, one concern is that maturing debt will be costly or impossible to renew, perhaps following a change in the government's credit rating. Market risks are also important. These include risks associated with the impact of changes in market prices, such as interest rates and exchange rates, on the cost of the government's debt servicing. Even if the capacity to pay is not in question, a payment shock, for example, from a sudden change in the exchange rate, can cause problems for planning future tax and spending.

In some circumstances there might be trade-offs between different types of risk. The most appropriate structure for public sector debt will vary according to the main shocks to which an economy is vulnerable. Also, the composition of the government debt stock can be optimised with respect to variations in debt-servicing costs alone, or to government spending as whole. If the focus is on the latter, then the relationship between different economic variables and a government's annual deficit also needs to be considered.(3)

The following section outlines the main areas of risk associated with public sector debt and for each one discusses the UK position.

Roll-over risk

For a given debt stock, a very low average maturity of debt potentially entails greater financing risk, as it forces a government to roll over its debt on a more frequent basis. Similarly, any changes in government debt-servicing costs, perhaps because of a deterioration in a government's perceived credit risk or changes in short-term interest rates, will occur more quickly the shorter the average maturity of the debt stock.

By lengthening the average duration of debt and having an even debt redemption schedule, a government can reduce the variance of its expected future debt-servicing costs. Long-duration debt will also limit the effect of any supply-side shock on a government's fiscal position.

As highlighted earlier in this article, the average remaining life of market holdings of UK gilts was more than ten years at end-March 2001, having lengthened slightly in 2000/01. This is a high figure compared with the world's other major economies, and indicates low roll-over risk.

Foreign currency risk(4)

In particular, a sharp depreciation of the domestic currency may have a big enough effect on debt-servicing costs and perceived fiscal dynamics to raise the perceived risk of default, unless the government has ready access to foreign currency assets, as the UK government has.

The UK public sector has little foreign currency denominated debt, only £7.7 billion as at end-March 2001, which was fully hedged with foreign currency assets held in the reserves.

(1) See 'Guidelines for public debt management', prepared by the International Monetary Fund and the World Bank, available at www.worldbank.org/fps/guidelines/guideslines_text.htm
(2) See 'Costs of banking system instability: some empirical evidence', Hoggarth, G and Sapporta, V, *Financial Stability Review*, June 2001.
(3) See the DMO Annual Review 2000/01.
(4) For both foreign currency risk (and interest rate risk discussed below) it is important to take any financial derivatives positions into account, as these may significantly change the effective composition of debt.

External public sector debt risks

For the public sector, external debt risks are typically defined to include those associated with (a) foreign currency-denominated public sector debt (discussed above) and (b) overseas holdings of public sector debt (sterling or foreign currency).

A recent IMF paper(1) outlines various indicators of external debt vulnerability. These indicators deal with a range of national and sectoral balance sheet risks, including four that focus on the public sector.

The first looks at foreign currency-denominated debt. As discussed above, the UK public sector has a relatively low level (Table B). The second indicator looks at non-resident holdings of UK government debt. As Table F suggests, these are also relatively small. Two further indicators echo this. First, the ratio of external public sector debt service to exports relates the repayment capacity of a country to its external obligations. Chart 5 shows that UK external public sector debt service was around 1.7% of exports in 2000 and comfortably below its recent peak of just under 3% in 1994.

A final indicator looks at external public sector debt to GDP (or tax revenues). GDP or tax revenues give measures of the resource base of an economy, and indicate the potential capacity of an economy that could be shifted to the production of exports (though this does not indicate how easy it would be to shift production). Chart 6 shows that UK external public sector debt was equivalent to just under 7% of GDP in 2000, a low since 1991 (the ratio of PSND to GDP was 31.6%).

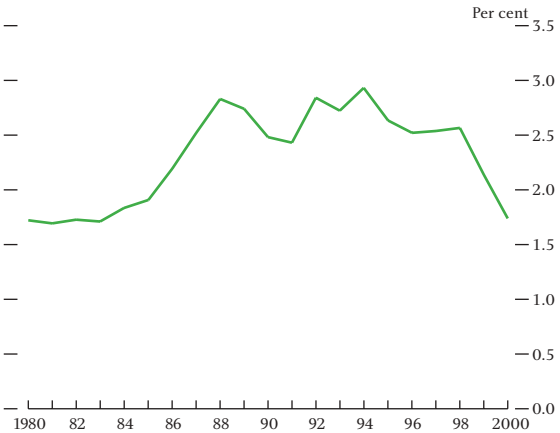
Table F
Holdings of central government sterling gross debt: summary

£ billions; *percentage of total in italics*

Amounts outstanding at end-March

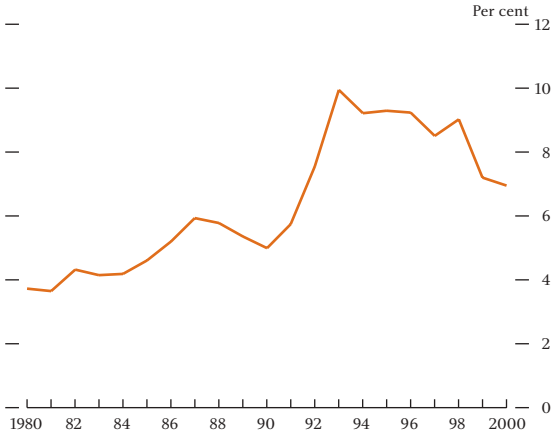
	2000		2001		Change 2000/01
Public sector	3.6	*1.0*	5.8	*1.6*	2.2
Banks	29.2	*7.7*	30.9	*8.4*	1.7
Building societies	1.1	*0.4*	1.0	*0.3*	-0.1
Institutional investors	188.7	*49.8*	202.3	*54.8*	13.6
Individuals and private trusts	93.0	*24.6*	83.1	*22.5*	-9.9
Other UK residents	1.2	*0.3*	1.4	*0.4*	0.2
Non-residents	61.9	*16.3*	44.6	*12.1*	-17.3
Total	**378.7**	***100.0***	**369.1**	***100.0***	**-9.6**

Chart 5
Ratio of external public debt service to exports



Source: ONS.

Chart 6
Ratio of external public sector debt to GDP



Source: ONS.

Fixed versus floating-rate debt (interest-rate risk)

For both domestic and foreign currency debt, sharp increases in short-term interest rates can have a significant impact on the cost of servicing debt. Although changes in interest rates will affect debt-servicing costs on new issues when fixed-rate debt is refinanced, the impact is likely to be greater with floating-rate debt, which will be affected as soon as rates are next reset. Any fixed-rate debt with a very short-term average maturity has to be regularly rolled over at the latest interest rates and so is similar in risk to floating-rate debt.

There are also some risks associated with long-term fixed-rate debt. In particular, countries with large amounts of long-term fixed-rate debt risk being locked in to inappropriately high debt-servicing payments if there is a persistent fall in the level of interest rates.

(1) See 'Debt and reserves-related indicators of external vulnerability', IMF, 23 March 2000. Available at www.imf.org/external/np/pdr/debtres/index.htm

The United Kingdom had only one floating-rate gilt remaining at end-March 2001, and it matured on 10 July 2001. Its nominal value was £3 billion.(1)

Nominal versus index-linked debt

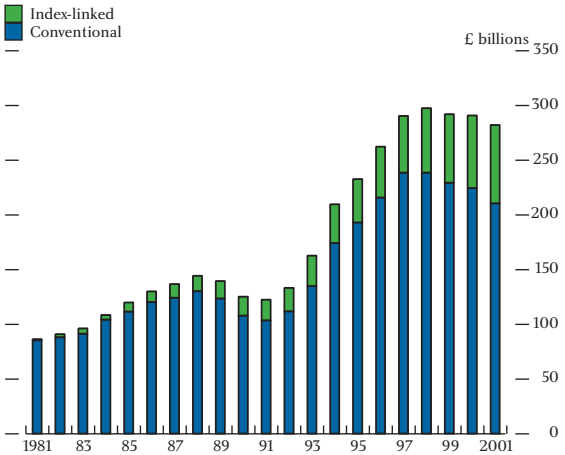
In a stable low-inflation environment there is little difference in the risks associated with nominal debt and index-linked debt of the same maturity and currency denomination. However, in periods of high inflation or deflation, and/or uncertainty about the monetary anchor, the extent to which debt is indexed can have an effect on debt management costs and risks.

Raising the costs to a government of surprise higher inflation is often argued to act as an extra discipline in favour of low inflation, by taking away the incentive for governments to inflate an economy to reduce the real value of debt. Hence issuing index-linked bonds may improve the credibility of a government's commitment to low inflation.(2)

And, to the extent that index-linked gilts have a distinct investor base, their issuance can broaden overall demand for a government's debt and so, at the margin, reduce refinancing risk.

The UK government has significant issues of index-linked gilts. As at end-March 2001, the nominal value of market holdings of index-linked gilts was £70.3 billion, 7% higher than a year earlier. Chart 7 shows the proportion of index-linked gilts increasing since their introduction in 1981.

Chart 7
Breakdown of UK government bonds as at end-March



Liquidity risks

Some risks associated with public sector debt particularly affect participants in the debt markets. However, they also have implications for the public sector. For example, prices in illiquid debt markets tend to be more volatile and could discourage market participation. This could lead to a liquidity premium in the markets and higher debt-servicing costs for the government.(3)

Although in some circumstances sound management of government finances requires a reduction in the stock of public sector debt, a declining supply of government debt securities can impair secondary market liquidity. This can be a particular problem when the market for debt securities is dominated by a few participants with inelastic demand, as the supply of debt securities in the secondary market will not be perfectly elastic at the market price.

It is possible that the decline in gilt issuance observed in recent years combined with concentrated price-insensitive demand from institutional investors (principally pension funds and insurance companies)(4) has put upward pressure on long gilt prices. The box on pages 414–15 looks in more detail at the changing shape of the sterling fixed-income markets and explores the other considerations that have also contributed to changes in liquidity conditions.

The estimated distribution of the central government sterling gross debt is shown in Table F. (These are provisional estimates, based on a range of data sources, and are subject to revision.) Institutional investors had the largest holdings of gilts, 54.8% in 2001, up from 49.8% in 2000. Individuals and private trusts held just under a quarter of the stock of gilts.

International comparison

Along with other European Union (EU) countries, the United Kingdom is required under the terms of the Maastricht Treaty to report government finance statistics

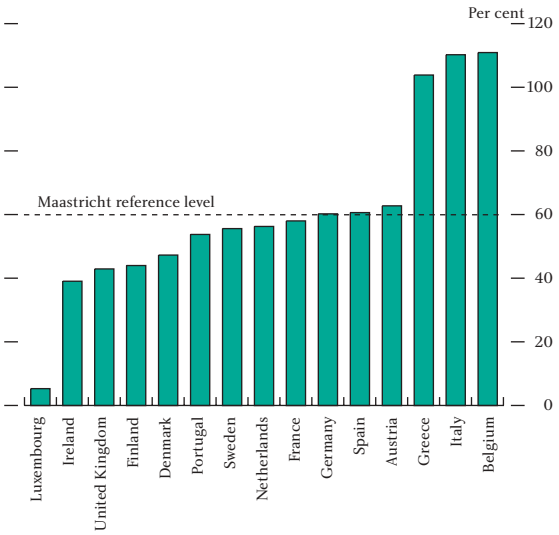
(1) The United Kingdom also issues Treasury bills and some National Savings products which are floating rate.
(2) Index-linked debt may also play a useful role in the government debt portfolio because of its deficit-smoothing properties in certain circumstances. See 'Consultation paper on index-linked gilt redesign', DMO, September 2001.
(3) Though in the recent case of the gilt market, discussed below, illiquid demand for gilts seems to have contributed to lower long-term UK interest rates.
(4) Institutional investors hold more than half of all gilts. See Devile, B, '2000 gilt ownership survey', *Bank of England Monetary and Financial Statistics*, September 2001.

to the European Commission for economic convergence reasons.

Government debt for this purpose is measured by general government consolidated gross debt (GGCGD), calculated as a percentage of nominal GDP.

The latest figures submitted to the Commission showed that UK gross government debt at end-December 2000 represented 42.9% of GDP. Apart from Luxembourg and Ireland, this was the lowest among EU countries (see Chart 8), and is comfortably below the Maastricht reference level of 60%. Debt ratios reported by Belgium, Greece and Italy remained above 100% of GDP in 2000, though all countries have seen declines in their debt/GDP ratios in recent years.

Chart 8
General government consolidated gross debt: end-2000



Source: Eurostat.

Conclusion

The fall of net issuance of government securities (in industrial countries) has led to modifications of debt management policy in order to help maintain liquidity. At the same time, the market has seen increased issuance of non-government bonds, a supply driven shift in investment strategies, and an increasing use of swap based benchmarks to price debt.

The fall in UK public sector net debt during 2000/01 was the largest on record, at £34 billion. Even excluding the £22.5 billion payments for licences to use the spectrum for third-generation mobile phones, the fall was the largest since 1988/89.

The importance for financial stability of monitoring sectoral balance sheets, including that of the public sector, has become more evident in recent years. The relatively low level of public debt relative to GDP in the United Kingdom is one of the indications that the debt's size and structure do not warrant any significant concerns about financial fragility from this source at the moment. The average maturity of the debt, its small foreign currency component, and the limited extent of holdings outside the United Kingdom may also offer some reassurance on this front.

The changing shape of the sterling fixed-income markets

Relative supplies of government and non-government bonds have shifted materially in recent years as governments in several industrial countries (including the United Kingdom) have paid down their debt, and while bond issuance by corporations and other non-government borrowers has increased strongly. This box highlights some of the consequences of these changes in the sterling fixed-income markets, drawing on the findings of a study recently published by the Bank for International Settlements.(1)

Uses of government bonds

Over the past two or three decades, financial market participants have come to use government securities for the following purposes:

- as an investment asset, free of default risk;
- as a benchmark for pricing and quoting yields on other securities;
- to speculate on future movements in interest rates;
- to hedge positions in other fixed-income securities;
- as collateral in securitised borrowing arrangements; and
- as a safe-haven asset in times of distressed market conditions.

In addition, the development of the infrastructure supporting government securities markets—the legal and regulatory framework, trade execution arrangements, clearing and settlement systems, repo and derivatives markets, and risk management procedures—are likely to have enhanced the development of non-government securities markets.

The declining supply of gilts (and other governments' bonds) in recent years has affected the ways in which these securities are used by market participants. Other developments, however, have also been influential. The introduction of the euro, the market disruption following the near collapse of Long Term Capital Management (LTCM) in September 1998, and changes in information technology have all had a significant impact on the way in which fixed-income markets function.

Fiscal positions

In 2000, the net issuance of government securities by industrial countries fell to its lowest level in decades. As noted elsewhere in this article, this development was particularly marked in the United Kingdom. Many governments, including the UK government, responded to these reductions in their financing requirements by modifying their debt management operations. Such modifications have generally been intended to improve the liquidity of government securities since this helps to lower borrowing costs.

To help forestall any deterioration in gilt liquidity, the UK government began in the mid to late 1990s to concentrate its borrowing in fewer and larger bond offerings. The number of original maturities and the frequency of auctions were reduced. In addition, regular use has been made of 'switch' auctions, which allow bondholders to convert their holdings of less liquid gilts into more liquid ones. In 2000, the United Kingdom (along with the United States and several other European governments) began buying back outstanding debt through reverse auctions. These operations also helped to concentrate liquidity in the remaining gilt issues.

Non-government bond markets

While the supply of gilts has declined in recent years, the outstanding stock of non-government sterling-denominated bonds has increased sharply, rising by almost threefold between 1995 and 2000, to £635 billion. In particular, triple-A rated supranational institutions have stepped in aggressively to provide substitutes for the declining supply of gilts.

The growth of the non-government segment of the market at a time when gilt issuance was declining raises questions about the extent to which the latter contributed to the former. This potential linkage is known as the crowding out hypothesis. Recent issuance patterns in the United Kingdom do not appear to suggest that non-government issuers have sought to step up their issuance in those maturity segments that the UK government has vacated. Among government and non-government issuers alike, long-dated bonds have accounted for the bulk of announced issues in recent years. This maturity distribution choice appears to have been driven principally by the inversion of the sterling yield curve. In addition, regulatory requirements are widely thought to have contributed to strong and relatively price-inelastic demand from pension funds and life assurance companies for long-dated sterling bonds.

The response of investors

Most classes of investor appear to have adjusted their investment strategies to at least some degree to accommodate these recent shifts in supply. The large number of performance indices introduced by the major investment banks over the past few years bears witness to institutional investors' willingness to move away from government bonds and towards more diversified portfolios of fixed-income assets.

In the United Kingdom, banks and securities firms have been net sellers of gilts since 1997, and insurance firms since 1998, purchasing instead debt securities issued by UK and foreign residents. In contrast, UK pension funds have continued to purchase gilts. As a result, an increasing proportion of UK gilts are now held by investors following relatively passive asset management strategies.

(1) See 'The changing shape of fixed income markets', *BIS working paper No. 104*, available at www.bis.org/publ/work104.htm

Arbitrage and hedging activity

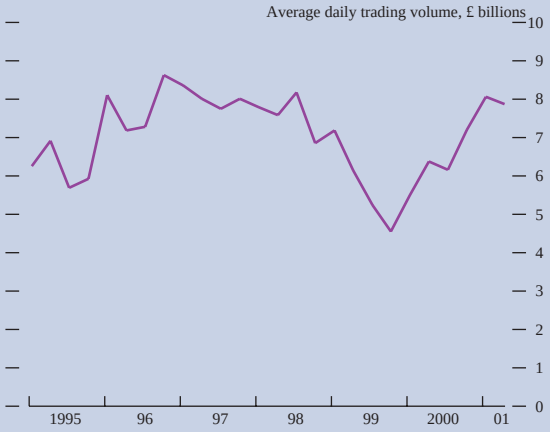
Unexpected reductions in the supplies of both gilts and US Treasuries have, at times, caused sudden increases in the spreads between government and private yields, thereby raising the volatility of credit spreads. This may have contributed to a shift away from the use of gilts for arbitrage and hedging trades. However, the most significant event to affect the volatility of credit spreads in recent years was the 1998 LTCM crisis. This prompted a large decline in arbitrage activity and led many sterling market participants to switch away from the near-exclusive use of gilts for hedging in favour of a wider array of instruments, including interest rate swaps and corporate bonds. Similar developments occurred in the dollar and euro-denominated markets.

Interest rate swaps have become especially popular for hedging purposes. The floating-rate leg of an interest rate swap is usually based on Libor. Since most of the banks in the Libor contributor panels are rated double-A, swap rates contain a premium for credit risk. As a result, swap rates tend to move closely with the prices of other credit products, including during periods of market turmoil, making them a more attractive hedging vehicle than government bonds. However, government securities have yet to be fully displaced. Owing in part to the existence of liquid repo and securities lending markets, transaction costs for hedging with government securities are frequently lower than the costs associated with other hedges. Consequently, market participants today tend to use a range of different instruments for different risk exposures and different expected holding periods.

Shifts in liquidity

The financial market turbulence in 1998, reductions in the supply of gilts and the increasing proportion of gilts held by pension funds with relatively passive trading strategies led to a deterioration in the liquidity of the gilts market. Although turnover can sometimes be a misleading indicator of liquidity, most market participants accept that longer-term trends in trading activity tend to be closely correlated with changes in liquidity. Trading volumes of gilts fell sharply in 1998 and 1999 (see Chart A). There was, however, some recovery in market turnover in 2000. Similar changes in turnover were evident in the US Treasury market.

Chart A
Turnover in gilt securities



Limited data are available on liquidity conditions in the sterling non-government securities markets. Nevertheless, there are some signs of improved liquidity. Data from Euroclear indicate that trading in sterling-denominated bonds listed on the London Stock Exchange declined in 1999 but returned to 1998 levels in 2000. Furthermore, over-the-counter derivatives markets have experienced a significant improvement in liquidity in recent years. The sterling interest rate swap market expanded by 28% in notional terms between 1998 and 2000, to £2.5 trillion. The growing use of swaps for hedging and positioning has been responsible for much of this improvement in liquidity.

Price discovery

Many central banks and market participants construct government yield curves to derive estimates of the market's expectations of future short-term interest rates. This approach relies on the assumption that no factors other than expected future spot rates systematically affect government bond yields. Empirical studies of the government yield curve tend not to support this pure expectations theory, however. Rather, forward rates embedded in government yields appear to be affected, in addition to expected future short-term rates, by factors such as the supply of and demand for securities in specific maturity sectors.

A number of market participants have suggested that the recent reductions in gilt issuance, together with the relatively price-inelastic demand for gilts from pension funds noted earlier, have contributed to gilt yields falling below 'true' risk-free rates. As a result, many market participants, including the Bank of England, now fit yield curves to instruments that settle against Libor rates (such as interest rate futures and swaps) as well as analysing gilt yield curves.

Pricing risk

New issues in the non-government bond market are typically quoted (ie marketed to end-investors) against common benchmarks. Government securities were once widely used in this capacity. Here also there has been a gradual shift away from the use of gilts and in favour of swap-based benchmark comparisons. But this change largely preceded the recent period in which the size of the gilt market diminished and does not, therefore, appear to have been strongly influenced by it. Rather, it appears to have been related more to considerations about investors' asset and liability structures and the ease with which investors can make comparisons between fixed-income securities denominated in different currencies. For example, banks' liabilities are typically related to short-term interbank rates. Therefore, these institutions tend to be more interested in benchmarking bond prices against the swap curve, which embodies expectations of future Libor rates.

Annex
Notes and definitions

Central government gross debt

Comprises:

British Government Stocks (BGS): Sterling, marketable, interest-bearing securities issued by the UK government. The nominal value of index-linked gilt-edged stocks is increased by the amount of accrued capital uplift. The whole nominal value of all issued stocks is recorded, even where outstanding instalments are due from market holders (where this is the case, the outstanding instalments are recorded as holdings of liquid assets). This article uses the same definition of short and medium-dated gilts as the National Loans Fund (NLF) accounts (less than five years and five to ten years respectively).

Treasury bills: Short-term instruments generally issued with either a one-month or a three-month maturity. The bills, which can be traded on the secondary market, are sold at a discount and redeemed at par. The amount of discount depends on the price accepted by the issuer at the tender.

National Savings securities: Non-marketable debt comprising a variety of products available to the public.

Certificates of tax deposit: Non-marketable debt available to taxpayers generally, which may be used in payment of most taxes.

Other sterling debt: Includes *coin* in circulation, *Ways and Means advances* (the method by which government departments and the Bank of England Issue Department lend overnight to the NLF), National Investment and Loans Office stocks (non-marketable stocks, issued directly to the National Debt Commissioners, whose terms reflect those on existing BGS), the *temporary deposit facility* (deposits by central government bodies and public corporations with the NLF), deposits with the National Debt Commissioners of *funds lodged in courts*, market holdings of *Northern Ireland government debt* (principally Ulster Savings Certificates), *bank and building society lending, balances of certain public corporations with the Paymaster General, funds held on behalf of the European Commission, other third-party deposits* (from the Insolvency Service), and the *net liabilities, guaranteed by government, of the Guaranteed Export Finance Company (GEFCO)*, following the reclassification of its transactions to central government in 1987.

Foreign currency debt: Converted to sterling at end-period middle-market closing rates of exchange and comprises *foreign currency bonds* (denominated in US dollars, Deutsche Marks and euro), *euro notes and bills, long-term post-war loans* from the governments of the United States and Canada and *assigned debt* (debt originally drawn under the Exchange Cover Scheme and transferred to the government following privatisations of public corporations).

Public sector consolidated gross debt

This includes *central government gross debt*, as well as all *local government and public corporation debt*. All holdings of each other's debt by these three parts of the public sector are netted off to produce a consolidated total.

The local government sector comprises all bodies required to make returns under the various local authorities acts. Public corporations are trading bodies (including nationalised industries), which have a substantial degree of independence from the public authority that created them, including the power to borrow and maintain reserves. For further details, see Chapter 4 of the *Financial Statistics Explanatory Handbook*, published by the Office for National Statistics.

Public sector net debt

Public sector net debt is derived from the consolidated debt of the public sector by deducting the public sectors' holdings of liquid (short-term) assets.

General government consolidated gross debt

Central government and local government gross debt, with holdings of each other's debt netted off to produce a consolidated total.

The foreign exchange and over-the-counter derivatives markets in the United Kingdom

By Sarah Wharmby of the Bank's Monetary and Financial Statistics Division.

In April this year, the Bank of England conducted its triennial survey of turnover in the UK foreign exchange and over-the-counter (OTC) derivatives markets,(1) as part of the latest worldwide survey coordinated by the Bank for International Settlements.(2) This article sets out the results of the UK survey and compares them with previous surveys and results for other major centres.

The main findings of the UK survey are:(3)

- *Average daily spot and forward foreign exchange turnover in April 2001 was $504 billion per day, 21% lower than the $637 billion per day recorded in 1998 (equivalent to a fall of 15% at constant 2001 exchange rates). This fall in turnover has taken place against a backdrop of decreasing global activity, which declined by 19% over the same period to $1,210 billion per day. These results contrast with previous surveys, which had consistently shown a strong increase in foreign exchange business.*
- *The decline in UK activity was more than accounted for by the fall in inter-dealer business from $530 billion to $341 billion. This is consistent with the increased role of electronic broking systems, particularly in the spot market where turnover fell by 30%.*
- *Underlying customer business in the foreign exchange market as a whole grew by 52%.*
- *The euro accounted for a larger proportion of the market in London than the Deutsche Mark did in 1998, but less than the sum of all the legacy currencies.*
- *Average daily turnover in OTC currency and interest rate derivatives was $275 billion, 61% higher than the $171 billion recorded in the previous survey in April 1998. This was driven by an increase in OTC interest rate swap business, and reflects the increasing importance of swaps as a trading and pricing benchmark. Global OTC derivatives activity also increased, by 53%.*
- *The United Kingdom has retained its position as the world's largest centre for foreign exchange and OTC derivatives business, accounting for 31% and 36% of the global foreign exchange and OTC derivatives markets respectively.*

Introduction

In April this year, central banks and monetary authorities in 48 countries, including the United Kingdom, conducted national surveys of turnover in the traditional foreign exchange markets—spot, outright forwards and foreign exchange swaps—and in over-the-counter (OTC) currency and interest rate derivatives. These surveys have taken place every three years since 1986.(4) They are coordinated on a global

(1) The survey covered OTC currency and interest rate derivatives only.
(2) Turnover was reported for the month of April 2001. See the box on survey details and definitions, on pages 424–25, for further details of the survey format.
(3) All comparisons are with the previous survey in 1998 and are based on average daily turnover, unless otherwise stated. Turnover figures published here are adjusted to remove double-counting of trades between UK principals that will have been reported by both parties (local double-counting).
(4) Coverage of OTC derivatives was included for the first time in 1995.

basis by the Bank for International Settlements (BIS), with the aim of obtaining comprehensive and internationally consistent information on the size and structure of the corresponding global markets. The Bank of England conducted the UK survey, which covers the business of institutions operating within the United Kingdom in these markets.

Foreign exchange

Daily turnover

Average daily net turnover(1) during April 2001 was $151 billion in the spot market and $353 billion in the forward market (of which 85% represented foreign exchange swap transactions). Total turnover, spot plus forward, was $504 billion per day. This is 21% lower than the $637 billion per day recorded in the previous survey in 1998. This fall has taken place against a backdrop of decreasing global foreign exchange activity, which declined by 19% over the same period to $1,210 billion. These results contrast with previous surveys, which had shown a continuing large increase in foreign exchange business.

In constant 2001 exchange rate terms, the fall in UK turnover was smaller, at 15%.(2) This measurement adjusts for exchange rate movements since 1998; many currencies have fallen against the dollar, so where market participants bought or sold a constant amount of a non-dollar currency in both 1998 and 2001, less would be recorded as dollar-valued turnover in 2001 than in 1998.

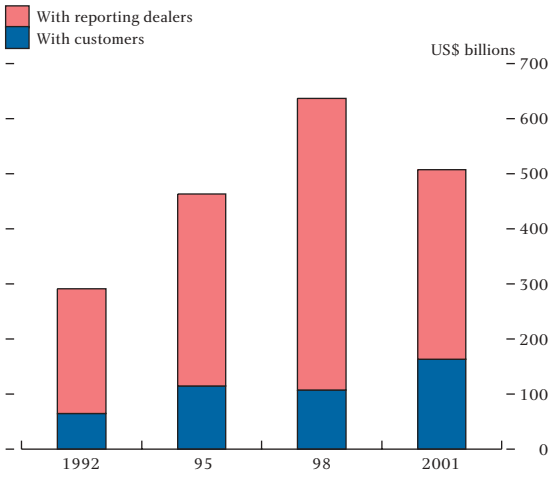
70% of firms taking part in the survey thought that their overall level of foreign exchange turnover during the survey period was representative of typical monthly turnover; 7% believed it to be above normal; and 23% below normal. These results are consistent with those reported for the 1998 survey.

Counterparties

Chart 1 shows that the reduction in foreign exchange turnover in the United Kingdom was more than accounted for by the $189 billion decrease in inter-dealer business, which fell from $530 billion in April 1998 to $341 billion in April this year. A decline in inter-dealer business was also the driving factor behind

Chart 1
Foreign exchange turnover by counterparty

Net average daily turnover in notional amounts



the fall in global turnover. This reduction in inter-dealer activity can partly be explained by consolidation in the banking industry, and also by the increased role of electronic broking systems, particularly in the spot inter-dealer market.

The UK foreign exchange market has become more concentrated since the 1998 survey was conducted. The combined market share of the top ten principals rose from 50% to 58%; and the top twenty's share reached 80%, up from 69% in 1998. The number of firms accounting for more than 1% of total turnover has fallen from 25 in 1998 to 20 in 2001, showing a concentration of business even among the largest institutions. This is partly the result of several mergers of large market players that have been a feature of the banking and securities industries in recent years. This has eliminated deals transacted between the two merged entities and has also left fewer active market participants to trade between each other, leading to a further reduction in activity.

Another influence on inter-dealer business is the increasing importance of electronic broking systems,(3) compared with direct dealing and voice broking. Market estimates indicate that more than two-thirds of UK inter-dealer spot activity is now conducted using electronic brokers, compared with around 30% in 1998. Such systems increase the transparency of market prices meaning that deals traditionally executed by phone to facilitate price discovery are no longer necessary, leading

(1) Adjusted to remove local double-counting.
(2) For these purposes each leg of a foreign currency transaction other than the US dollar leg has been converted into original currency amounts at average current April exchange rates and then reconverted into US dollar amounts at average April 2001 exchange rates. A time series of constant exchange rate calculations is shown in Table B.
(3) For example, EBS and Reuters.

Global survey results

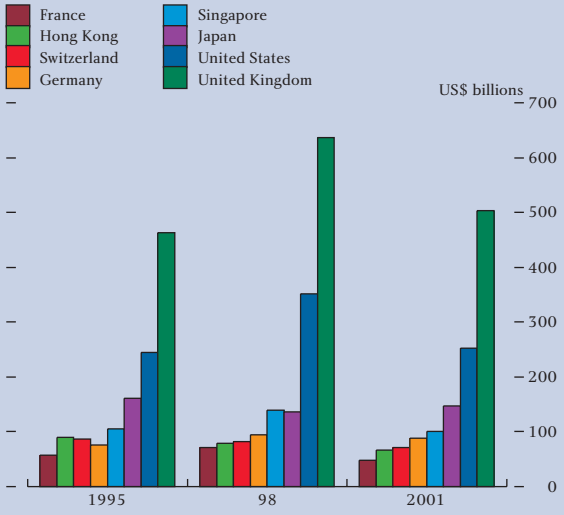
Foreign exchange

Average daily turnover in the global foreign exchange markets was $1,210 billion[1] in April 2001, a fall of 19% compared with the $1,490 billion recorded in April 1998.

Most countries saw a fall in foreign exchange turnover. There were, however, a few exceptions. Turnover in both Canada and Sweden rose, boosted by the relaxation of restrictions on institutional investors that have taken place since the 1998 survey. In Japan, the 8% rise in activity was driven by growth in cross-border swap activity. And Australia saw an increase in turnover, largely as the result of an increase in the number of global players centring their Asian time zone business there.

The United Kingdom's global market share has fallen slightly, from 32.5% to 31.1%. But, as Chart A shows, the UK market remained by far the largest in the world; larger than the next three biggest players (United States 16%, Japan 9% and Singapore 6%) combined. The largest euro-area centre is Germany (5½%), with the euro area as a whole accounting for 13½% of the global market, once account is taken of double-counting within the euro area.

Chart A
Foreign exchange turnover—United Kingdom and other centres



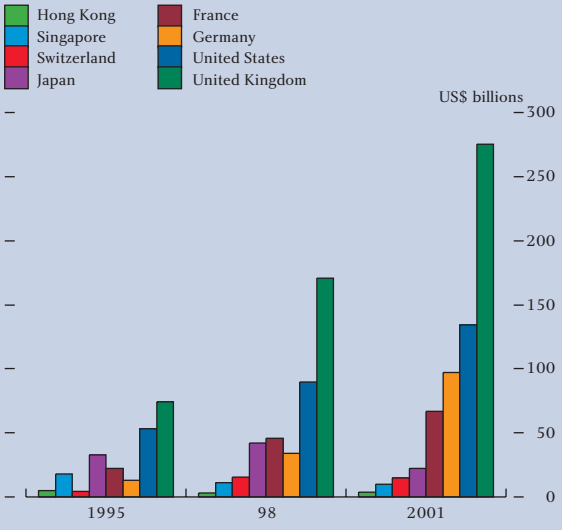
OTC derivatives

In the OTC derivatives markets, average daily turnover in April 2001 was $580 billion, exceeding that in April 1998 by 53%.

This increase in turnover was reflected in the results of most countries, as shown by Chart B. In particular, Germany saw a 185% rise in OTC derivatives business, likely due to activity in the EONIA swap market. Both Japan and Singapore, however, saw a notable fall in activity compared with 1998.

The United Kingdom's global OTC derivatives market share has remained roughly constant at 36%. As in the foreign exchange market, it has remained the largest in the world. The next-largest market is the United States, which is half the size of the UK market at 18%.

Chart B
OTC derivatives turnover—United Kingdom and other centres



(1) The BIS aggregate global results are adjusted to remove double-counting of trades between participants in surveys reporting to two different central banks that will appear in both national surveys (cross-border double-counting). So the simple aggregation of national results, which are only adjusted for local double-counting, will not equal the global statistics released by the BIS. The data for the euro area have been similarly adjusted.

to a more efficient market, with less opportunities for arbitrage, and an overall fall in foreign exchange turnover.

Underlying customer business increased in absolute terms from $107 billion to $163 billion between 1998 and 2001, a rise of 52%; customer business now accounts for 32% of total turnover, compared with 17% in 1998. This was driven by increased trading with financial customers. Market commentary suggests that this reflects the increased activity and sophistication of asset managers in these markets, an effect that has outweighed the decline in activity of hedge funds since the previous survey was conducted.

Business with non-financial institutions remained a small part of the market, at 5% of total turnover. One influence on this figure is likely to have been the volume of cross-border mergers and acquisitions (M&A) activity taking place at the time of the survey. During April 2001, M&A activity was very low, particularly when compared with the much higher levels seen throughout 1999 and 2000. It is therefore possible that the 2001 figure for the business of non-financial institutions is an under-representation of the activity of these counterparties; if the survey had been conducted in a different month, the proportion of non-financial customer business could have been higher.

The proportion of business attributable to cross-border deals rose very slightly since the 1998 survey, from 66% to 67%. The global results show that cross-border deals account for a relatively high proportion of UK turnover compared with other centres. The comparable figure reported by the BIS was 57% of global turnover.

Currency composition

The US dollar remained the dominant currency in the London market, being used on one side of the transaction in 92% of all deals (see Table A). The euro replaced the Deutsche Mark as the second most traded currency, accounting for a larger proportion of the market than the Deutsche Mark did in 1998, but less than the sum of all twelve euro legacy currencies; a trend that was reflected in the global survey. Euro/dollar was the most actively traded currency pair, capturing 34% of the market. This compares with the 22% market share of dollar/Deutsche Mark in the 1998 survey.

The introduction of the euro, and resultant disappearance of trading between the legacy currencies,

Table A
Foreign exchange turnover—currency breakdown

Per cent

	1992	1995	1998	2001
US dollar	81	84	88	92
Euro	-	-	-	41
Deutsche Mark	41	36	32	-
French franc	4	9	5	-
ECU and other EMS currencies	17	11	21	-
Pound sterling	24	16	18	24
Japanese yen	15	20	14	17
Swiss franc	8	7	7	6
Canadian dollar	2	2	3	4
Australian dollar	1	2	2	3
Other currencies	7	13	10	13
All currencies	**200**	**200**	**200**	**200**

Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.

is likely to have contributed to the reduction in foreign exchange turnover since the 1998 survey. But the extent of this will have differed across financial centres. In the United Kingdom, the proportion of turnover attributable to trading Deutsche Mark against other EMS currencies in the 1998 survey was 3%, and it is estimated that total trading between euro legacy currencies in the United Kingdom accounted for no more than 5% of turnover. So the effect on turnover of the disappearance of intra-legacy currency trading is likely to have been small in the United Kingdom. The effect of the introduction of the euro in other European centres will however have been more significant, as, prior to this, these centres traditionally had a comparative advantage for trading in their national currency. For example, in the 1998 survey, domestic currency trading represented 80% of turnover in Italy, 41% in Belgium and 41% in France. This partly explains the much larger falls in foreign exchange turnover seen in some euro-area centres, compared with the United Kingdom: turnover in Belgium, Italy and France fell by 63%, 39% and 33% respectively.

The UK market's reliance on domestic currency business is relatively modest. The proportion of UK turnover in April 2001 involving sterling rose to 24%, largely reflecting an increase in the market share of sterling/dollar from 14% to 20%. Euro/sterling trading accounted for 3% of the UK market.

The introduction of the euro is also likely to have had an effect on non-legacy currency markets, such as the dollar. It is, for example, no longer necessary to swap legacy currencies using the dollar as a vehicle currency, as was common practice before the introduction of the euro, reflecting better liquidity in the dollar swap market. Dollar/legacy currency swap activity totalled $185 billion in the 1998 survey, accounting for 50% of the total foreign exchange swap market. Euro/dollar

trading now accounts for 34% of the foreign exchange swap market, with turnover of $101 billion.

There has also been an increase in the use of 'other currencies' since the 1998 survey. This is largely due to a rise in activity in the Scandinavian currencies, and may be the result of general portfolio diversification following the merging of the twelve euro legacy currencies.

Instruments

The figures in Table B show a further fall in the proportion of foreign exchange business transacted for spot value, from 51% in 1992 to 40% in 1995, 34% in 1998, and 30% in 2001. This again reflects the influence of electronic broking in the spot market discussed earlier. In contrast, turnover in outright forwards has increased by 10% to $53 billion.

Table B
Foreign exchange turnover by transaction type
Net average daily turnover in notional amounts

US$ billions; *percentage of total net turnover in italics*

	1992		1995		1998		2001	
Spot transactions	148	*51*	186	*40*	217	*34*	151	*30*
Outright forwards	20	*7*	33	*7*	48	*8*	53	*10*
FX swaps	123	*42*	244	*53*	372	*58*	300	*60*
Total 'traditional' turnover	**290**		**464**		**637**		**504**	
Memorandum item:								
Turnover at April 2001 exchange rates (a)	259		382		592		504	

(a) Each leg of a foreign currency transaction other than the US dollar leg has been converted into original currency amounts at average current April exchange rates and then reconverted into US dollar amounts at average April 2001 exchange rates.

There has been an increase in the market share of foreign exchange swap (FX swap) transactions from 58% to 60%, despite a fall in turnover in value terms from $372 billion to $300 billion (19%). This fall can partly be explained by the disappearance of the euro legacy currencies, particularly those deals that involved the dollar as a vehicle currency, as described in the previous section.

In addition, FX swaps are often used as tools to manage interest rate risk; they are effectively linked to interest rates of two different currencies, with their value determined by movements in those interest rates. Since the 1998 survey, the interest rate derivatives market has seen the development of a range of new, more sophisticated interest rate risk management products. There has also been a large increase in OTC interest rate derivatives market activity (up 93%), as shown below. The fall in FX swap activity could therefore reflect the fact that risk that used to be hedged using FX swaps is now being managed in the interest rate derivatives market.

A similar trend was evident in the United States, where the value of FX swap turnover fell by 31%, but OTC interest rate swap activity increased by 165%.

Market share of foreign banks

Foreign-owned institutions operating in the London market accounted for 81% of principals' aggregate turnover in London compared with 85% in 1998. North American principals remained the most active, with a 46% market share, followed by non-UK EU principals at 21%. This represents a slight fall in the market share of US institutions and a slight rise in that of non-UK EU institutions. The proportion of turnover transacted by Japanese principals fell from 7% to 3%.

OTC derivatives

Daily turnover

Average daily turnover in the United Kingdom for OTC currency and interest rate derivatives continued to increase. In April 2001, turnover was $275 billion, 61% higher than the $171 billion recorded in the April 1998 survey. Within this, the interest rate derivatives market grew by 93%, and the currency derivatives market reduced in size by 22%. Global OTC derivatives turnover also increased, by 53%.

At constant 2001 exchange rates, the change in UK turnover was more pronounced, indicating an 80% increase in OTC derivatives business.

83% of firms taking part in the survey thought that their overall level of OTC derivatives turnover during the survey period was representative of monthly turnover; 2% considered it to be above normal; and 15% below normal.

Instruments

The fall in size of the OTC currency derivatives market to $37 billion was largely driven by a 22% decrease in the use of currency options, which account for 89% of the market. This was less than the fall in activity in these instruments reported by other centres; turnover in OTC currency options in the United States fell by 42%, and in Germany by 44%.

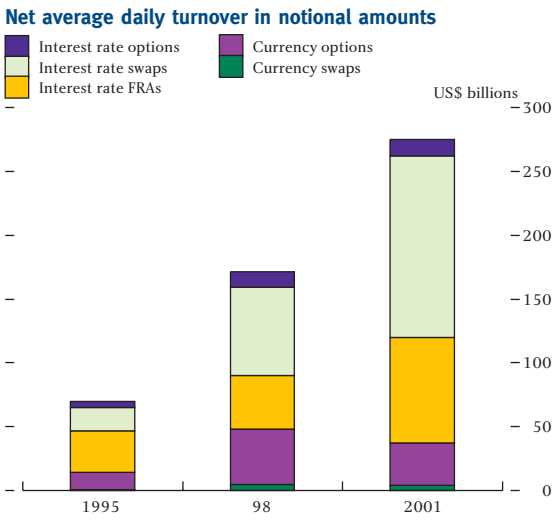
A significant part of the decrease in the United Kingdom can be attributed to a fall in euro-related trades.

Currency option transactions involving euro legacy currencies totalled $23 billion in 1998. In 2001, euro transactions had fallen to $16 billion, a decline of $7 billion. This is consistent with both the disappearance of the euro legacy currencies and the fact that trading in these instruments was unusually high in the 1998 survey as they were used to hedge risk in advance of the announcement of euro parity rates in May of that year. Market commentators also suggest that pricing practices in the currency options market are now more consistent than in 1998, which might have had the effect of reducing trading opportunities between dealers.

A major contribution to the increase in interest rate derivatives turnover was a 106% growth in the interest rate swap market, as can be seen from Chart 2. This follows the development of a range of new instruments in this category and reflects the increasing importance of swaps as a trading and pricing benchmark. In particular, the use of euro overnight index average (EONIA) swaps—which exchange cash flows based on a fixed interest rate and a variable EONIA-based rate—is estimated to have increased sharply over the volumes seen for the previous national currencies in 1998. They are used, among other things, for position-taking and for hedging short-term interest rate risk, including on repo transactions. Interest rate swaps represent the biggest segment of all the derivatives survey's instruments, accounting for more than half of the total OTC market (60% of the interest rate derivatives market).

Turnover in forward-rate agreements (FRAs) has also expanded substantially, by 96%, maintaining their 35% share of the interest rate derivatives market. Activity in interest rate options showed a more modest increase of 10%, with market share of these instruments declining from 10% to 5%.

Chart 2
OTC derivatives turnover by transaction type

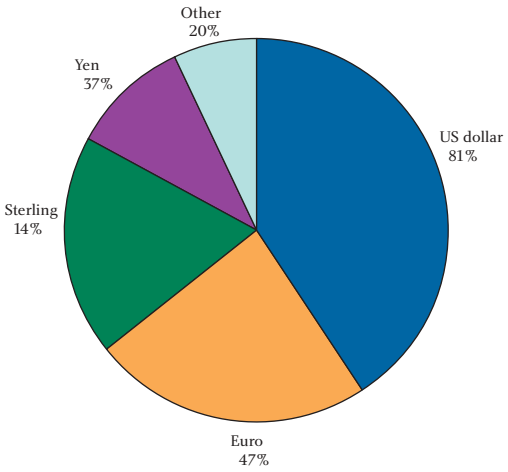


Currency composition

As Chart 3 shows, the dollar remained the most traded currency in the currency derivatives market. 81% of deals now involve the dollar on one leg, up from 76% in 1998. As in the foreign exchange market, the euro accounted for a greater proportion of turnover than the Deutsche Mark did in 1998 (entering 47% of deals on one side compared with 42% in 1998) but less than the sum of all the legacy currencies (57% in 1998). Sterling was involved in 14% of currency derivative transactions, down from 17% in 1998.

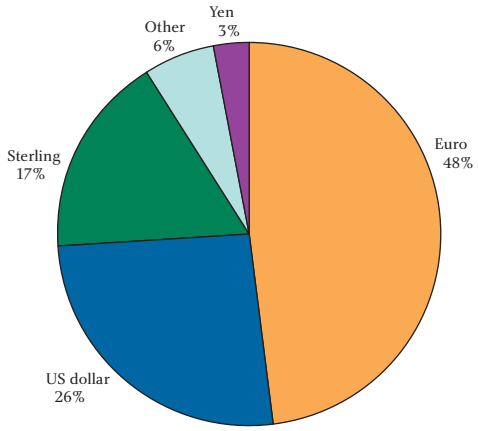
The euro was the dominant currency in the UK interest rate derivatives market (see Chart 4), accounting for 48% of total turnover, the same proportion as in the

Chart 3
OTC currency derivatives—currency breakdown



Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.

Chart 4
OTC interest rate derivatives—currency breakdown



global market as a whole, down from 56%[1] in 1998. However, the value of transactions conducted in euro increased in absolute terms from $69 billion[2] to $113 billion, possibly reflecting the increase in the size of the EONIA swap market described in the previous section. Both sterling and the US dollar increased their market shares, from 13% and 16%, to 17% and 26% respectively.

Counterparties

In the currency derivatives market, there was a substantial decrease in the proportion of the market accounted for by inter-dealer business, and an equivalent rise in the proportion accounted for by customer business, from 20% to 32% (see Table C). Customer business also rose in absolute terms, from $10 billion to $12 billion, driven by an increase in business with non-financial institutions.

Table C
OTC derivatives turnover by counterparty

Net average daily turnover in notional amounts

US$ billions

	Total		Currency derivatives (a)		Interest rate derivatives (b)	
	1998	2001	1998	2001	1998	2001
Reporting dealers	126	217	38	25	87	192
Local	43	65	12	6	29	59
Cross-border	84	153	26	19	58	134
Other financial institutions	36	45	6	6	30	39
Local	18	27	1	2	17	25
Cross-border	18	19	5	4	13	15
Non-financial customers	10	12	4	6	6	6
Local	3	3	1	1	2	2
Cross-border	7	9	3	5	4	4
Total	**172**	**561**	**48**	**37**	**123**	**238**

(a) Currency swaps and options.
(b) Single-currency contracts only.

By contrast, inter-dealer interest rate derivatives business grew strongly, accounting for 81% of turnover in April 2001 compared with 71% in 1998. This is consistent with the fact that, unlike in the foreign exchange spot market, electronic broking has yet to make significant inroads into the OTC interest rate derivatives market. Although customer business fell in terms of market share, there was an absolute increase in the value of customer contracts entered into, from $36 billion to $45 billion.

Cross-border business continued to account for roughly two-thirds of currency and interest rate derivatives turnover in the United Kingdom, compared with 58% on a global basis.

Market concentration

Overall, the results show that the OTC derivatives market in London has become more concentrated since 1998. The top ten's combined market share rose from 67% to 74% and the top twenty's rose from 82% to 89%.

A smaller number of participants undertook currency derivatives business than interest rate derivatives business during April 2001, although there appears to be little difference in market concentration between the two markets. Activity in currency derivatives was reported by 77 firms. Nineteen firms had 1% or more of the market; 12 had between 1% and 5%; and 7 had more than 5%. Activity in interest rate derivatives during April 2001 was reported by 132 firms. Nineteen firms had 1% or more of the market; 14 had between 1% and 5%; and 5 had more than 5%.

(1) Based on the sum of all the euro legacy currencies in 1998.
(2) Based on the sum of all the euro legacy currencies in 1998.

Survey details and definitions

Participants

257 banks and securities houses participated in the UK survey. As in previous years, the Bank of England asked all banks active in the United Kingdom, and some non-bank financial firms believed to be active principals in the wholesale markets, to participate in the survey. Other institutions, active in the markets covered, did not take part directly, but their transactions with participating principals will have been reported by those institutions. It is reasonable to assume that little trading took place between non-participating entities.

The questionnaire

Survey participants were requested to complete a questionnaire prepared by the Bank of England, based on a standard format produced by the Bank for International Settlements (BIS) and agreed with other central banks. Participants were asked to provide details of their gross turnover for the 19 business days in April 2001. Gross turnover (measured in nominal values) is defined as the absolute total value of all deals contracted; there was no netting of purchases against sales. Data were requested in terms of US dollar equivalents, rounded to the nearest million. The basis of reporting was the location of the trade, regardless of where it was booked. The questionnaire asked for data broken down by currency, instrument and type of counterparty.

The survey distinguished the following types of transaction:

Foreign exchange

- *Spot transaction*: Single outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) within two business days. The spot legs of swaps and swaps that were for settlement within two days (ie 'tomorrow/next day' swap transactions) were excluded from this category.

- *Outright forward*: Transaction involving the exchange of two currencies at a rate agreed on the date of the contract for value or delivery (cash settlement) at some time in the future (more than two business days later). Also included in this category were forward foreign exchange agreement transactions (FXA), non-deliverable forwards, and other forward contracts for differences.

- *Foreign exchange swap*: Transaction involving the actual exchange of two currencies (principal amount only) on a specific date at a rate agreed at the time of the conclusion of the contract (the short leg), and a reverse exchange of the same two currencies at a date further in the future at a rate (generally different from the rate applied to the short leg) agreed at the time of the conclusion of the contract (the long leg). Short-term swaps carried out as 'tomorrow/next day' transactions are included in this category.

OTC currency derivatives

- *Currency swap*: Contract that commits two counterparties to exchange streams of interest payments in different currencies for an agreed period of time and to exchange principal amounts in different currencies at a pre-agreed exchange rate at maturity.

- *Currency option*: Option contract that gives the right to buy or sell a currency with another currency at a specified exchange rate during a specified period. This category also includes currency swaptions, currency warrants and exotic foreign exchange options such as average rate options and barrier options.

Single-currency OTC interest rate derivatives

- *Forward-rate agreement (FRA)*: Interest rate forward contract in which the rate to be paid or received on a specific obligation for a set period of time, beginning at some time in the future, is determined at contract initiation.

- *Interest rate swap*: Agreement to exchange periodic payments related to interest rates on a single currency. Can be fixed for floating, or floating for floating, based on different indices. This category includes those swaps whose notional principal is amortised according to a fixed schedule independent of interest rates.

- *Interest rate option*: Option contract that gives the right to pay or receive a specific interest rate on a predetermined principal for a set period of time. Included in this category are interest rate caps, floors, collars, corridors, swaptions and warrants.

Reporting institutions were asked to distinguish between transactions with *reporting dealers*, *other financial institutions* (all categories of financial institution other than reporting dealers) and *non-financial institutions*. In each case they were asked to separate local and cross-border transactions (determined according to the location, rather than the nationality of the counterparty) to permit adjustment for double-counting.

The aggregate responses (adjusted for double-counting) for the main sections of the questionnaire are reproduced in Tables D, E and F (on pages 426–30). The BIS intends to publish an analysis of the global survey results in early 2002. A survey of global outstanding positions in the derivatives markets (measured at the end of June 2001) is also being undertaken and global results for this survey will be released by the BIS in due course.

Table D
Average daily net-gross foreign exchange turnover(a)

US$ millions (rounded to the nearest million)

	US dollar against:						Sterling against:						
	Euro	¥	SwFr	Can$	Aus$	Other	US$	Euro	¥	SwFr	Can$	Aus$	Other
Spot													
Reporting dealers	**35,858**	**18,496**	**4,225**	**5,186**	**3,646**	**9,504**	**12,910**	**5,457**	**270**	**60**	**17**	**28**	**128**
Local	9,263	3,697	952	293	735	1,520	4,706	1,778	97	12	2	9	47
Cross-border	26,595	14,799	3,272	4,893	2,911	7,984	8,204	3,679	173	49	15	18	81
Other financial institutions	**12,939**	**8,243**	**1,686**	**1,142**	**729**	**2,885**	**4,589**	**1,869**	**200**	**43**	**26**	**26**	**136**
Local	5,285	3,643	620	531	367	1,325	2,508	1,030	100	34	14	16	111
Cross-border	7,654	4,600	1,066	611	363	1,560	2,081	839	100	8	12	10	25
Non-financial institutions	**2,389**	**864**	**310**	**170**	**195**	**324**	**1,183**	**703**	**103**	**19**	**7**	**26**	**100**
Local	615	177	89	71	55	72	620	432	25	12	4	21	40
Cross-border	1,774	687	221	99	140	252	563	271	79	7	4	5	60
Sub-total	**51,185**	**27,603**	**6,221**	**6,498**	**4,570**	**12,713**	**18,683**	**8,030**	**573**	**122**	**50**	**80**	**364**
Outright forward													
Reporting dealers	**10,936**	**3,107**	**864**	**310**	**1,648**	**4,913**	**6,128**	**1,377**	**84**	**27**	**9**	**22**	**90**
Local	2,953	643	278	89	239	808	2,268	398	40	5	2	5	54
Cross-border	7,983	2,464	586	221	1,410	4,106	3,860	979	45	22	7	17	36
Other financial institutions	**4,927**	**2,377**	**869**	**375**	**699**	**1,485**	**2,570**	**1,107**	**190**	**43**	**16**	**19**	**243**
Local	2,358	934	502	243	545	516	1,826	746	143	12	8	16	172
Cross-border	2,570	1,443	367	131	154	970	744	361	47	31	7	3	71
Non-financial institutions	**1,826**	**687**	**162**	**122**	**211**	**337**	**767**	**601**	**151**	**26**	**8**	**49**	**123**
Local	561	210	27	78	68	85	479	351	46	9	6	31	66
Cross-border	1,265	477	135	45	143	251	287	250	105	17	1	18	57
Sub-total	**17,690**	**6,170**	**1,895**	**807**	**2,558**	**6,735**	**9,465**	**3,086**	**425**	**96**	**32**	**90**	**455**
Foreign exchange swaps													
Reporting dealers	**70,680**	**27,576**	**9,644**	**7,304**	**6,422**	**25,994**	**50,020**	**3,214**	**220**	**31**	**6**	**18**	**49**
Local	15,809	5,492	2,400	1,090	1,964	5,175	18,148	968	76	12	1	5	8
Cross-border	54,871	22,084	7,243	6,215	4,458	20,819	31,872	2,247	144	18	5	13	41
Other financial institutions	**27,206**	**11,555**	**5,696**	**3,363**	**2,638**	**10,706**	**21,046**	**1,326**	**291**	**41**	**34**	**28**	**77**
Local	13,957	5,169	2,641	2,343	1,755	6,640	10,551	878	186	21	31	22	58
Cross-border	13,250	6,386	3,055	1,020	882	4,066	10,495	448	106	20	2	6	19
Non-financial institutions	**3,279**	**1,478**	**462**	**264**	**169**	**861**	**2,939**	**1,449**	**156**	**61**	**68**	**57**	**170**
Local	977	719	89	108	127	383	2,024	960	135	30	56	53	83
Cross-border	2,302	759	373	156	42	478	915	488	21	31	12	4	88
Sub-total	**101,166**	**40,609**	**15,801**	**10,932**	**9,228**	**37,561**	**74,005**	**5,989**	**668**	**132**	**108**	**103**	**297**
Total	**170,041**	**74,382**	**23,917**	**18,237**	**16,357**	**57,009**	**102,153**	**17,104**	**1,666**	**350**	**190**	**273**	**1,116**
Maturity of forwards; per cent (b)													
Seven days or less	68	68	76	78	80	72	71	36	24	32	28	39	43
Over seven days	31	31	23	21	19	27	28	62	75	67	72	59	57
Over one year	1	1	1	1	1	2	1	2	1	0	0	1	1

(a) Adjusted for local double-counting.
(b) Gross maturities data cannot be adjusted accurately for local double-counting. The figures here are gross (unadjusted), given as a percentage of gross outright forward and foreign exchange swap turnover.

Euro against:						
¥	SwFr	Can$	Aus$	Other	Residual	Total, all currencies
6,656	**2,025**	**43**	**47**	**2,156**	**347**	**107,061**
3,255	349	3	5	355	48	27,128
3,401	1,676	40	42	1,801	300	79,933
1,288	**580**	**34**	**31**	**683**	**91**	**37,221**
433	222	5	7	291	37	16,579
855	359	29	25	393	53	20,642
330	**111**	**9**	**14**	**171**	**88**	**7,116**
167	41	3	3	74	51	2,571
163	70	5	11	97	37	4,544
8,274	**2,716**	**86**	**93**	**3,011**	**526**	**151,397**
755	**237**	**35**	**33**	**228**	**210**	**31,012**
195	36	18	4	70	33	8,137
559	200	16	29	158	178	22,875
509	**161**	**37**	**43**	**239**	**149**	**16,059**
230	59	21	26	96	74	8,526
279	102	17	17	143	75	7,532
151	**60**	**12**	**35**	**92**	**208**	**5,628**
40	29	6	13	47	125	2,276
111	31	6	22	45	83	3,352
1,415	**458**	**84**	**111**	**559**	**567**	**52,698**
1,141	**299**	**41**	**39**	**185**	**214**	**203,097**
218	21	17	9	33	25	51,471
923	279	23	30	152	189	151,627
600	**135**	**101**	**57**	**140**	**101**	**85,141**
206	72	79	38	38	58	44,742
395	63	22	19	102	43	40,399
219	**166**	**50**	**16**	**129**	**103**	**12,097**
105	49	16	11	51	20	5,994
114	117	35	5	78	83	6,103
1,960	**601**	**191**	**112**	**454**	**418**	**300,336**
11,649	**3,775**	**361**	**316**	**4,024**	**1,511**	**504,431**
37	42	35	38	32	32	69
62	58	64	60	67	67	30
1	0	1	2	1	1	1

Table E
Average daily net-gross OTC currency derivatives turnover[(a)]

US$ millions (rounded to the nearest million)

	US dollar against:						Sterling against:						
	Euro	¥	SwFr	Can$	Aus$	Other	US$	Euro	¥	SwFr	Can$	Aus$	Other
Currency swaps													
Reporting dealers	**624**	**875**	**41**	**5**	**93**	**211**	**810**	**129**	**6**	**3**	**1**	**3**	**3**
Local	147	398	23	1	8	107	438	52	6	0	0	0	3
Cross-border	477	477	18	5	85	104	372	77	0	3	1	3	0
Other financial institutions	**91**	**189**	**8**	**0**	**15**	**32**	**111**	**14**	**3**	**0**	**0**	**0**	**3**
Local	19	69	0	0	1	20	24	5	3	0	0	0	3
Cross-border	72	120	8	0	14	12	86	9	1	0	0	0	0
Non-financial institutions	**245**	**43**	**3**	**2**	**48**	**22**	**161**	**8**	**10**	**3**	**0**	**0**	**0**
Local	50	18	0	0	20	0	141	0	10	0	0	0	0
Cross-border	194	26	3	2	28	22	20	8	0	3	0	0	0
Sub-total	**960**	**1,107**	**52**	**8**	**157**	**265**	**1,081**	**151**	**19**	**6**	**1**	**3**	**5**
OTC options sold													
Reporting dealers	**3,652**	**2,951**	**262**	**328**	**696**	**420**	**708**	**386**	**54**	**4**	**0**	**2**	**19**
Local	904	594	75	30	50	132	161	133	6	0	0	0	3
Cross-border	2,748	2,358	188	298	645	289	547	253	47	4	0	2	16
Other financial institutions	**896**	**845**	**125**	**39**	**72**	**143**	**297**	**110**	**29**	**8**	**0**	**2**	**4**
Local	271	297	50	5	12	39	110	55	11	8	0	0	2
Cross-border	625	548	75	34	59	103	187	55	18	1	0	2	2
Non-financial institutions	**540**	**430**	**48**	**160**	**339**	**31**	**234**	**160**	**8**	**2**	**0**	**1**	**2**
Local	101	98	2	111	8	6	110	51	1	0	0	0	0
Cross-border	439	331	46	49	331	25	124	109	7	2	0	1	2
Sub-total	**5,088**	**4,226**	**435**	**527**	**1,107**	**594**	**1,239**	**656**	**91**	**15**	**1**	**5**	**25**
OTC options bought													
Reporting dealers	**3,556**	**3,278**	**291**	**381**	**780**	**608**	**698**	**412**	**82**	**10**	**2**	**2**	**61**
Local	919	655	82	76	71	190	162	133	4	0	0	0	12
Cross-border	2,636	2,623	209	305	709	418	536	279	78	10	2	2	49
Other financial institutions	**917**	**794**	**119**	**20**	**75**	**142**	**210**	**122**	**12**	**3**	**0**	**5**	**3**
Local	298	243	54	0	18	53	105	58	0	3	0	0	0
Cross-border	620	551	65	20	56	89	105	64	12	0	0	5	3
Non-financial institutions	**586**	**409**	**29**	**204**	**29**	**85**	**167**	**164**	**8**	**0**	**1**	**1**	**1**
Local	66	77	2	118	3	3	77	36	2	0	0	0	0
Cross-border	520	333	28	86	26	82	90	128	6	0	1	1	1
Sub-total	**5,059**	**4,481**	**439**	**606**	**884**	**835**	**1,075**	**698**	**102**	**14**	**3**	**9**	**65**
Total OTC options	**10,147**	**8,706**	**874**	**1,132**	**1,990**	**1,429**	**2,314**	**1,354**	**193**	**28**	**3**	**14**	**89**
Total	**11,106**	**9,813**	**926**	**1,140**	**2,147**	**1,694**	**3,395**	**1,506**	**212**	**34**	**5**	**17**	**95**

(a) Adjusted for local double-counting.

Euro against:						
¥	SwFr	Can$	Aus$	Other	Residual	Total, all currencies
114	**11**	**1**	**0**	**22**	**7**	**2,959**
29	6	0	0	4	1	1,221
85	5	1	0	18	7	1,738
20	**6**	**0**	**0**	**4**	**3**	**500**
3	5	0	0	0	0	152
17	1	0	0	4	3	348
78	**0**	**0**	**0**	**56**	**2**	**681**
0	0	0	0	0	0	240
78	0	0	0	56	2	441
212	**18**	**2**	**0**	**81**	**13**	**4,141**
906	**153**	**0**	**4**	**122**	**180**	**10,847**
257	72	0	1	18	7	2,443
648	81	0	2	103	173	8,404
182	**112**	**0**	**1**	**67**	**44**	**2,976**
56	68	0	0	12	0	996
126	45	0	1	55	44	1,980
135	**39**	**0**	**7**	**49**	**2**	**2,189**
24	6	0	0	7	0	526
111	33	0	7	42	2	1,662
1,222	**305**	**1**	**12**	**238**	**226**	**16,011**
914	**180**	**1**	**10**	**112**	**106**	**11,483**
156	73	0	1	15	9	2,559
758	107	0	9	97	97	8,924
252	**66**	**0**	**0**	**63**	**27**	**2,829**
75	30	0	0	16	11	964
177	36	0	0	47	16	1,865
1,095	**16**	**0**	**2**	**5**	**2**	**2,805**
20	0	0	0	0	0	402
1,076	15	0	2	5	2	2,404
2,261	**261**	**1**	**12**	**180**	**135**	**17,118**
3,484	**566**	**2**	**24**	**418**	**361**	**33,129**
3,696	**583**	**4**	**24**	**499**	**374**	**37,270**

Table F
Average daily net-gross OTC interest rate derivatives turnover[a]

US$ millions (rounded to the nearest million)

	£	US$	Euro	¥	SwFr	Can$	Aus$	Dkr	HK$	Skr	Other	Total
FRAs												
Reporting dealers	**10,916**	**20,848**	**27,256**	**2,427**	**735**	**38**	**211**	**2,051**	**169**	**1,481**	**1,748**	**67,880**
Local	4,530	4,401	12,576	154	421	7	89	360	56	317	280	23,191
Cross-border	6,387	16,447	14,679	2,272	314	31	122	1,692	113	1,164	1,468	44,689
Other financial institutions	1,952	3,682	6,813	198	156	61	197	761	11	283	332	14,445
Local	1,655	2,715	6,038	130	156	61	193	374	0	217	162	11,701
Cross-border	297	967	775	68	0	0	4	387	11	65	171	2,744
Non-financial institutions	333	108	175	39	0	0	0	22	0	20	143	840
Local	149	22	100	0	0	0	0	0	0	0	0	271
Cross-border	184	86	74	39	0	0	0	22	0	20	143	569
Sub-total	**13,201**	**24,639**	**34,244**	**2,663**	**891**	**99**	**407**	**2,834**	**179**	**1,784**	**2,223**	**83,165**
Swaps												
Reporting dealers	**20,970**	**26,691**	**59,836**	**3,090**	**1,270**	**329**	**1,616**	**611**	**409**	**516**	**833**	**116,171**
Local	9,133	4,101	19,256	458	138	46	142	159	54	153	223	33,862
Cross-border	11,837	22,589	40,580	2,632	1,132	283	1,474	451	355	363	611	82,308
Other financial institutions	3,473	8,432	9,707	717	216	34	73	33	32	157	111	22,984
Local	1,923	4,399	4,733	273	49	15	28	14	0	128	78	11,638
Cross-border	1,550	4,033	4,974	443	168	19	45	19	32	30	33	11,346
Non-financial institutions	915	348	958	49	95	1	164	1	1	38	13	2,583
Local	551	77	170	18	0	0	139	0	0	6	0	961
Cross-border	364	271	788	32	95	1	26	1	1	32	13	1,623
Sub-total	**25,358**	**35,470**	**70,501**	**3,856**	**1,582**	**364**	**1,853**	**645**	**442**	**711**	**957**	**141,738**
OTC options sold												
Reporting dealers	436	683	3,127	98	136	8	1	4	0	23	12	4,529
Local	139	87	500	16	124	0	0	1	0	9	3	880
Cross-border	297	596	2,627	83	12	8	1	2	0	14	9	3,649
Other financial institutions	205	315	751	13	10	0	0	0	0	10	0	1,306
Local	118	258	556	2	8	0	0	0	0	5	0	948
Cross-border	87	56	196	11	1	0	0	0	0	5	0	357
Non-financial institutions	35	360	927	143	1	0	0	2	0	3	2	1,474
Local	32	317	136	23	0	0	0	0	0	0	1	509
Cross-border	3	43	791	120	1	0	0	2	0	3	1	965
Sub-total	**677**	**1,358**	**4,806**	**255**	**146**	**8**	**1**	**6**	**0**	**36**	**14**	**7,308**
OTC options bought												
Reporting dealers	447	305	2,869	96	135	8	1	4	2	21	13	3,899
Local	97	41	451	9	123	0	0	1	0	6	6	735
Cross-border	350	264	2,417	86	12	8	0	3	2	15	7	3,165
Other financial institutions	164	152	394	34	3	0	0	0	0	5	0	753
Local	108	111	257	7	2	0	0	0	0	5	0	491
Cross-border	56	41	137	27	1	0	0	0	0	0	0	263
Non-financial institutions	49	144	626	71	2	0	0	2	0	3	0	898
Local	42	81	67	28	0	0	0	0	0	0	0	219
Cross-border	7	63	559	43	2	0	0	2	0	3	0	679
Sub-total	**660**	**601**	**3,889**	**201**	**140**	**9**	**1**	**6**	**2**	**28**	**13**	**5,551**
Total OTC options	**1,337**	**1,959**	**8,695**	**456**	**286**	**17**	**2**	**12**	**2**	**64**	**28**	**12,859**
Total OTC interest rate derivatives	**39,896**	**62,068**	**113,439**	**6,975**	**2,760**	**479**	**2,263**	**3,491**	**623**	**2,560**	**3,208**	**237,762**

(a) Adjusted for local double-counting.

The Bank's contacts with the money, repo and stock lending markets

This article looks at the Bank's liaison with the London money markets and in particular at the work of the Sterling Money Markets Liaison Group and the Stock Lending and Repo Committee.

Introduction

In addition to having a regular dealing relationship with participants in its open market operations, the Bank of England also maintains close contact with them in order to discuss market sentiment, expectations, liquidity and trading conditions in unsecured and secured markets. The Gilt-Edged and Money Markets Division also has regular bilateral contact with a wider group of banks, investment banks, financial institutions and brokers as part of its market liaison function. Such liaison contributes to both monetary policy and financial stability goals and to the Bank's interest in maintaining the effectiveness of UK financial services.

In addition to bilateral contacts, the Bank liaises with market participants through two key committees—the Sterling Money Markets Liaison Group (MMLG), chaired by Ian Plenderleith, Executive Director, and the Stock Lending and Repo Committee (SLRC), chaired by Neal Hatch, the Head of Gilt-Edged and Money Markets Division.

MMLG

MMLG, an informal group, was established in the summer of 1999 as a means for the Bank and leading market participants to maintain regular contact with each other on operational matters of common interest. It has met quarterly since then. Meetings usually start with a short presentation by the Bank representatives based on the regular 'markets and operations' article in the *Quarterly Bulletin*. In response, members are invited to give their views on current developments. There is then a discussion on a range of structural developments involving the money markets which can, where necessary, be carried forward by delegated working groups.

Representatives from the market are invited to attend MMLG in their own right, rather than as representatives of a firm or group of firms, and therefore do not generally send alternates when they cannot attend. In addition to market members, who come from a broad range of institutions, there are also members from trade organisations and official bodies. These include the Financial Services Authority (FSA), the UK Debt Management Office (DMO), LIFFE, CRESTCo, the Chartered Institute of Public Finance and Accountancy, the Association of Payment Clearing Services (APACS), the Association of Corporate Treasurers, the London Money Market Association, the Wholesale Markets Brokers' Association, and the London Investment Banking Association. On occasion others are invited to the meetings to discuss items of particular interest: the British Bankers Association (BBA) were recently invited, as discussed below.

The first few MMLG meetings proved invaluable as opportunities to share views on the millennium date change and its impact on money market activity and liquidity. The Group discussed plans to cope with a possible sharp increase in notes in circulation and, in mid-1999, the expansion of eligible collateral in the Bank's money market operations to include euro-denominated debt. This expansion of eligible collateral proved useful over the millennium date change and has been maintained since. The article now turns to some of the areas worked on by MMLG over the past year or so.

MMLG has discussed and contributed to the preparation of the non-investment products (NIPS) code in conjunction with the Foreign Exchange Joint Standing Committee and the London Bullion Market Association; this new code, successor to the London Code of Conduct in respect of non-investment products, will come into effect in December this year. The Code provides guidance on what is currently good practice in the sterling, foreign exchange and bullion wholesale

deposit markets, and in the spot and forward foreign exchange and bullion markets.(1)

A working group set up by MMLG contributed to the work led by the Bank and CRESTCo on the review of money market instruments and plans for their dematerialisation so that they can be settled in the CREST system: it is hoped that this change, which will no longer require instruments to be issued initially in paper form, will be introduced in the second half of 2002. Most sterling money market instruments are currently issued in bearer, paper form as negotiable instruments; they may be transferred through the Central Moneymarkets Office (CMO) system run by CRESTCo, with the physical paper immobilised. Certificates of deposit can already be issued in dematerialised form.

At the suggestion of MMLG, the Bank undertook a review of the main legal agreements used by members of the London Money Markets Association, including repo, secured lending and stock lending agreements, and sought views on whether any changes were needed, for example to achieve greater harmonisation of approach in the agreements. The general response suggested that most concerns about legal agreements had been addressed in the groups working on updating The Bond Market Association (TBMA)/International Securities Market Association (ISMA) Global Master Repurchase Agreement and the new Global Master Securities Lending Agreement (consolidating existing securities lending agreements). Indications from the market also suggested that there was no demand for new institutional arrangements for reviewing legal agreements and that it was sufficient to rely on existing legal and market fora, as well as on discussions in the MMLG and SLRC.

The Bank recently presented a report to MMLG and BBA on BBA Libor settlement rates, having established that both foreign and domestic banks in London were content that these rates were representative of market rates with normal dispersion patterns. At the July meeting of MMLG, members' views were sought on the then new overnight deposit facility introduced as part of the Bank's open market operations in order to make the operations symmetrical towards the close of the dealing day and reduce undue volatility and softness in the overnight interest rate. The deposit facility was explained in the box on page 281 of the Autumn 2001 *Quarterly Bulletin*.

More recently, following occasional comment in the market, the Bank asked MMLG if there was a consensus in favour of refining the calculation of the sterling overnight interbank average (SONIA) rate, which is used as the floating-rate leg for the purpose of SONIA swaps, now a widely used derivative. MMLG members agreed that the cut-off time for the daily calculations be extended from 3.30pm to 4.15pm, which change was implemented on 1 November.

Other topics debated recently by the Group have been the outlook for the global economy and the extent to which the United Kingdom would be influenced by any further weakness elsewhere. Regular domestic topics are the growth and use made of the various money markets in London, such as interbank deposits, certificates of deposit, commercial paper and repo.

SLRC

SLRC was established, initially as the Stock Borrowing and Lending Committee, in 1990. It provides a forum for the Bank, securities lending and repo practitioners and for the DMO, FSA, CRESTCo, BBA, APACS, London Stock Exchange, London Clearing House and others to discuss developments in sterling repo and lending markets. European Repo Council and US bond market representatives attend to discuss areas of common interest relating to structural, legal and other developments. It has also considered the work on the proposed EU Collateral Directive and the Hague Conference work on reducing legal risks associated with taking as collateral securities held through multiple tiers of intermediaries.

The Committee has recently debated the potential effect on stock lending and repo of the proposed Basel capital rules. The new regulatory framework now coming into force has been discussed and in particular how the provisions on market abuse in the Financial Services and Markets Act will apply. CRESTCo has briefed on the impact of delivery versus payment and London Clearing House on the progress of the Repoclear project, which will greatly facilitate netting.

SLRC is involved in providing good practice guidelines for the repo and stock lending markets. It produced the Gilt Repo and Equity Repo Codes and more recently a revised Stock Borrowing and Lending Code. Work is in progress on producing a UK annex to the latter code, and it is envisaged that other country-specific annexes

(1) See 'The London Foreign Exchange Joint Standing Committee: a review of 2000', *Quarterly Bulletin*, Summer 2001.

will be produced subsequently. A sub-group is working with legal advisers in obtaining and reviewing legal opinions on stock lending agreements in various jurisdictions.

The SLRC seeks to keep under review work on changes to the main legal agreements used in the markets; and was instrumental in producing the revised Gilts Annex in 2000 to accompany the revised TBMA/ISMA Global Master Repurchase Agreement (GMRA 2000).

Most recently the Committee considered the performance of the market following 11 September and the lessons arising. It also considered the concerns expressed by a few individuals about short selling and stock lending, noting that both activities were a normal and accepted part of developed financial markets, and already well recognised as such by the authorities. Short selling facilitates orderly settlement and the avoidance of fails, and helps to improve the liquidity of securities markets. These concerns have now subsided.

Minutes of the MMLG and SLRC meetings are posted on the markets area of the Bank's web site at http://www.bankofengland.co.uk/markets/index.htm

The formulation of monetary policy at the Bank of England

By Charles Bean, Executive Director for Monetary Analysis and Statistics and Chief Economist, and Nigel Jenkinson, Deputy Director for Monetary Analysis and Statistics.

This article describes the internal processes adopted by the Monetary Policy Committee and the Bank for the formulation of monetary policy. It covers the regular monthly policy round as well as the quarterly forecast round and the preparation of the accompanying Inflation Report.

Introduction

In May 1997, the Bank of England Monetary Policy Committee was created by the Government to set interest rates in the United Kingdom. The Committee was charged with the responsibility of maintaining price stability as a necessary foundation for the maintenance of sustainable economic growth with high levels of employment. The specific policy objective is reviewed annually by the Chancellor of the Exchequer. But to date, the Committee's goal has remained the pursuit of a target of 2½% for the annual rate of change in the retail price index excluding mortgage interest payments (RPIX). This target applies at all times. Subject to the primacy of maintaining price stability, the Committee must support the Government's economic policy, including its objectives for growth and employment.

The Committee has nine members: five with executive responsibilities in the Bank (the Governor, the two Deputy Governors, the two Executive Directors with responsibility for monetary policy analysis and monetary policy operations respectively) and four other members appointed by the Chancellor of the Exchequer. Each member of the Committee is individually accountable for his or her monetary policy judgment. Decisions are taken by a simple majority.(1)

This article explains how the Committee currently discharges its main responsibilities, and describes the key internal processes it has adopted. These processes have evolved over time, and the Committee and the Court of Directors of the Bank review them regularly to ensure that they work efficiently and that they conform to best international standards.

The first section of the article provides a very brief summary of the transmission mechanism of monetary policy, which provides the context for the processes adopted by the Committee. The second section focuses on the monthly policy round. The third covers the production of the quarterly forecast and the publication of the *Inflation Report*. Subsequent occasional articles in the *Bulletin* will explore particular aspects of the processes in more detail.

The transmission of monetary policy

In the standard description of the transmission mechanism found in most economics textbooks, monetary policy affects inflation by first impacting on the level of aggregate demand, as households and businesses respond to (say) an increase in interest rates by increasing their savings and reducing their investment. This in turn reduces tightness in labour and product markets and consequently exerts downward pressure on wage and price inflation.

In practice, the transmission mechanism is considerably more complex than this.(2) Changes in official interest rates may be passed on incompletely into retail lending or saving rates, while the response of long-term interest rates, which may be more relevant for investment decisions, will depend on how the policy action affects market participants' expectations of future short-term rates and inflation. These changes in official and market rates are also likely to affect the value of equity and

(1) There is a quorum of six of whom two must hold office as Governor or Deputy Governor of the Bank. The chair shall be taken by the Governor, or in his absence by the Deputy Governor with executive responsibility for monetary policy. The Chairman has a casting vote in the event of a tie.
(2) See 'The transmission mechanism of monetary policy', *Bank of England Quarterly Bulletin*, May 1999.

housing wealth, which, in turn, will affect spending. An increase in the official interest rate may well also lead to changes in the exchange rate, which will have both a direct effect on retail goods price inflation via import costs, as well as an indirect effect via aggregate demand through the impact on net trade. Moreover, changes in interest rates are likely to affect consumer and business expectations of future inflation and this in turn will affect their spending and pricing decisions.

So the transmission mechanism from monetary policy to inflation is complex. Moreover, the strength of the different channels is likely to vary over time—for instance, high levels of indebtedness will tend to make consumers and businesses more sensitive to changes in interest rates. And a key difficulty in the formulation of monetary policy is the fact that changes in interest rates invariably have their full impact on the economy only after a considerable time lag. Typically, the bulk of the effect on aggregate demand can take a year or even longer to come through, while the full effect on inflation can take up to a further year to manifest itself. These 'long and variable' lags mean that monetary policy can do very little to affect the current inflation rate, but must instead look at prospective inflation developments a year or more ahead. Thus an evaluation of medium-term inflation prospects must inevitably play a central role in the monetary policy process. Likewise, the monthly news on economic trends and financial market developments must be interpreted in terms of its likely impact on future, rather than just current, economic prospects.

The monthly policy round

The Committee reviews the setting of monetary policy monthly to a pre-announced schedule.(1) Each monthly cycle contains three elements:

- Briefing in advance of the policy meeting.
- The two-day policy meeting culminating in the interest rate decision, which is implemented immediately.
- Production and publication of the Minutes.

The timetable for a typical round is shown in Table A. The three components of the process are described below in turn.

Table A
Timetable for a typical monthly round

Briefing	
Throughout the month	Circulation of briefing material and analysis of data releases and market developments by staff.
Friday before policy meeting	Half-day pre-MPC briefing meeting.
Monday/Tuesday	Staff undertake follow-up work requested by the Committee.
Policy meeting	
Wednesday	Policy meeting commences early afternoon. Committee identifies the key issues and debates their implications for inflation prospects.
Thursday	Policy meeting concludes. Committee members provide their assessment of the appropriate policy stance and vote on the level of interest rates. Policy announcement at noon. Decision implemented immediately in a round of open market operations at 12:15 pm.
Minutes	
Week following policy meeting	Draft of the Minutes circulated and comments from Committee members incorporated.
Monday (second week after policy meeting)	Committee meets and signs off the Minutes.
Wednesday (two weeks after policy meeting)	Publication of the Minutes at 9.30 am.

Briefing the Committee

Information on economic and financial developments and prospects in the United Kingdom and overseas is released throughout the month. On most days new information becomes available, either from the release of economic data or from the publication of surveys of business trends or consumer sentiment. Financial market participants react to this information as well as to news on the performance of individual companies and to any perceived changes in the outlook for economic policy. That reaction is in itself economic news, which is also relevant to the Committee's decision.

Committee members monitor this economic information carefully. For all major UK data releases and surveys, Bank staff circulate a short analytical 'indicator' on the day of publication that summarises the new data and identifies and analyses the key trends. Releases of data on the major overseas economies are also circulated, with analytical comments added by Bank economists; a weekly summary of international economic developments is also provided. Financial market movements are monitored on a continuous basis by Bank staff, and a weekly note interpreting the main developments is provided to the Committee.

Economic data releases and movements in financial markets often raise issues that warrant additional

(1) Additional meetings are permitted under the 1998 Bank of England Act. The Governor convened a special meeting on 18 September 2001—the first occasion that this facility has been used.

analysis. For example, do recent movements in import prices suggest a change in the pricing behaviour of foreign suppliers to UK markets? To what extent might compositional changes in employment explain the surprising strength of manufacturing earnings growth? How close is the link between movements in capital goods prices and the outlook for investment growth? Why have bond yields moved? Such questions are addressed in a series of analytical notes and research papers that are circulated to the Committee each month. Some pieces of analysis and research are commissioned directly by the Committee; others are provided on the initiative of Bank economists. Sometimes these pieces of analysis may also be developed into articles in the research section of the *Bulletin*.

The Bank's twelve regional Agents, who each provide a summary of the latest economic trends as perceived by their business contacts over the previous month, are an important additional source of intelligence. The Bank's Agents have around 7,000 business contacts across the whole country, whom they visit on a regular basis. The attraction of this information is that it is timely and focused on the Committee's needs, while official data are often published with a considerable lag. Moreover, Committee members themselves have substantial direct contact with business through their regular programme of regional visits.

Finally, and in addition to the analysis and interpretation provided by the Bank's staff, Committee members also receive a wide range of briefing material from external sources. These include the press, economic research institutes, financial market and academic economists, international organisations, employer and trade union groups, and public sector bodies.

The centrepiece for the monthly Committee briefing is the so-called 'pre-MPC' meeting, which is typically held on the Friday morning preceding the regular policy meeting. The aim of the full morning meeting is to draw out all of the key economic news over the past month and put it into context.(1) All Committee members attend, which ensures that all are briefed to a high level and enter the policy meeting on an equal footing. The meeting format provides an opportunity for Committee members to ask questions and to probe further on the analysis of recent economic trends.

The pre-MPC meeting takes the form of a series of set-piece presentations by senior Bank staff. Each presentation covers a different aspect of the economic landscape, building up a comprehensive picture of the key economic and financial developments over the previous month. There is a considerable emphasis on graphical interpretation throughout the presentations to emphasise key points. The broad parameters of each presentation are set by the objective of providing a thorough assessment of the latest economic news. But the nature and form of each presentation varies considerably from month to month as speakers tailor their material to draw out the salient features. Copies of the presentations are subsequently circulated to each Committee member to provide the opportunity for additional scrutiny prior to the policy meeting itself. To assist Committee members in monitoring trends in particular data series, each member receives an accompanying standardised briefing pack of around 500 charts and tables in advance of the pre-MPC meeting.(2)

The agenda for a typical pre-MPC meeting is shown in Table B, together with a brief summary of the main areas covered. Presentations vary somewhat in length according to current importance of the topic, and there is flexibility to rearrange the timetable to include short

Table B
Agenda for a typical pre-MPC meeting

International environment	World output and trade, global oil and commodity price trends; economic and financial market developments in the United States, the euro area and Japan; monetary and interest rate developments overseas; emerging markets.
Monetary and financial conditions	UK money and credit aggregates and sectoral financing trends; retail and mortgage interest rates; interest rate expectations; equity prices; corporate bond spreads; exchange rates.
Demand and output	UK GDP; demand components (consumption, investment, public spending, inventories, trade); housing market; sectoral output trends; profits and labour income; business and household surveys.
Agents' special topic	Response to a short survey commissioned by the MPC at the previous policy meeting on a topic of particular interest.
Labour market	Employment, hours worked, unemployment and inactivity; vacancies; skill shortages; earnings and settlements; productivity and unit labour costs.
Prices	UK energy, petrol, and other commodity prices; producer prices (manufacturing and services); retail prices (recent trends and near-term outlook); price deflators.
Agents' overview	Business contacts' perspective on latest economic trends, drawing on some 600–700 discussions with contacts over the previous month. Key regional and sectoral differences are highlighted.
Financial market intelligence	Market participants' views on recent and prospective movements in exchange rates and interest rates.

(1) The briefing meeting used to take the best part of a full working day in the early years of the Committee. Following internal discussion and the external review of MPC procedures by Don Kohn of the Federal Reserve (see 'The Kohn Report on MPC procedures', *Quarterly Bulletin*, Spring 2001), the Committee agreed to concentrate the meeting into a half-day.
(2) The chartpack is updated before the policy meeting, with new data and survey information highlighted.

special presentations on particularly topical issues. For example, there is typically a presentation on fiscal trends in the meeting following the Budget and the Pre-Budget Report.(1) Moreover, once a quarter there is a short session synthesising the main news from the latest external forecasts of the UK economy.

The Agents' special topic is a key part of the pre-MPC meetings. At the end of the policy meeting each month, the Committee identifies an issue on which a sample of the Bank's regional Agents' business contacts can provide up-to-date insights and information that cannot be readily obtained from an alternative source. Examples of recent special topics include: the economic impact of the terrorist attacks in the United States; service sector prospects; export trends; and stock levels. In each case, 150–200 firms selected by the Agents provide responses to a short, focused, questionnaire, with the replies collated for the following pre-MPC meeting.

Prior to the policy meeting, the Committee receives written answers to questions raised at pre-MPC that could not be resolved in the meeting, as well as any new economic data or business or consumer surveys.(2)

The monthly MPC meeting

The timetable for the regular MPC meetings is announced well in advance to provide certainty to markets on the timing of potential interest rate changes.(3) Monthly meetings are prescribed in the Bank of England Act: the Committee generally meets on the Wednesday and Thursday following the first Monday of the month.(4) Meetings typically start at 3 pm on the Wednesday, concluding with a published policy announcement at noon on Thursday.

The first afternoon is devoted to a thorough review of the major economic news over the previous month and of the implications for the outlook. Following a short summary of key developments since pre-MPC by the Bank's Chief Economist, the discussion is commonly organised around selected issues under each of the major headings covered by the pre-MPC presentations. So a typical afternoon might begin with developments in the world economy, followed by issues arising from, in turn: monetary and financial data; UK demand and output trends; labour market developments; and cost and price pressures. To conclude the discussion, the Committee also examines whether there are any tactical issues that are relevant to the immediate policy decision.

The discussion on each broad area is led by the Deputy Governor responsible for monetary policy, but is free-flowing in format. Committee members participate actively, debating and weighing the economic news and analytical evidence.

The Treasury sends a representative to the policy meeting, to date either the Head of the Macroeconomic Policy and Prospects Directorate or the Permanent Secretary to the Treasury. This representative does not participate in the general discussion, but does from time to time brief the Committee on fiscal trends and on particular public policy issues, such as the impact of the foot-and-mouth epidemic or public sector pay developments, in order to facilitate effective policy coordination. There are also five Bank staff members present: a three-person Secretariat, which has the responsibility for taking the minutes of the meeting, and the Deputy Directors responsible for Monetary Analysis and Statistics and for Market Operations respectively. They do not take any part in the discussion, apart from providing occasional factual clarification, if requested by a Committee member.

Committee members reflect on the discussion overnight. On the Thursday morning, the Governor summarises the key points and invites Committee members to comment on or amend this resumé. The Governor then invites each member in turn to give their assessment of recent economic developments, and their view on the appropriate stance of monetary policy. The Deputy Governor responsible for monetary policy usually speaks first, while the Governor usually concludes. Other Committee members are called in random order.

Each member generally takes around ten minutes to present his or her assessment. At the end of each assessment there is an opportunity for other Committee

(1) Treasury staff provide briefing on the Budget and the pre-Budget Report in a separate meeting. The Committee has also received briefing from the Low Pay Commission on the introduction and subsequent uprating of the National Minimum Wage.
(2) There is generally limited UK economic data, as the pre-MPC and MPC meetings are deliberately scheduled in a relatively fallow period in the monthly and quarterly data rounds. However, additional information on business trends and on house price developments is typically published in this gap as well as data on the major overseas economies.
(3) Typically meetings are announced in the early autumn for the subsequent calendar year.
(4) During 2001, two of the scheduled meetings were held instead on Tuesday and Wednesday in order to allow the Governor to attend the General Council of the European Central Bank.

members to ask questions. Usually, members conclude by giving an indication of their preference for the decision on the level of interest rates, but sometimes individuals reserve their position until they have heard the arguments put forward by all Committee members. At the end of the discussion, members initially reserving their position signal their recommendation.

Once all Committee members have given their views, the Governor puts a motion that he expects will command a majority and calls for a vote. Members in a minority are then asked to confirm their preferred level of interest rates.

Finally, the Committee drafts the press statement to be published at 12 noon. On some occasions, typically when interest rates are changed or when the policy decision clearly differs from expectations held by financial market participants, the Committee issues a statement explaining the main reasons behind its action. On others, for example when the Committee has voted to maintain the previous level of interest rates and such a decision is widely expected, the press statement simply reports the interest rate decision.

Minutes

The Minutes are published at 9.30 am on the Wednesday two weeks after the start of the policy meeting. A first draft is circulated by the Secretariat early in the week following the policy meeting. After a round of written comments, the Minutes are agreed by the Committee at a meeting on the Monday prior to publication.

Comments in the Minutes are deliberately unattributed. The main reason for this is to promote a vigorous discussion and debate of the key economic issues at the meeting, encouraging members to promote, test, challenge, and reject arguments. If all comments were attributed in the Minutes, there is a risk that this would encourage members to prepare set-piece statements in advance of the meeting, and that there would be less interaction and intellectual engagement in the discussion.

The quarterly forecast

Given that monetary policy decisions depend crucially on a forward-looking view of inflation prospects, the MPC undertakes an inflation-forecasting exercise on a regular quarterly basis with the assistance of Bank staff. To aid it in this task, the Committee employs a 'suite' of quantitative models of the UK economy.(1) A central tool in the production of these forecasts is a relatively standard macroeconometric model (MM). Two general types of model supplement the MM. First, there are quantitative theoretical models designed to illuminate particular issues that are not captured in the MM. Examples include the consequences of technical progress concentrated in a particular sub-sector of the economy, and the role the banking sector may play in amplifying shocks at particular points in the economic cycle.(2) Second, there are purely data-based models which are used to provide alternative forecasts as a cross-check on the projections produced with the MM. The projections are also systematically compared with those produced by independent forecasters.

The suite of econometric models is an essential tool, but the quarterly projections are not simply the result of running either the MM, or the suite, mechanically. All economic models are highly imperfect reflections of the complex reality that is the UK economy and at best they represent an aid to thinking about the forces affecting economic activity and inflation. The MPC is acutely aware of these limitations. Moreover, a considerable amount of judgment is required to generate the projections. In making those judgments, the MPC draws on a range of additional sources of information about economic developments. The published projections thus represent the Committee's best collective judgment about economic prospects in the light of all the information available to it, not the mechanical output of a particular econometric model.

The Committee thus draws on a whole range of information in preparing its projections, just as it does during the regular monthly MPC round. However, the quarterly forecast round provides the opportunity for more in-depth discussion of key issues in an explicitly quantitative framework. This provides an opportunity to stand back and look afresh at economic news over a run of months and review whether the level of interest rates remains appropriate. So the forecast process can result in the Committee modifying its view of economic prospects, and thus of the appropriate setting of interest rates, even though there may have been little news about the economy since the previous monthly policy meeting.

(1) See *Economic models at the Bank of England (1999)*, and *Economic models at the Bank of England: September 2000 update*.
(2) See Hall, S, 'Credit channel effects in the monetary transmission mechanism', on pages 442–48.

An example of such a re-evaluation occurred during the August 2001 round. Although the news between the July and August MPC meetings did not obviously point to a change in policy, taking fresh stock of the domestic, and particularly global, economic trends over the year thus far led the Committee towards a slightly more pessimistic view of economic prospects. As a result the Committee opted to cut the official interest rate by a further 25 basis points at the August policy meeting. The fact that the quarterly forecast round may lead to such a re-evaluation means that the probability of the level of official interest rates being changed is slightly higher during *Inflation Report* months. Since the Bank was given operational independence in June 1997, there have been 18 MPC meetings associated with a quarterly forecast round and rates were changed at 10 of those meetings (56%). By contrast there were 37 MPC meetings outside a quarterly forecast round and rates were changed just 13 times (35%).

The forecast round

The structure of a typical forecast round is shown in Table C.(1) It would usually start as early as eight weeks before the date of the associated *Inflation Report* with the model review meeting. At this meeting between the Committee and the staff, the latter report back on any research work commissioned by the Committee at the conclusion of the previous forecast round. The Committee then agrees how the outcome of this research is to be taken on board in the economic models to be used in preparing the subsequent projections, as well as on any other factors that need to be resolved before the staff can begin preparing the projections.

Table C
Timetable for a typical quarterly forecast round

	Date relative to MPC meeting	Content
Model review meeting	Seven weeks before	Staff report on research commissioned at conclusion of previous forecast round. Committee agrees on how the results are to be taken on board during the forecast round.
Benchmark forecast meeting	Three weeks before	Staff provide updated projections incorporating latest data and identify key issues for subsequent discussion by the Committee.
Three key issues meetings	Two to three weeks before	Discussion of major issues requiring the Committee's judgment. Staff provide detailed background notes on each issue.
Two draft forecast meetings	One week before	Staff provide revised projections incorporating judgments made at the Key issues meeting. Committee takes a 'top down' view of the plausibility of the projections and the attendant risks.
Inflation Report published	One week after	Contains final projections, incorporating any policy changes made at the most recent policy meeting.

During the following four weeks, the members of the Bank's Conjunctural Analysis and Projections Division, in conjunction with other members of the staff of Monetary Analysis and other parts of the Bank, prepare a so-called 'benchmark forecast' with the aid of the MM. This benchmark forecast is an update of the projections from the previous round incorporating the latest data and any model changes and associated adjustments already agreed by the Committee. At the same time, staff in the International Economic Assessment Division prepare an updated forecast for the world economy, which is an essential input into the forecast for the domestic economy. The international forecast is prepared primarily with the aid of the National Institute of Economic and Social Research's global economic model (NiGEM), but also draws on other tools such as the IMF's MULTIMOD, as well as internal research.

While these benchmark forecasts are being prepared, Bank staff prepare a number of background papers analysing key issues on which they think the Committee will need to form a judgment in making its agreed projections. Recent examples of such key issues include: the possible impact on the economy of the terrorist attacks in the United States; the durability of the consumer boom; and past and future supply-side developments. The papers discuss the various possible views that the Committee might take, and bring together evidence that might help the Committee to form its judgment about the issue in question. Sometimes these background papers will draw on one or more of the other models in the suite.

About four weeks before the publication of the *Inflation Report*, and therefore three weeks before the associated MPC policy meeting, the staff present the benchmark forecasts for both the world and UK economies to the Committee. The staff also provide an analysis of the factors behind any change from the projections contained in the previous *Inflation Report*. On the basis of the material provided by the staff, the Committee agrees the key issues it wishes to discuss in more detail. These may be those key issues already identified by the staff, but may also include others identified by individual MPC members.

The Committee focuses its discussions on issues that satisfy two conditions. First, it must be one about which there might reasonably be a variety of views on the

(1) The forecast process has been modified over the past year in the light of internal discussion and the external review of MPC procedures by Don Kohn of the Federal Reserve (see 'The Kohn Report on MPC Procedures', *op cit*).

Committee. If an issue is a straightforward one about which there is likely to be little debate, then the Committee will not spend much time discussing it. Second, it must be an issue that is quantitatively important for the projections. The restriction to issues that are quantitatively significant helps to focus the Committee's discussion and was recommended in the report into MPC procedures carried out by Don Kohn of the US Federal Reserve.(1) Prior to that report, the Committee spent time discussing more peripheral issues, decisions on which are now delegated to the staff. A by-product of this change in procedure is that the projection is not necessarily 'fine-tuned' in all respects by the Committee.

The discussion of the key issues is spread across three separate meetings with the staff over a week or so, with each meeting typically lasting about three hours. On each issue, there may be a consensus across the Committee members about what judgment to take, but unresolved issues may sometimes be carried forward for further assessment. The risks around each individual judgment are also discussed, though sometimes the interconnection of judgments on different, but related, issues leads to the discussion of risks being postponed until later in the forecast round.

By the end of this sequence of key issues meetings, the Committee needs to have taken a collective view on each of the major judgments. In every case the Committee, under the guidance of the Governor, tries to reach a view that represents a position that most, if not all, of the Committee can subscribe to. But in the event of a significant disagreement on a particular issue, a vote may be taken with the majority viewpoint subsequently being embodied in the projections.

The staff then produce revised projections embodying the Committee's judgment on the key issues, as well as updating them for any new data that have been published since the benchmark forecast was prepared. The new projections, referred to as the draft forecast, are then presented to the Committee a few days before the associated MPC policy meeting. Up to this point, the forecasts have been built up on an issue-by-issue basis, that is to say primarily from the 'bottom up'. When the staff present the new draft forecast, they also provide systematic comparisons with forecasts produced using other models in the Bank's suite and with the forecasts of outside bodies. These comparisons help the Committee to take a 'top-down' perspective, and assess whether the overall shape of the forecast and the attendant risks is plausible. Sometimes, as a result of this process, the Committee asks for further adjustments to the projections, and the timetable makes provision for a further meeting if necessary.

At the final stage the Committee again tries to reach a broadly common position on the overall shape of the forecast, but if this is not possible then the majority judgment again prevails. The outcome of this process constitutes the 'best collective judgment' of the Committee. Of course, sometimes individual members may feel that the Committee's collective view is sufficiently far from their own to wish to note that explicitly when the projections are published. Table 6.B in Section 6 of the *Inflation Report* provides illustrative calibrations of the possible impact of taking alternative judgments on certain key assumptions that might be preferred by minority Committee members. And the range of differences among the Committee on the central projections for growth and inflation, and for the balance of risks, is summarised in Section 6 and the Overview.

For the associated MPC policy meeting, the staff provide near-final projections, based on the prevailing level of official interest rates. They also typically provide alternative projections based on other possible settings for official rates to help the Committee in its deliberations. It is important to emphasise, however, that there is no mechanical link between the central projection for inflation at the two-year horizon and monetary policy. The box on page 67 of the November 2000 *Inflation Report* explains why this is so. The discussion at the policy meeting may lead the Committee to wish to modify its projections further, and if so the timetable offers scope for some last-minute amendments before the *Inflation Report* goes to press.

The *Inflation Report*

The Bank is required by the 1998 Bank of England Act to publish a quarterly report on inflation prospects. The *Inflation Report* provides description and analysis of the current state of the economy, as well as describing the Committee's assessment of economic prospects as embodied in the projections. Together with the Minutes of the monthly policy meeting, the *Inflation Report* provides a vehicle for explaining the Committee's

(1) See 'The Kohn Report on MPC Procedures', *op cit.*

thinking and thus enhances the transparency of the monetary policy process.

The timetable for preparing the *Inflation Report* runs parallel to the quarterly forecast round described above with the drafting carried out by a small dedicated team. The typical *Inflation Report* starts with a short Overview, which is followed by four sections on: money and asset prices; demand and output; the labour market; and costs and prices. The focus of these sections is on reporting and interpreting recent and current developments. A fifth section briefly summarises monetary policy decisions during the past quarter, drawing on the already published Minutes. The final section describes the Committee's assessment of the economic outlook and the projections for growth and inflation.

Publication of the *Inflation Report* takes place one week after the corresponding policy meeting. While the Act only requires that it be published 'with the approval' of the Committee, in practice the texts of the Overview and Section 6 are agreed formally by the Committee at a special meeting, just as with the Minutes of the regular monthly policy meetings. Invariably there is also an associated press conference led by the Deputy Governor responsible for Monetary Policy, accompanied by the Chief Economist and the Director for Financial Market Operations. The full text of the *Report* is available on the Bank's web site at www.bankofengland.co.uk/inflationrep/index.html

Conclusions

This article has described the current processes underlying the monthly MPC meetings and the quarterly forecast round leading up to the publication of the *Inflation Report*. These processes have evolved considerably since the MPC was created and the Bank first started publishing an *Inflation Report* in 1993, and more particularly since the Bank was given operational independence over monetary policy in 1997. The processes will no doubt continue to evolve in the future as the Bank strives to find better ways of operating. However, we hope that this snapshot of present procedures provides a flavour of how the Bank and the MPC go about formulating monetary policy.

Credit channel effects in the monetary transmission mechanism

By Simon Hall of the Bank's International Finance Division.

Economic models often assume that the impact on the wider economy of changes in financial conditions can be summarised by a relatively limited range of financial variables, such as risk-free interest rates and long-term government bond rates. But changes in financial conditions can at times have important effects, which these variables do not necessarily indicate. This article reviews so-called 'credit channel' models, which consider how changes in the financial positions of lenders and borrowers can affect spending in the economy. These models provide a useful framework for analysing some potentially important interactions between the monetary stability and financial stability objectives of central banks. Subsequent articles in this Bulletin *use a specific 'credit channel' model to illustrate the potential for these interactions in the UK corporate and household sectors.*

Introduction

Economic models often assume for simplicity that the impact on the wider economy of changes in financial conditions can be summarised by a relatively limited set of financial variables, such as short-term risk-free interest rates and long-term government bond rates. However, financial developments can, at times, have important effects on the economy, which these variables would not necessarily indicate. For example, following the suspension of debt payments by Russia in the summer of 1998 and the emergence shortly afterwards of problems at the hedge fund Long Term Capital Management (LTCM), interest rates on corporate debt rose relative to rates on government debt, and a number of central banks reduced official interest rates to mitigate possible effects on spending in the wider economy. In practice, policy-makers take account of a wide range of information on conditions in financial markets to monitor, and potentially respond to, these sorts of developments.(1)

This article reviews so-called 'credit channel' models, which consider explicitly how changes in financial conditions can affect monetary policy. These models provide a useful framework for analysing and simulating some potential important interactions and feedbacks between the monetary stability and financial stability objectives of central banks. In particular, these models suggest that fluctuations over time in the financial position of lenders and borrowers—financial stability considerations—can influence how official interest rate changes affect spending and inflation—monetary stability considerations. The article concludes by reviewing a specific 'credit channel' model, developed by Bernanke, Gertler and Gilchrist (1999). The following two articles in this *Bulletin*(2) use this model to show how credit channel effects may affect spending in the UK corporate and household sectors.

The pecking order of finance

Much of mainstream macroeconomic theory is based on the simplifying assumption that financial structure—particularly the composition of companies' and households' balance sheets—is irrelevant to spending behaviour. Under this approach, borrowers are indifferent between alternative sources of finance. Firms face the same cost of financing investment spending whether they use retained internal funds, bank borrowing or equity finance. And consumers are indifferent between spending out of current income and borrowing against future income. In this world, spending decisions depend on factors such as tastes and production technologies, with financing responding passively in the background. In addition, policy-makers can monitor financial conditions by looking at a relatively narrow range of indicators, such as

(1) Developments in financial indicators are discussed in detail in the Bank's *Financial Stability Review* and in the 'Money and asset prices' section of the *Inflation Report*.
(2) See Hall, 'Financial effects on corporate investment in UK business cycles' on pages 449–59, and Aoki, Proudman and Vlieghe, 'Why house prices matter', on pages 460–68.

short-term risk-free interest rates and long-term bond rates.

This irrelevance of finance to other economic decisions relies on some strong assumptions. In particular, capital markets must function in a frictionless way. To do so, lenders and borrowers need to have the same information about the risks and returns to lending. Borrowers must face no search costs in finding suitable lenders and no transactions costs in writing financial contacts. And there must be no concerns about corporate control, and no tax advantages favouring particular sources of finance.

These assumptions do not generally hold in actual financial markets and borrowers do seem to care about their source of finance. In practice households and companies often spend out of their own income before borrowing. For example, retained internal funds accounted for about half of all new corporate financing in the 1990s.(1) In terms of external finance flows, equity issuance has grown to be the largest source of overall UK corporate external financing in recent years, partly as a result of a number of large equity-financed mergers and acquisitions. But for many individuals and smaller firms, bank loans remain the most important source of external finance. For example, in 1997–99 bank borrowing represented around 60% of all external finance for small firms.(2)

These preferences for retained incomes and/or bank borrowing mean that changes in the relative cost and/or the availability of these sources of finance can have distinct economic effects. The next section considers possible explanations for these preferences. The subsequent section shows how these in turn provide the economic foundations for macroeconomic credit channel models.

Preferences for internal finance and for bank loans

One reason why borrowers may prefer to use internal funds rather than external finance might be to avoid external scrutiny, and possible intervention, in their financial affairs. This may be particularly important for small companies concerned that resort to external finance might constrain their management control over their business, for example if loans include restrictive covenant clauses.(3)

In addition, borrowers often face search and transactions costs in obtaining external finance, which they do not incur when using internal funds. Banks may be the preferred source of external finance because they are able to save on these costs. Borrowers can often meet their total financing requirement from a single bank and through a unique loan contract rather than having to use a number of different sources.

Banks can also help to match the preferences of borrowers to those of lenders. These preferences often differ. Typically borrowers want to borrow long term with the option to default if they are unable to repay. By contrast, lenders (depositors in the case of banks) often prefer to hold their funds in an easily accessible and safe form. Without an intermediary, borrowers might need to refinance frequently, incurring search and transactions costs, and might have to pay substantial premia to lenders to cover default risk. An intermediary can use insurance principles to diversify risk across its entire loan book and can pool its short-term deposits to match the long-term maturity of its assets.

However, much of the economic literature on financial intermediation has focused on potential costs arising when lenders have imperfect information and are unable to observe and monitor perfectly the behaviour of borrowers. So-called 'agency costs' arise when lenders ('principals') are unable to ensure that borrowers ('agents') act in the lenders' best interests. For example, if lenders are unable to observe directly the riskiness of borrowers and raise the cost of borrowing to compensate for potential default costs, they may attract higher-risk borrowers. Another possibility is that lenders cannot monitor the use of borrowed funds. Contrary to the wishes of lenders, highly indebted borrowers with limited liability may have an incentive to take more risks, raising the probability of default. Finally, lenders might face substantial costs in observing the true ability of borrowers to repay loans on maturity. Borrowers may have an incentive to understate the success of investment projects financed with external funds unless they expect that lenders will check on the actual outcome. If borrowers obtain funds from many different lenders, there may be either duplication of

(1) For a review of the role of corporate cash flow in investment, see Hubbard (1997). For a discussion of the influences of liquidity constraints on consumption, see Deaton (1994).
(2) These figures are based on a survey of UK small and medium-sized enterprises by the ESRC Centre for Business Research, Cambridge; see Cosh and Hughes (2000).
(3) Jensen and Meckling (1976) discuss the relationship between financial structure and corporate control.

monitoring costs and/or free-riding or insufficient monitoring.

In the absence of financial intermediaries, these potential agency costs could raise external finance charges above levels that would prevail in capital markets that have no informational problems, and might even lead to certain borrowers being denied funds completely.(1) Banks may have a comparative advantage in alleviating some of these potential costs. They typically have a stock of experience in screening and monitoring loans.(2) They may also have specialist knowledge about borrowers' behaviour through their direct access to borrowers' deposit histories and/or ongoing customer relationships.(3) But although banks may be able to reduce agency costs below levels in markets for direct (unintermediated) finance, it is unlikely that they will be able to reduce them to the extent that bank borrowing is as cheap to the firm or household as using their own funds.

Overall it seems likely that external finance will generally be more costly than internal funds, particularly where there are substantial transactions or agency costs. Financial intermediaries may be able to save borrowers some of these costs. That may make bank finance an important source of funds for borrowers who are particularly subject to these costs. For large firms, the fixed transactions costs of direct finance may be small relative to their overall financing needs and informational costs may be reduced by established reputations, bond ratings and published annual reports. But direct finance may be much more costly for individuals, small firms or first-time borrowers. These borrowers are likely to be more dependent on the cost-saving functions of banks, allowing a wedge (or spread) to develop between the costs they face for bank and direct finance. So any shock to banks' ability to lend may affect the cost of finance for these borrowers.

Implications for finance supply

Lenders are likely to adopt a variety of strategies to deal with potential agency costs in credit markets. Measures to improve information flows are likely to be particularly important. In traded debt and equity markets, borrowers have an incentive to disseminate information about their prospects and cultivate reputations as reliable borrowers. Bank customers may not be able to provide such explicit information, or offer similar track records as careful borrowers. So banks will seek to develop their own expertise in assessing loan applications, for example by developing systems and models for evaluating and tracking risk.

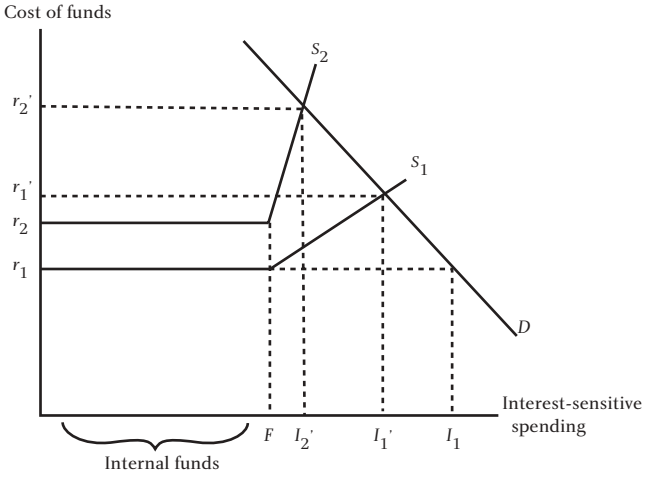
Lenders may also look for signals about the riskiness of loans to borrowers and the potential for agency costs to arise. Lenders might use borrowers' own contributions to their finance needs (such as retained income, posted collateral, or, for consumers, the deposit on a house) as a signal of borrowers' likely incentives to act diligently and report project outcomes truthfully. Borrowers who are willing and able to meet a substantial share of their overall finance needs or post a large amount of collateral to back loans may be considered as better credit risks since they have more to lose by failing to repay loans. By contrast, borrowers who make little contribution to their financing from their own resources may have less well-defined incentives to avoid risk-taking and to ensure that loans are repaid.

Figure 1 illustrates how these effects might affect the cost and availability of external funds to borrowers.(4) For financing needs up to F, a borrower can use internal finance at an opportunity cost of r_1 (which can be thought of as the sum of the economy-wide risk-free rate and a borrower-specific risk factor). If there were no informational problems, the borrower would demand $I_1 - F$ of external funds at an interest rate of r_1. But for financing needs beyond F, the lender is not prepared to supply funds at this rate due to the expected impact of agency costs on returns. External borrowing is charged at a premium. This premium increases as the share of total external finance rises, as higher borrowing linked with limited liability potentially increases incentives to take risks and raises expected default rates. As a result, lenders require more compensation and so S_1 is upward-sloping beyond F. The equilibrium level of external finance is $I_1' - F$ charged at r_1', with a premium (or spread) of $r_1' - r_1$. This external finance premium may also increase as interest rates rise as this may lower the present discounted value of collateral and/or reduce current cash flow, raising the probability of default. So if interest

(1) Models with quantitative credit rationing include Jaffee and Russell (1976) and Stiglitz and Weiss (1981).
(2) Diamond (1984) suggests that financial intermediaries may have a role in economising on these monitoring costs by acting like an auditor hired by the ultimate lenders.
(3) As suggested by Fama (1985) and Leland and Pyle (1977).
(4) This example is based on Oliner and Rudebusch (1996).

rates rise to r_2, the finance supply schedule may become S_2, which is steeper than S_1.(1)

Figure 1
Financial conditions and the marginal cost of finance



This simple example illustrates potential links between borrower financial positions, agency costs and the cost of external finance. These links imply that firms that are prepared to post more 'collateral' per unit of external finance or to finance a greater proportion of an investment project from internal cash flow are likely to face a lower external finance premium. These mechanisms open up potential channels for the cost and/or the availability of finance to depend on borrower-specific financial positions.

Macroeconomic models of the credit channel

The credit channel literature discusses two distinct (but complementary) ways that financial market imperfections might affect the wider economy. The *bank lending channel* focuses on the impact of shocks to banks' balance sheets on the cost and/or availability of finance for borrowers who depend on these banks as lenders. Under the *balance sheet channel* it is the balance sheet of borrowers, rather than lenders, which matters for finance costs.

Bank lending channel

The bank lending channel describes how monetary (or other) shocks to banks' balance sheets might affect the cost of finance for certain borrowers over and above the standard impact on finance costs of higher official interest rates.(2) This channel may be potentially significant if increases in interest rates lead to a reduction in the supply of bank loans and if these loans are imperfect substitutes for other forms of finance.

Following a monetary tightening, banks may find that their ability to obtain external funds to fund lending, such as deposits (or traded liabilities like certificates of deposit), declines. This might happen, for example, if banks face the same restrictions on raising external finance as other firms, as described above. If banks cannot adjust their balance sheets simply by reducing holdings of short-term assets (such as government debt), this might restrict their ability to extend new loans.

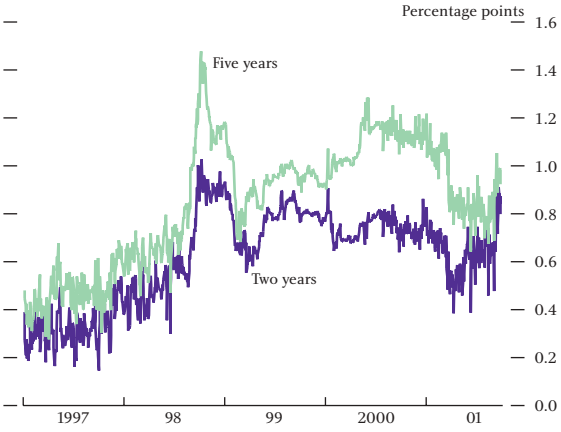
Highly creditworthy borrowers—such as large firms—may be able to substitute readily other forms of finance for bank funds. For them the change in finance costs following the monetary tightening is the same regardless of their source of finance, and can be summarised by changes in risk-free interest rates. But other borrowers—such as small firms and individuals—may be unable to switch readily from banks to alternative finance sources. It is possible that the cost of bank loans for these borrowers may overshoot changes in market interest rates as they compete for a smaller pool of bank loans.(3) This may be associated with a rise in the actual price or spread demanded on the loan and/or a tightening in non-price conditions (such as covenants or collateral requirements). In addition, the quantity of credit may become (more) rationed, although this is not a strictly necessary component of the bank lending channel.

The resultant tightening in loan supply under the bank lending channel is often termed a '*credit crunch*'. What matters in a 'credit crunch' is that changes in official interest rates no longer summarise changes in the cost of finance for certain borrowers. The credit channel effect here can be thought of as the additional adjustment in spending arising from the differential movement of bank loan rates to official rates (or from changes in the degree of quantitative loan rationing). For borrowers affected by a 'credit crunch', loan spreads and quantities of lending will be important indicators of the cost and/or availability of finance.

(1) The supply curve may eventually become vertical as the impact on returns of incentive and sorting effects becomes unacceptable to lenders. This is the limit case of quantity rationing suggested by Stiglitz and Weiss (1981).
(2) There is no reason here in principle to focus exclusively on the impact on finance supply of shocks to balance sheets of deposit-taking institutions. If shocks inhibit the ability of any finance supplier whose funds are imperfectly substitutable for some class of borrowers, then there could be credit effects.
(3) Of course, it is possible that lenders may be concerned that higher loan rates could damage the quality of their existing loan portfolios by raising default rates. In this case, loan rates for current borrowers may be sticky, with price or quantitative restrictions on loans more apparent for new borrowers.

Non-monetary shocks might also lead to changes in bank loan supply. Lending capacity might be reduced by shocks to the financial health of the banking sector. For example, loan losses or a fall in bank equity prices might reduce bank capital. Alternatively, changes in prudential regulation might reduce bank capital adequacy and banks may not be able easily to replenish capital—as in Figure 1 above, they too may face an upward-sloping supply curve for new external finance. When bank lending (and the activity of bank-dependent borrowers) is constrained by the availability of economic or regulatory capital, this is often termed a '*capital crunch*'. Finally, banks' (or other lenders') risk appetites and their desire for liquidity on their balance sheet may occasionally change markedly—bank willingness (rather than capacity) to lend to borrowers of unchanged risk falls. This was evident in the autumn of 1998 following the Russian debt default and the problems at the hedge fund LTCM when markets' perception of risk appeared to change sharply, leading to an increased demand for liquidity and a marked widening in credit spreads (see Chart 1)—a '*market credit crunch*'.

Chart 1
Sterling A-rated corporate bond spreads(a)



(a) Derived from Bloomberg par yields for A-rated sterling-denominated corporate bonds and UK government bond par yields.

Sporadic or continuous?

Critics of the bank lending channel have argued that monetary shocks are unlikely to have a significant incremental impact on bank loan supply in countries with well-functioning financial systems. They point to the easy access banks have to sources of liquidity and the absence in general of binding regulatory constraints on bank reserves or capital. A credit or capital crunch is perhaps more likely to matter in less developed financial markets when a substantial proportion of loans is intermediated by small and/or poorly capitalised banks with limited buffer stocks of liquid securities. In addition, bank lending channel effects may arise from episodic non-monetary shocks rather than be a continuous feature of the monetary transmission mechanism. For example, experience suggests that bank lending channel effects have been important following changes in regulatory requirements (as in Japan following the introduction of Basle capital requirements); when substantial loan losses (as in the Latin American lending crisis in the 1980s) have reduced or eliminated banks' buffers of excess capital over regulatory requirements; or when there has been a large shift in actual or perceived default risk on bank portfolios (for example, following the Russian debt default).(1) Even if these effects have been infrequent, this potential for substantial spillovers from financial instability to the real economy highlights the need for careful monitoring of banking system health and lending behaviour.

The balance sheet channel

As noted earlier, although banks can reduce some of the costs involved in raising external finance, external funds tend to be more expensive than internal funds, reflecting an external finance premium. As outlined above, informational costs in the supply of external finance, and this premium, may vary with borrower financial positions. The *balance sheet channel* describes how the financial health of borrowers can affect finance supply and cause and/or amplify shocks to economy-wide spending.(2)

The balance sheet channel operates by generating changes in agency costs and the external finance premium as borrower financial positions change in response to economic shocks. In practice there are a number of ways of modelling interactions between financial positions and finance costs.(3) Here we focus on a representative approach adopted by Bernanke, Gertler and Gilchrist (BGG) (1999). This model forms the basis of the analyses of potential balance sheet credit channel effects in the UK corporate and household sectors in the following two articles in this *Bulletin*.

(1) Of course, these shocks may or may not ultimately derive indirectly from monetary policy impulses. For example, increases in official interest rates might weaken bank balance sheets by reducing bank equity prices or by raising the risk associated with bank loan portfolios.
(2) The distinction between the bank lending and balance sheet channels is in some ways artificial. In principle, the balance sheet channel can affect any recipient of external finance, be it final borrowers or banks.
(3) Examples include Kiyotaki and Moore (1997) and Carlstrom and Fuerst (1997).

The BGG financial accelerator model is, in most respects, a standard macroeconomic model. However, the model differs by including an imperfect information problem in the supply of external finance to the corporate sector.(1) Specifically, BGG assume that lenders face costs in observing the outcome of borrowers' investment projects. As a result, lenders charge borrowers a premium to cover their expected monitoring costs. A key innovation in the model is that corporate net worth—firms' financial positions—determines this external finance premium. In standard models, without financial accelerator effects, firms would increase their capital stock until the expected return on capital was equal to the firm's own opportunity cost of funds. However, in this model when a substantial portion of corporate investment is funded internally (ie borrowing and capital gearing are low), the external finance premium is small (tending to zero for investment that is fully internally funded or collateralised), raising investment. When corporate investment is mainly funded through external borrowing (ie capital gearing is high), the premium is high, depressing investment. The intuition for this is that corporate net worth represents borrowers' own stake in an investment project and serves as a signal to lenders of borrowers' likely incentive to default on loans. For lenders to offer funds to borrowers they require a premium sufficient to offset the greater likelihood that the borrower will default (and the lender will incur default/monitoring costs) when the borrower's stake in a project is low.

This added element provides for greater amplitude and persistence in the economy's response to shocks, and for inter-relationships between spending behaviour and financial positions that are not available in standard models. For example, the model offers two key additional monetary transmission mechanisms. First, there is a role for corporate cash flow. An unexpected rise in interest rates (or a fall in productivity) reduces output, lowers cash flow and raises the proportion of a given investment project that must be financed from external funds. This increases expected agency costs and the external finance premium, reducing investment and subsequent output, revenue and cash flow. Second, asset prices play an active role in transmitting shocks through their impact on the value of collateral. An unanticipated monetary tightening reduces the demand for physical capital and lowers asset prices. This reduces the value of collateral available to back loans, raises the external finance premium and reduces current investment and subsequent output and cash flow. And expectations of future declines in cash flow and investment exacerbate current movements in (forward-looking) asset prices.

In addition, the initial financial position of the corporate sector becomes critical in determining the response of corporate net worth, the cost of finance and investment to economic shocks. For a highly-geared corporate sector, a shock to project returns will have a far more marked impact on internal cash flow (and external finance premia) than in a corporate sector with low levels of borrowing. The BGG model therefore provides theoretical grounding for the intuition that more heavily indebted economies tend to be more vulnerable to adverse shocks. It also suggests that the strength of credit effects may vary over time as financial positions fluctuate over the course of the business cycle.

Conclusions

This article has reviewed potential theoretical explanations for two features of finance provision—the apparent preference by many borrowers to finance spending using own funds, and for many of those who do borrow, to rely on bank rather than capital market finance. These so-called 'credit channel' models help to explain why borrowers' financial positions might affect their spending, and why shocks to banks can have a marked impact on borrowers that are particularly dependent on bank finance. As such, these models illustrate some important interactions between the monetary and financial stability objectives of central banks and highlight the need for policy-makers to monitor a wide range of financial indicators.

In practice, banking system distress and significant disruptions to bank loan supply are relatively rare in developed banking sectors, as in the United Kingdom. As such, bank lending credit channel effects may be relatively infrequent. Balance sheet credit channel effects probably play a more continuous role in the economy, but they too will likely vary in strength over time, reflecting structural changes in the financial system and cyclical fluctuations in borrower financial health. This article focuses on a representative model of balance sheet effects by Bernanke, Gertler and Gilchrist (1999). The following two articles in this *Bulletin* use the framework of this model to show how credit channel effects may affect spending in the UK corporate and household sectors.

(1) In the article by Aoki *et al* (see pages 460–68), this information problem in the supply of finance is analysed for the household sector.

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Financial effects on corporate investment in UK business cycles

By Simon Hall of the Bank's International Finance Division.

The slowdown in corporate investment in the early 1990s recession was more marked than in the equivalent period of the 1980s downturn. This article reviews corporate sector investment and financial health in these periods. It then uses a 'credit channel' model to consider the potential for interactions between corporate financial positions and investment spending. Simulations of the model suggest that financial effects may vary in strength over time. In particular, the model provides some support for the view that financial effects might have been relatively more important in the early 1990s recession, given the greater dependence of the corporate sector at that time on external borrowing.

Introduction

The depth and persistence of the UK recession of the early 1990s surprised many economic forecasters, particularly the prolonged weakness of corporate investment growth. Views on the causes of sluggish investment in this period vary. However a number of analyses have suggested a potential role for financial factors, noting the coincidence of weaker corporate investment with a marked financial retrenchment by the sector.(1)(2)

This article focuses on the potential role of corporate financial health in investment behaviour in the early 1990s.(3) It does so by examining whether the theoretical predictions of a macroeconomic model explicitly designed to allow for interactions between real and financial factors are consistent with features of observed behaviour. The model used is the 'financial accelerator model' developed by Bernanke, Gertler and Gilchrist (BGG) (1999), described in the previous article in this *Bulletin*.

Recessions past

The depth and length of the UK recession of the early 1990s surprised many economists, particularly the sharp fall in corporate fixed investment. Several commentators have suggested that corporate indebtedness may have played a role. This section considers this possibility by reviewing historical evidence on investment and corporate financial conditions in recent recessions—with a particular focus on comparing the early 1990s downturn with the recession of the early 1980s.(4)

Spending compared

Table A reports changes in key components of gross domestic expenditure in recent major UK recessions. The table shows that GDP fell by a comparable amount in the downswing phases of the 1980s and 1990s recessions. But the contributions to each downturn varied markedly. Perhaps most notably, consumption fell as the economy entered recession in the early 1990s but supported the economy in the downturn phase of the early 1980s recession.

Table A
Real GDP components in recessions

Percentage change over nine quarters leading up to trough (a)

Trough	1975 Q3	1981 Q1	1992 Q2
Total GDP	-3.1	-2.6	-2.2
Consumption	-1.6	3.7	-1.4
Government consumption	7.7	2.3	4.6
Gross domestic fixed capital formation	-3.1	-10.0	-10.8
of which, business investment	*9.9*	*-6.7*	*-12.3*
Exports	2.7	-3.2	7.8
Imports	-2.9	-2.0	4.4

Source: Office for National Statistics (ONS).

(a) The average interval between peaks and troughs in coincident indicators in the three most recent major recessions (see Moore (1993)).

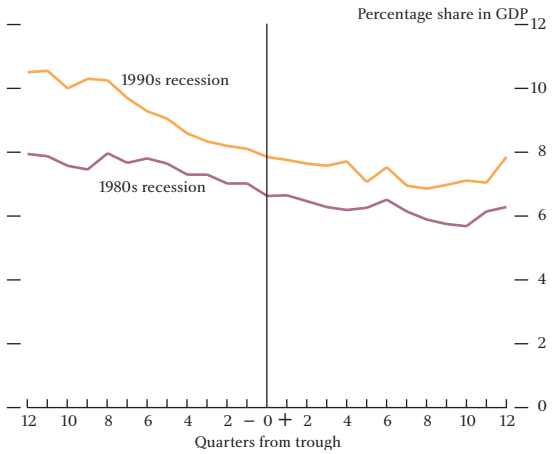
(1) References to the 'corporate sector' relate to non-financial companies only.
(2) Studies of investment behaviour over this period include Young (1993), Smith *et al* (1994) and Whitaker (1998).
(3) This is analysed in more detail in Hall (2001).
(4) This paper focuses on developments in the non-financial corporate sector. However, interactions between household sector financial conditions and spending may have been at least as important in the early 1990s. Potential household sector credit effects are considered in the article by Aoki, Proudman and Vlieghe on pages 460–68 of this *Bulletin*.

The profile of aggregate investment was broadly similar in the 1980s and 1990s downturns, and considerably weaker than in the 1970s recession. But these aggregate data hide sharp discrepancies in the behaviour of public and private investment. Public sector investment was relatively weak during the 1980s downturn, particularly following the 1981 Budget. By contrast, Budgets in the early 1990s tended to raise public sector investment spending. But business investment growth was considerably weaker in the early 1990s than in the 1970s and 1980s recessions: from a relatively high level at the end of the 1980s, business investment fell by around 12% in the period leading up to the output trough in 1992 Q2 and continued to fall until late 1993. In the equivalent period of the 1980s downswing, business investment fell by roughly half as much. Put another way, a fall in business investment accounted for about two-thirds of the GDP downturn in the 1990s recession compared with only about a quarter in the 1980s slowdown.

One possibility is that the sharp fall in investment in the early 1990s reflected particularly weak output growth or a high cost of capital—standard factors used to explain investment in economic models. But, as noted above, the change in GDP was broadly similar across the 1980s and 1990s recessions. Chart 1 shows that although investment by non-financial companies was higher as a share of output entering the early 1990s downturn, it fell more sharply relative to GDP than in the equivalent period of the previous recession.(1) It is difficult to measure the real cost of finance precisely. Chart 2 presents a simple proxy measure based on the ratio of companies' current earnings relative to the market value of their net financial liabilities.(2) According to this measure, the cost of finance was lower in the early 1990s recession than in the 1980s recession. As such, finance costs do not appear to help explain weaker investment in the most recent recession.

Given the apparent inability of GDP and the cost of finance to account fully for differences in investment behaviour in the early 1990s, we might expect economic models based largely on these explanatory variables to overpredict investment at that time. There is some evidence that a number of economic models failed to predict fully the slowdown in investment growth. Table B suggests that, on average, medium-term projections for aggregate investment made in January 1990 by

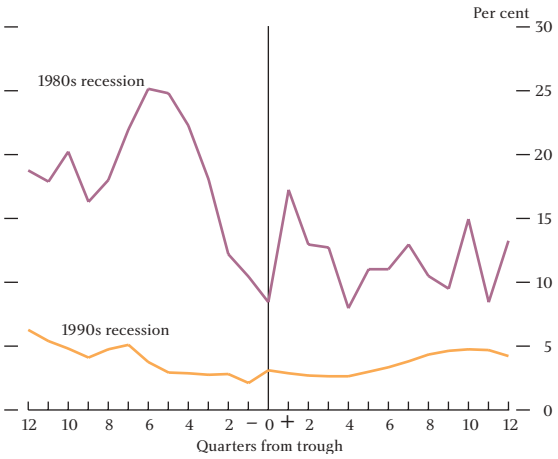
Chart 1
Corporate investment(a)



Sources: ONS and Bank of England.

(a) Industrial and commercial companies (ICCs).

Chart 2
Cost of finance(a)



Sources: ONS and Bank of England.

(a) Defined as ICCs' post-tax profits divided by the market value of their net financial liabilities.

Table B
Forecasts and outturns for gross fixed investment

Average of forecasts made in January 1990; per cent

	1989	1990	1991	1992	1993
Average forecast					
Annual growth in investment	5.7	0.7	1.2	3.5	3.3
Implied investment/GDP ratio	18.6	18.5	18.3	18.4	18.5
Outturns					
Annual growth in investment	5.9	-2.3	-8.7	-0.7	0.8
Actual investment/GDP ratio	18.6	18.1	16.8	16.6	16.4

Source: HM Treasury (1990).

HM Treasury's Panel of Independent Forecasters substantially overstated subsequent investment growth in the early 1990s. And total investment as a share of GDP fell more sharply over this period than the ratio implied by forecasts of investment and GDP, suggesting that this may not simply have reflected errors in GDP forecasts.

(1) The higher investment share in the late 1980s may be due partly to privatisations. Changes in the composition of the corporate private sector are likely to have affected most corporate sector indicators over the period of this study.
(2) This measure is discussed in Fleming *et al* (1976).

Financial conditions compared[1]

If these standard determinants of investment cannot fully explain behaviour over this period, can financial factors account for the unusual weakness of investment in the early 1990s compared with the early 1980s?

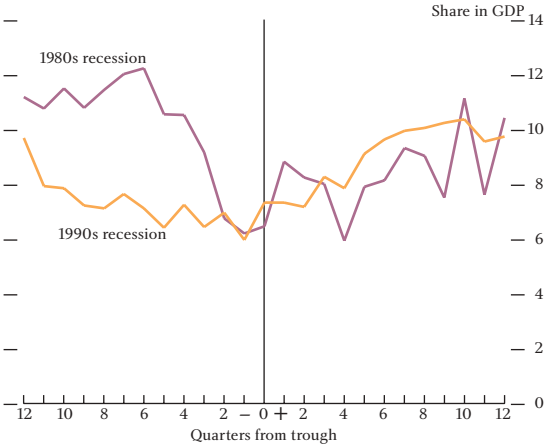
The initial financial position of the corporate sector was considerably less favourable at the start of the 1990s recession than prior to the previous downturn.[2] Several indicators suggest that corporate cash flow was weaker:

- Despite higher corporate profitability, large dividend payments in the late 1980s and early 1990s meant that companies' undistributed corporate income as a share of GDP was relatively lower (see Chart 3).

- Interest payments were a greater burden on corporate income entering the 1990s recession. Income gearing (interest payments as a share of post-tax income) was almost twice as high at the onset of the 1990s recession as at the previous downturn (see Chart 4), reflecting both weaker income and greater indebtedness (see Chart 5).

- As a result, companies were far more dependent on externally supplied finance in the 1990s recession. The financial deficit was around 4% of GDP entering the 1990s downturn compared with a *surplus* of about 1% at the start of the 1980s recession (see Chart 6).

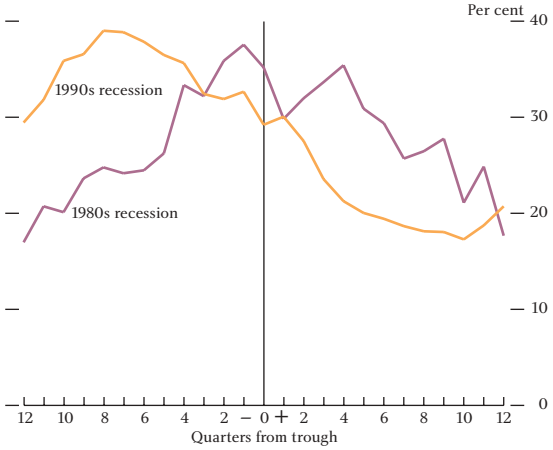
Chart 3
Corporate undistributed income[a]



Sources: ONS and Bank of England.

(a) ICCs.

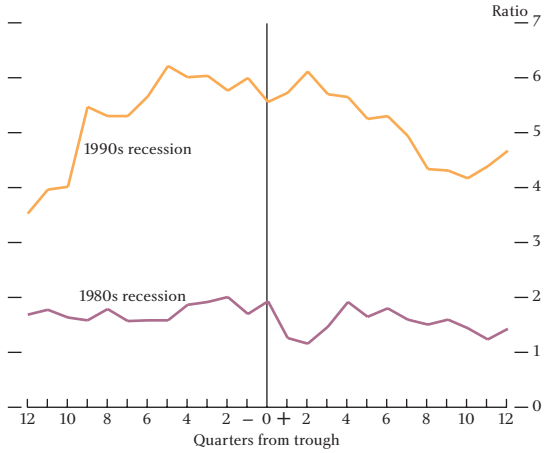
Chart 4
Corporate income gearing[a]



Sources: ONS and Bank of England.

(a) ICCs pre-1987; private non-financial corporations (PNFCs) post-1987.

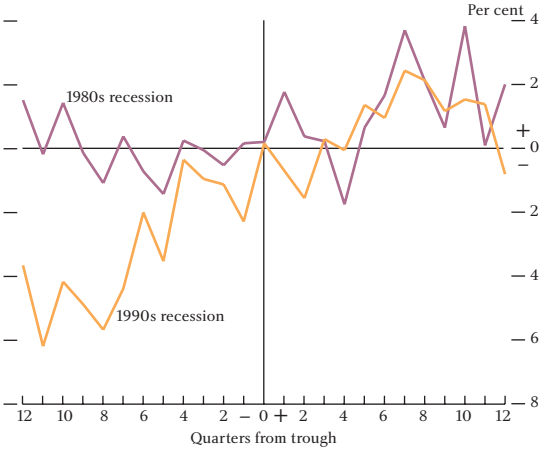
Chart 5
Corporate debt: income ratio[a]



Sources: ONS and Bank of England.

(a) ICCs pre-1987; PNFCs post-1987.

Chart 6
Corporate financial balance[a]



Sources: ONS and Bank of England.

(a) ICCs.

(1) Recent developments in corporate financial positions are discussed in the box on pages 6–7 of the August 2001 *Inflation Report* and in the *Financial Stability Review*, Issue 10, Bank of England, June 2001, pages 74–82. For a discussion of trends in corporate and personal sector financial health in recent recessions, see Chrystal and Hoggarth (1998).

(2) Note that fully consistent data for the financial position of the non-financial corporate sector are not available for the full period considered in this study.

Corporate balance sheet positions were also less favourable entering the 1990s downturn and weakened substantially as capital markets revised their expectations about future profitability:

- Confidence about future profitability and greater credit availability due to financial liberalisation contributed to a substantial build-up in corporate debt during the 1980s, heightening the sensitivity of the sector to interest rate changes (see Chart 5).
- Capital gearing, as measured by debt relative to physical capital, rose in the downswing of the 1990s recession to about four times its level in the 1980s downturn (see Chart 7).
- Capital gearing, as measured by debt relative to financial market valuations of corporate assets (including non-physical assets), started the 1990s downswing at similar levels to the equivalent period of the previous downturn but rose sharply as markets revised their valuations of corporate assets (see Chart 8).
- The persistent weakness of asset prices was an important distinguishing feature of the 1990s recession. Chart 9 shows the sustained weakness in real equity prices and falls in real house and commercial property prices in the early 1990s. As well as indicating marked revaluations of the present value of future asset returns, these asset price reductions lowered collateral available to back corporate borrowing.

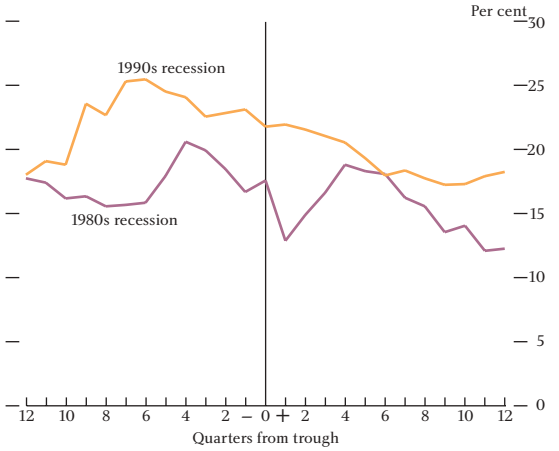
Overall, these *ex ante* indicators suggest considerably higher corporate financial fragility at the onset of the 1990s recession than at the start of the previous downturn. *Ex post* evidence subsequently pointed to greater corporate distress in the 1990s recession in response to the unanticipated weakening in economic prospects at that time. For example, default rates reached unprecedented levels, evident in sharp rises in the rate of corporate insolvencies (see Chart 10).

Chart 7
Corporate debt as a share of physical assets(a)

Sources: ONS and Bank of England.

(a) ICCs pre-1987; PNFCs post-1987.

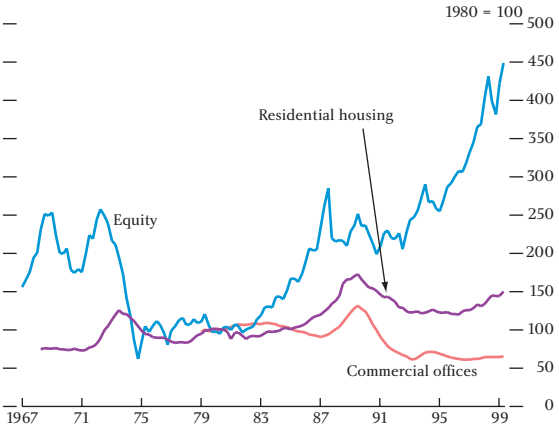
Chart 8
Corporate debt as a share of financial valuations of assets(a)



Sources: ONS and Bank of England.

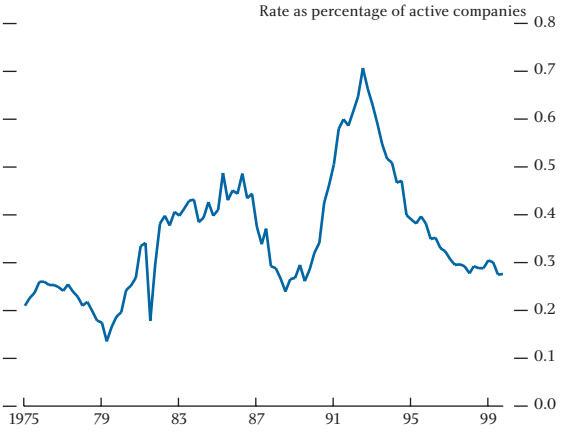
(a) ICCs pre-1987; PNFCs post-1987.

Chart 9
Real asset prices



Sources: ONS and Bank of England.

Chart 10
Insolvency rate



Sources: ONS and Bank of England.

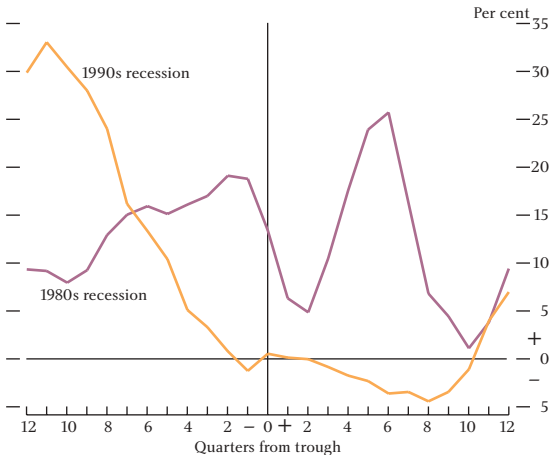
Finance demand and supply

One interpretation of the sustained weakness of investment in the early 1990s is that the unexpected deterioration in economic prospects led to a sharp fall in companies' desired levels of capital and indebtedness. Rather than invest, companies may have used internal funds to repay debt and reduce their potential sensitivity to future shocks. On their own, changed expectations about the returns from existing capital and a desire to strengthen their balance sheet positions should not have inhibited companies from borrowing to fund profitable new investment opportunities. But greater uncertainty about future demand (see Chart 12 below) may have raised risk premia embedded in corporate hurdle rates for investment.

It is also possible that the weakness of investment in the early 1990s might have partly reflected a tightening in the supply of finance. The willingness of lenders to satisfy corporate finance demand will depend on their assessment of the likely returns from lending. In general lenders will supply funds if loan rates exceed the cost of providing funds, including expected default costs. Lenders may assess default probabilities using *ex ante* indicators of borrower financial risk and/or *ex post* evidence on default. As noted above, these indicators of credit risk tended to be less favourable in the early 1990s downturn than in the previous recession and lenders may have adjusted rates on new loans accordingly. By itself, rising loan rates relative to risk-free rates in response to greater risk in lending does not represent a tightening in supply for equivalent-risk companies. But is there any evidence that loan rates or other terms of provision of funds rose by more than needed to offset higher credit risk? Did lenders stop offering funds to certain classes of borrower altogether? And did this inhibit new investment?

Over the course of the early 1990s recession, there was certainly a substantial weakening in flows of external finance to the corporate sector. The corporate financial balance, which measures total net flows of finance into the sector, moved from a large deficit to a surplus (see Chart 5). And within total financial flows, bank lending growth fell sharply, with firms on average repaying bank debt in the early years of the recovery (see Chart 11).(1)

Chart 11
Corporate bank lending growth(a)

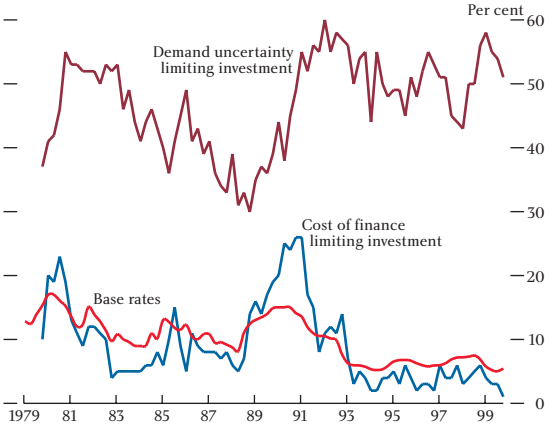


Source: Bank of England.

(a) ICCs.

In practice, however, it is extremely hard to judge whether lower volumes of finance reflected weaker corporate demand for funds or tighter finance supply.(2) We have little direct evidence on the actual loan rates and risk characteristics of lending to the corporate sector during the 1990s recession. One potential aggregate indicator is the CBI Industrial Trends survey, which showed a much sharper rise in the proportion of manufacturing respondents citing the cost of finance as a constraint on capital expenditure in the early 1990s than in the early 1980s (see Chart 12). And, importantly, this rise was greater than can be explained by the normal relationship between base rates and responses to this question, although this might just reflect deteriorating credit quality (evident in higher

Chart 12
CBI cost of finance



Sources: CBI and ONS.

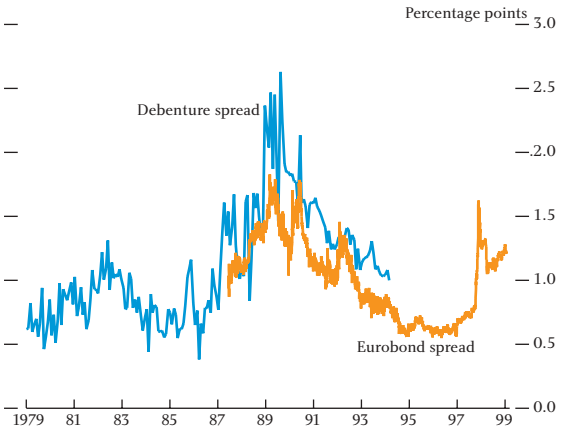
(1) Espezel and Mizen (2000) note that corporate non-bank external finance liabilities increased over this period. Kohler *et al* (2000) point out that higher non-bank finance might be consistent with a trade credit channel interpretation, with quoted firms 'helping out' those firms without direct access to capital markets.

(2) For example, evidence submitted by the Bank of England to a Treasury and Civil Service Committee in March 1991 concluded: 'There is little evidence that (lenders) have tightened standards beyond what is required, given the change in their customers' position and prospects'; see Bank of England (1991). Hickok and Osler (1994) found that 'slowing credit demand due to cyclical factors appears to explain some but not all of the recent slowdown in British credit growth (in the early 1990s)'.

insolvencies in the early 1990s) rather than a tightening in credit supply for equivalent-risk loans.

Corporate bonds offer an alternative source of finance for large borrowers. To the extent that prices of credit-rated corporate bonds reflect an assessment of average default risk over the duration of the bond, short-term shifts in bond spreads might help to identify whether finance costs shifted because of changing risk or due to tighter credit supply. Chart 13 shows the spread between bond rates for A-rated corporates and default-risk-free yields on government debt of comparable maturity. These spreads widened significantly more at the start of the 1990s than in the early 1980s downturn. It may well be that this widening in spreads simply reflected an equal shift in the risk of A-rated companies from the perspective of both borrowers and lenders (ie there was no shift in the external finance premium). However, it is also consistent with a tightening in the terms of finance supply and a rise in the external finance premium. That might have added to the demand-side factors weakening corporate investment.

Chart 13
Corporate bond spreads(a)



Sources: Bloomberg and Bank of England.

(a) Proxy measures defined as yields on debentures or corporate eurobonds minus approximate equivalent-maturity yield on risk-free government debt. Corporate bond yields are derived as a composite of investment-grade company debt.

Modelling financial effects

Many theoretical models of aggregate investment make the simplifying assumption that corporate financial conditions have no effect on investment behaviour. However, growing empirical evidence, particularly in the United States, supports a role for corporate financial health in determining investment.(1) In addition, a recent theoretical macroeconomic model by Bernanke, Gertler and Gilchrist (1999)(2) explicitly considers ways in which corporate financial health and investment may interact when capital markets operate with imperfect information about the risks involved in finance provision. In this model, lenders are unable costlessly to observe and assess companies' ability to repay borrowed funds. So borrowed funds tend to be a more costly source of finance for investment than retained profits. BGG show that this cost differential—the 'external finance premium'—might vary with borrower financial health. Specifically, when borrowers can finance much of their investment using retained profits, the cost of finance will be low, encouraging investment. And when companies are heavily dependent on external financing, finance costs will tend to be higher, discouraging investment. This added financial effect can amplify and prolong the impact of shocks to the economy.

Historic relationships between financial variables and investment

Are the theoretical predictions of the BGG model consistent with actual developments in investment and corporate financial health in recent recessions? A starting-point for assessing the BGG model's theoretical predictions is to consider average historic relationships between these variables in the UK economy. Chart 14 shows how business investment, corporate external funding, real GDP, real equity prices and corporate bond spreads have responded on average to unexpected interest rate rises.(3) The chart suggests that on average companies' total net flow of external funds, as measured by the financial deficit, has fallen after monetary tightenings. As might be expected, output and particularly investment have declined. And equity prices have weakened, perhaps as markets have anticipated lower future yields. Finally, there appears to be no statistically significant response of bond spreads for A-rated corporates.

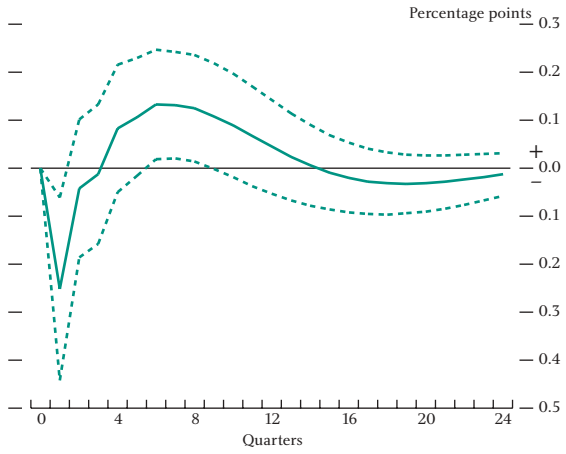
Relationships between financial variables and investment in the BGG model

How do these actual responses compare with the behaviour of these variables in the BGG model economy? To investigate this we set parameters in equations of the BGG model roughly to approximate

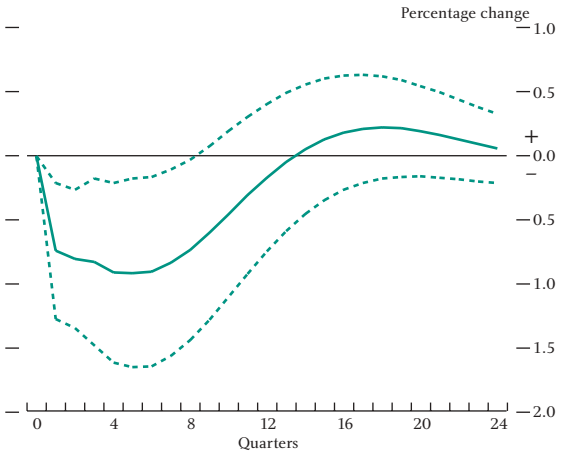
(1) Hubbard (1997) provides a survey of US evidence. UK studies include Devereux and Schianterelli (1990) for corporate fixed investment and Small (1997) for inventory investment.
(2) Described in 'Credit channel effects in the monetary transmission mechanism' on pages 442–48 of this *Bulletin*.
(3) As estimated using an econometric vector autoregression model.

Chart 14
Estimated average responses to interest rate rises(a)

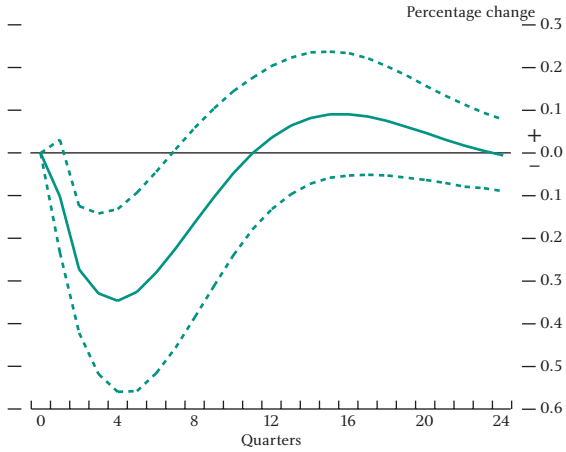
Response of financial deficit



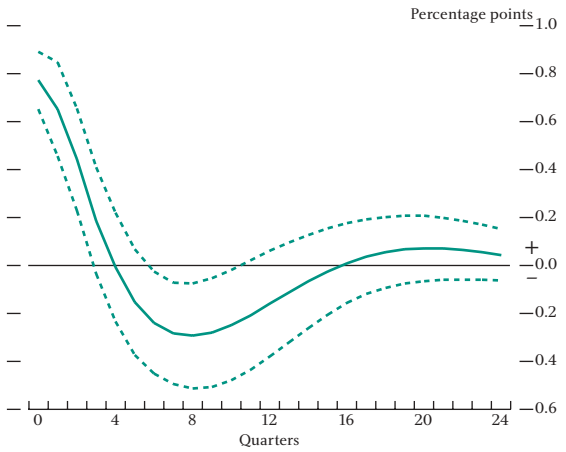
Response of investment



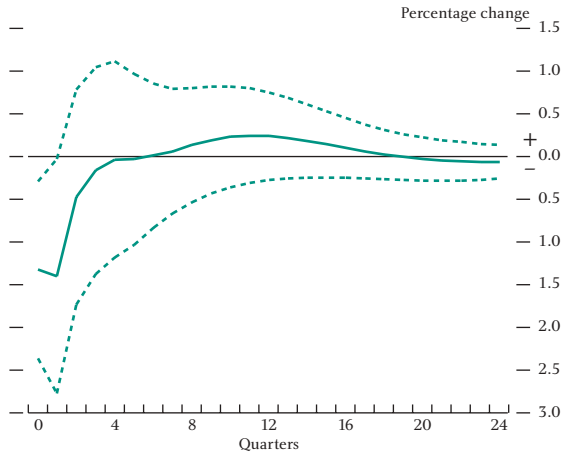
Response of output



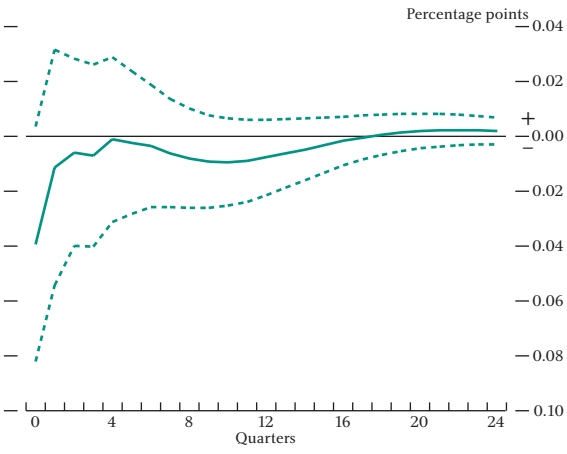
Response of interest rate



Response of share prices



Response of bond spreads



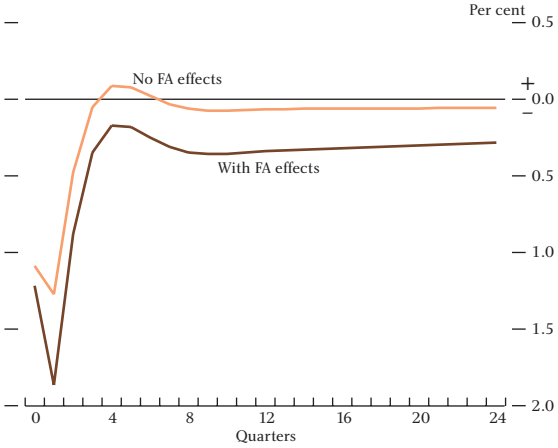
(a) Response to a one standard deviation (about 80 basis points) interest rate shock. Dashed lines mark bands of plus and minus two standard errors.

actual relationships and structural features of the UK economy. A key parameter relates to the financial position of the corporate sector. Theoretically, calibration of corporate financial conditions in the BGG model requires an estimate of the proportion of the corporate capital stock that is financed using companies own internal funds and/or backed by collateral. In the United Kingdom, the share of debt on corporate balance sheets has been low historically (relative to, say, the United States) and the share of traded equity correspondingly high. Using this financial health indicator to calibrate the model would yield weak financial effects. However, the *internal* equity of the corporate sector—that is, companies' own stake in financing their production activities, which might help lenders to assess potential default risk—may be overstated by the value of *traded* equity. As such we set the BGG financial health parameter using the share of internally-generated finance (ie profits) in total financial *flows* to the sector (in this benchmark comparison this is set at 60%, the approximate average for the whole period since 1978).

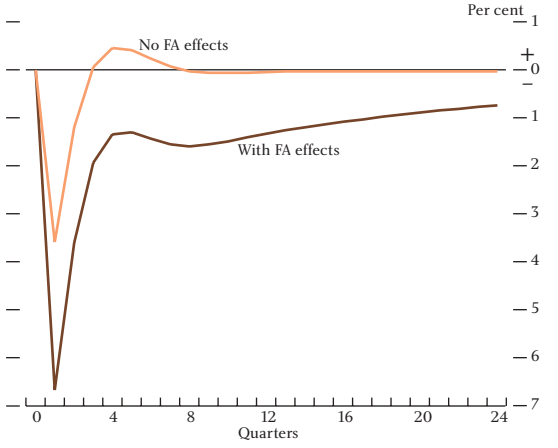
Chart 15 shows how key variables in the BGG model respond to a simulated similar unexpected rise in interest rates when financial conditions are set to reflect UK historical average internal finance shares in investment. As seen in the estimated responses of actual data, investment and output fall after an unanticipated rise in interest rates, although the initial quantitative impact in the model is much larger than in the data. The spread of rates charged for external funds over risk-free interest rates (the external finance premium) rises slightly—reflecting the negative impact in the model of higher interest rates on corporate profits and collateral—while estimated average actual responses of bond spreads show little change. The chart also shows simulated responses based on the BGG model, but with the financial effects 'switched off' (ie the cost of external finance does not respond to shifts in the financial position of firms). These results show how financial effects in the model add to the size and persistence of the responses of investment and output to interest rate rises.

Chart 15
Model economy

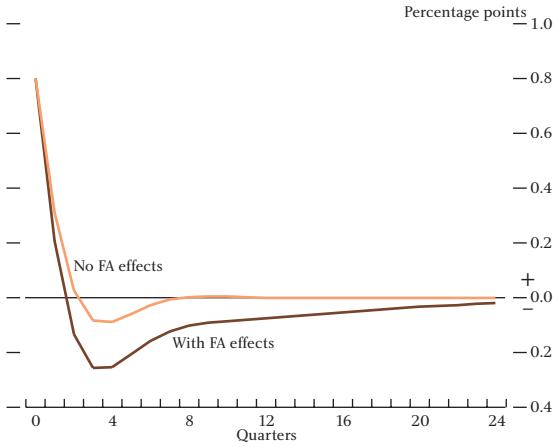
Output



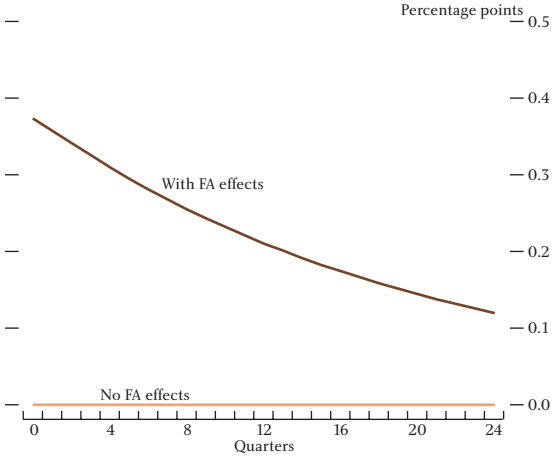
Investment



Nominal interest rate



External finance premium



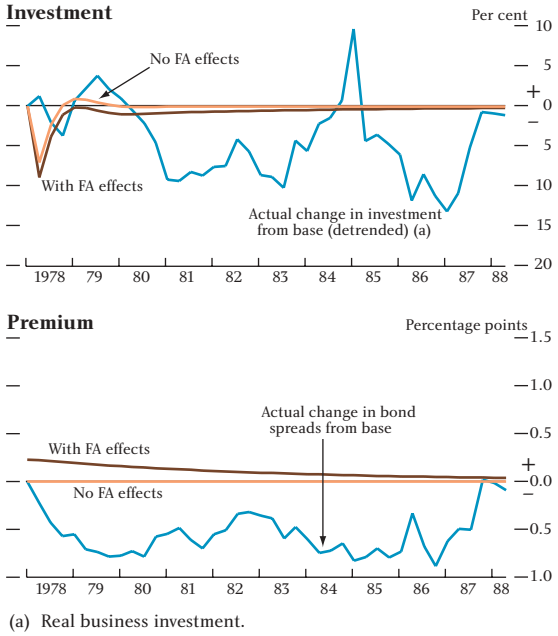
Time-varying financial effects

At face value, the limited response of external finance spreads in actual data seems to suggest that financial effects may have been of little importance in the United Kingdom. However, we cannot exclude the potential for such effects on these results alone. It may well be the case that the strength of interactions between investment and corporate financial health has varied over time. As such, our average estimates in Chart 14 may have covered periods when financial effects may have mattered and periods when they probably did not. Chart 13 lends some support to this view. Bond spreads actually fell at the start of the early 1980s downturn but rose sharply in the early 1990s downturn.

Can we use the BGG model as a tool for understanding ways in which corporate financial effects may have varied over time? In this section we attempt to illustrate how one might, by running some simple experiments based on investment behaviour in the recessions of the early 1980s and 1990s. In each experiment the parameter capturing the financial position of the corporate sector is reset broadly to match internal finance shares at the start of each downturn. We noted above that the financial condition of the UK corporate sector was less favourable at the onset of the 1990s recession than at the start of the 1980s downturn. In each case, we simulate the effect of unexpected increases in interest rates on the model economy, assumed for simplicity to equal actual rises in official interest rates in 1978 and 1988 (although these rises may well considerably overstate actual monetary 'shocks' at these times). We also abstract from the other shocks hitting the economy over these periods. Finally, we compare our simulations with actual changes in (detrended) investment and bond spreads from their starting levels in these periods.

Chart 16 shows simulations of the impact on our model economy of the rise in interest rates in 1978, with initial financial conditions set to approximate the relatively low external borrowing of the corporate sector at that time.(1) Comparison of model responses with and without financial accelerator effects suggests that those financial effects may not have added greatly to the impact on investment of the monetary tightening in this period—perhaps not surprising given the relatively low dependence of the corporate sector on external finance at the time. There is a slight rise in the premium on external finance in our simulation, contrasting with the actual falls observed in bond spreads (although Chart 12 suggests that spreads on other forms of finance may have risen at this time).(2)

Chart 16
1980s recession experiment



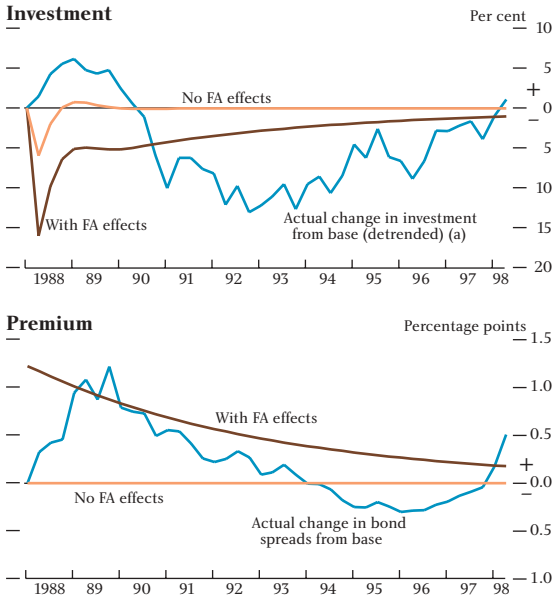
(a) Real business investment.

Chart 17 reports results for an experiment for the 1990s recession. Here financial effects are more potent in our simulations, reflecting the less favourable initial financial position of the UK corporate sector.(3) After the initial rise in interest rates in 1988, actual investment continued to rise but then fell sharply and remained below its starting-point for some time. As in previous experiments, these simple simulations of our stylised model economy do not adequately capture this short-run behaviour of actual investment. But the simulations do seem to suggest that weaker financial health might have contributed to the persistent weakness of investment particularly when compared with results from the model economy without financial effects. An important factor leading to sustained weak investment in the model is lower asset prices (which, as noted earlier, were an important distinguishing feature of the period). Lower asset prices, together with higher interest rates, weaken the financial position of an

(1) Specifically, the internal finance share is set to 75%. The economy is hit in 1978 Q1 with a monetary shock of 150 basis points (approximately equal to the overall change in base rates in the year from 1978 Q1 at a quarterly rate).
(2) The anomalous fall in bond spreads in the early 1980s might have been related to the thinness of the corporate bond market at that time. See Davis (1992) for a discussion of historic trends in the UK corporate bond market.
(3) Here the internal finance share is low at 40%. A 125 basis points monetary shock hits the economy in 1988 Q2 (approximately equal to the change in rates over the year from 1988 Q2 at a quarterly rate).

indebted corporate sector, leading to a rise in the external finance premium. As the charts show, the model economy broadly mirrors movements in corporate bond spreads over this period, with an initial rise and then gradual decline in the external finance premium charged over base rates.

Chart 17
1990s recession experiment



(a) Real business investment.

Conclusions

This article has explored the potential different role of financial factors in corporate investment behaviour in the 1980s and 1990s recessions. Companies were much more dependent on external finance in the early 1990s downturn and investment was relatively weaker. The article uses a macroeconomic model, which includes potential for financial effects, as a tool for analysing possible shifts over time in the strength of interactions between corporate financial conditions and investment. Model simulations suggest that financial effects may have been more important in the early 1990s recession than in the 1980s recession.

Clearly these simple experiments cannot hope to explain the complexities of investment behaviour in recent recessions: the article does not claim that financial accelerator effects were the single, or even the most important, determinant of corporate investment behaviour in the early 1990s recession. But the model-based results do illustrate that relationships between financial conditions and real behaviour can vary substantially over time. In this way, the exercise highlights the importance of monitoring interactions between corporate financial fragility, finance supply and investment spending.

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Why house prices matter

By Kosuke Aoki, James Proudman and Gertjan Vlieghe of the Bank's Monetary Assessment and Strategy Division.(1)

This article analyses the role of house prices in the transmission mechanism of monetary policy. It is argued that house prices matter because houses can be used as collateral, against which households borrow to finance housing investment and consumption. The implication of structural change in UK retail credit markets is also considered, as this may have changed the relationship between house prices and consumption.

Introduction

House prices in the United Kingdom have received a great deal of attention from policy-makers and economic commentators. It is often assumed that if house prices are growing rapidly, consumption growth will be strong too. But the economic links between house prices and economic activity are complex. Houses are different from other assets for two reasons. First, people usually live in their houses and value directly the services provided by their home. So the benefit of an increase in house prices is directly offset by an increase in the opportunity cost of housing services. Second, UK houses are not widely traded internationally. So UK homeowners in aggregate cannot realise their capital gains on houses to increase consumption. All UK homeowners cannot simultaneously move out of homeownership. The gain to a last-time seller is therefore also a loss to a first-time buyer, who will usually be a UK consumer too. This contrasts with capital gains on financial assets, which can be realised in aggregate in the United Kingdom, if overseas agents are willing to buy the assets. So there is no traditional 'wealth effect' on consumption from housing in the way that we think of a wealth effect arising from a change in the value of households' financial assets.

But there are other reasons why house prices and consumption may move together. First, if consumers are optimistic about economic prospects, they are likely to increase their consumption of housing and non-housing goods alike. Second, if house price increases are accompanied by an increase in housing transactions, as they often are, these transactions may have a direct effect on consumption as people buy furniture, carpets and major appliances for their new home. Third, house prices may have a direct impact on consumption via credit market effects. Houses represent collateral for homeowners, and borrowing on a secured basis against housing collateral is generally cheaper than borrowing on an unsecured basis (via a personal loan or credit card). So an increase in house prices makes more collateral available to homeowners, which in turn may encourage them to borrow more, in the form of mortgage equity withdrawal (MEW), to finance desired levels of consumption and housing investment. The increase in house prices may be caused by a variety of shocks, including an unanticipated reduction in interest rates, which will lower the rate at which future housing services are discounted.

This article describes in detail how this credit market channel may form part of the monetary transmission mechanism. It also considers the implications for monetary policy of recent structural changes in the United Kingdom's retail financial markets. Increased competition has widened the availability of retail credit and reduced its price. In the mortgage market, there is now a wider range of products, and it has become easier for consumers to withdraw housing equity to finance consumption. Other consumer credit products are also more widely available, so that credit constraints in the United Kingdom may be lower now regardless of the level of house prices.

(1) A longer version of this paper is forthcoming in *Economic Policy Review*, published by the Federal Reserve Bank of New York, under the title 'Houses as collateral: has the link between house prices and consumption in the UK changed?', a revised version of which is forthcoming in the Bank of England's *working paper series*.

The article shows that these structural changes are likely to have opposing effects on consumption, house prices, and housing investment. Better access to mortgage equity means that, for a given house price increase, more additional borrowing will be devoted to consumption relative to housing investment. The response of consumption to an unanticipated change in interest rates will therefore be larger, and the response of house prices and housing investment will be smaller. But an increase in the availability of credit unrelated to housing means that consumers do not have to reduce consumption as much in the face of a temporary income reduction. This change in the availability of credit unrelated to housing therefore has the opposite effect: the response of consumption to an unanticipated change in interest rates is smaller, because consumers are less dependent on current income. We estimate that the aggregate effect of the financial innovations combined is that the magnitude of house price responses to an unanticipated change in interest rates has fallen relative to consumption responses. This has important implications for the information content of house prices, because it implies that, even for similar economic shocks, the relationship between house prices and consumption is changing over time.

The UK housing market

Stylised facts

Charts 1.1 to 1.3 show the changes in the key housing variables (house prices and housing investment) and GDP over the period since 1970. House prices move strongly with GDP, though with a slight time lag. Housing investment, on the other hand, clearly leads the output cycle. Housing investment and house prices also move closely together, with housing investment leading house prices.

Chart 1.4 shows the changes in house prices and consumption. Breaking down consumption into durables and non-durables, the strongest relationship seems to be that between house prices and consumption of durable goods (see Charts 1.5 and 1.6). This is consistent with a household credit channel, as purchases of durable goods are more likely to be financed by borrowing, and so will be more sensitive to changes in interest rates if there are frictions in the market for credit. If changes in the extent of credit frictions are in turn correlated with fluctuations in house prices—for example if house prices proxy the availability of housing collateral—then this could generate a strong correlation between house prices and durable goods consumption.(1)

The effect of monetary policy on house prices: some initial econometric results

As the relationship between consumption and house prices suggests that a household credit channel may be part of the monetary transmission mechanism, we investigate how house prices are affected by monetary policy. We estimate a small econometric model for the period 1975 to 1999 to provide a rough guide to the effects of an unexpected increase in the short-term interest rate.(2) Output falls, and the price level falls after a lag. House prices, housing investment and consumption also fall. Housing investment responds more quickly than house prices, and falls by more. Durable goods consumption falls by more than non-durables consumption.(3)

We also analyse the relationship between housing variables and inflation (see Chart 1.7). We conducted a series of regressions that test the significance of house prices and housing investment in explaining inflation, output and consumption. We find that when real interest rates are included in the regression, house prices have no marginal predictive power for inflation, output or consumption, though housing investment is significant for output. So house prices appear to affect consumption only via their effect on the transmission of monetary policy, but house prices have no marginal predictive power for inflation outside this mechanism.

These results are informative but need to be interpreted with some care. The sample spans a period of considerable change in the UK financial markets, which is likely to have altered the empirical relationships between the variables. The box on page 464 discusses these changes in detail.

(1) Note that a strong correlation between house prices and durable goods consumption could also arise because both goods are 'lumpy', ie they provide services that last several years. So when consumers learn about an increase in their lifetime income, they are likely to increase their immediate demand for durable goods, including housing, more than for non-durable goods. Nevertheless, it is difficult to achieve the observed amplitude of house prices in a model without credit frictions.
(2) See Aoki, Proudman and Vlieghe (2001) for details of the econometric results in this and the following section.
(3) The results are all measured relative to the variables' underlying trends.

Chart 1.1
House prices and output

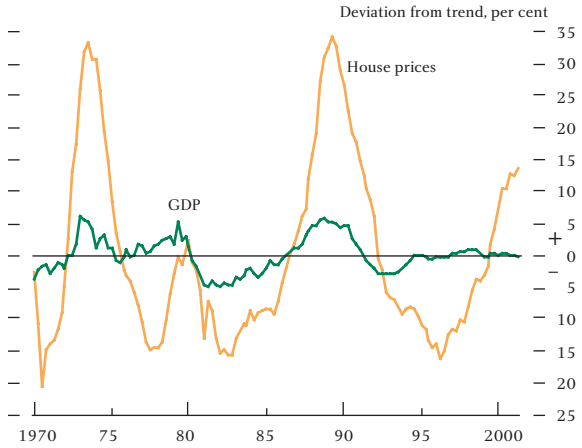


Chart 1.2
Housing investment and output

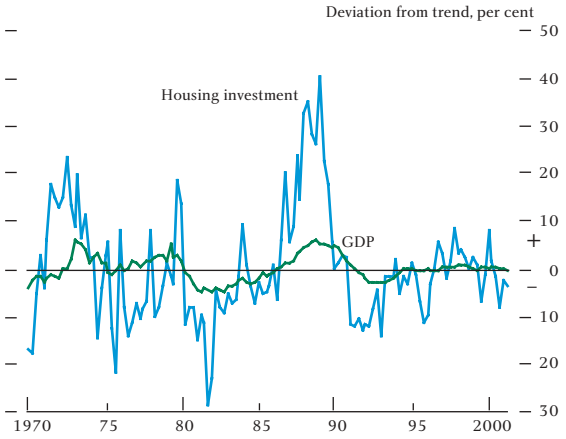


Chart 1.3
House prices and housing investment

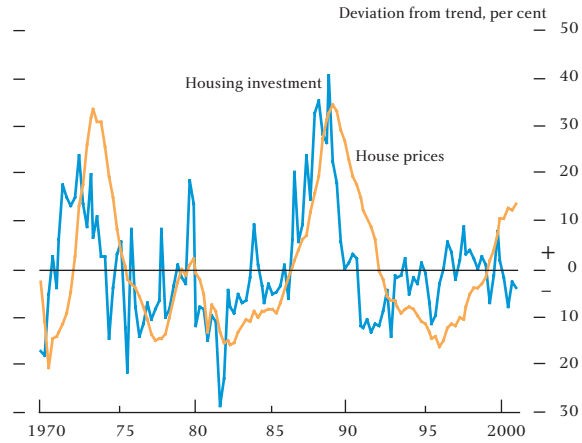


Chart 1.4
House prices and consumption

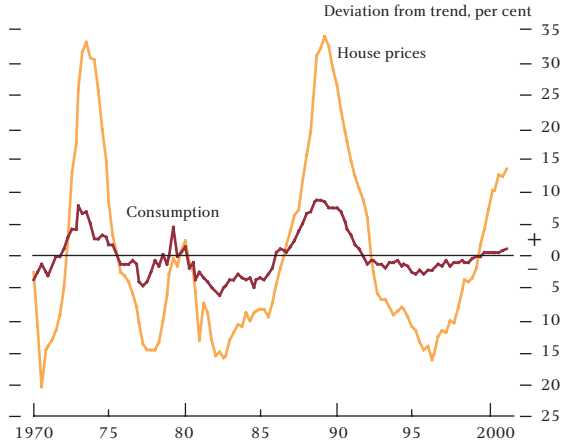


Chart 1.5
House prices and consumption of non-durable goods

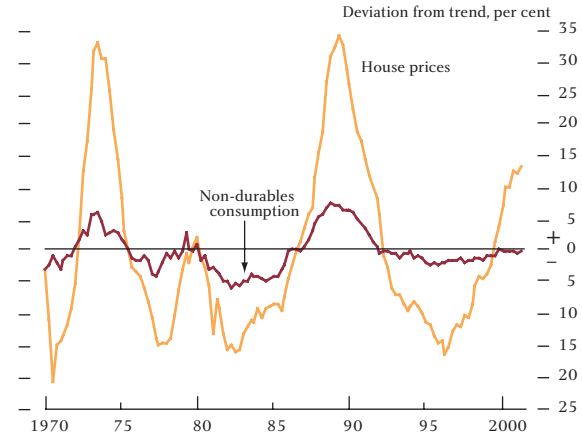


Chart 1.6
House prices and consumption of durable goods

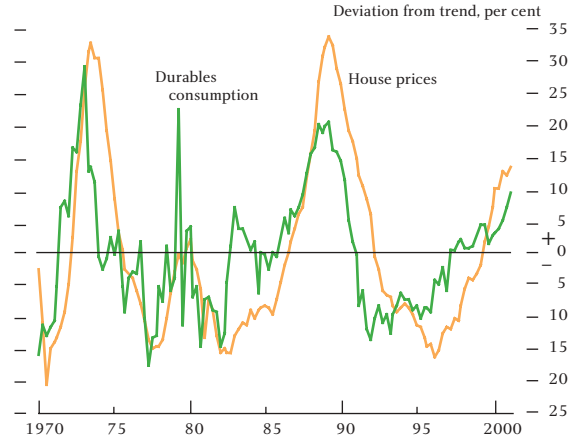


Chart 1.7
House prices and inflation

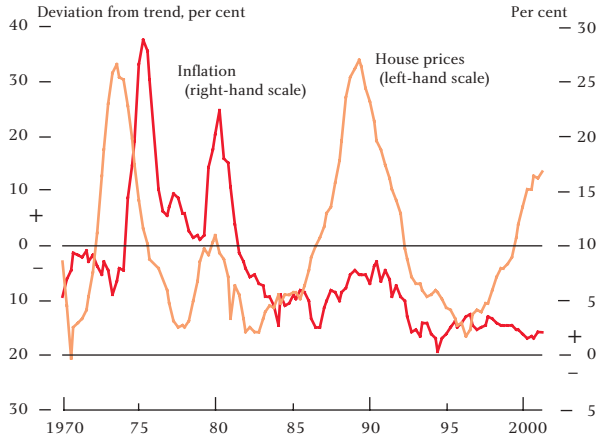
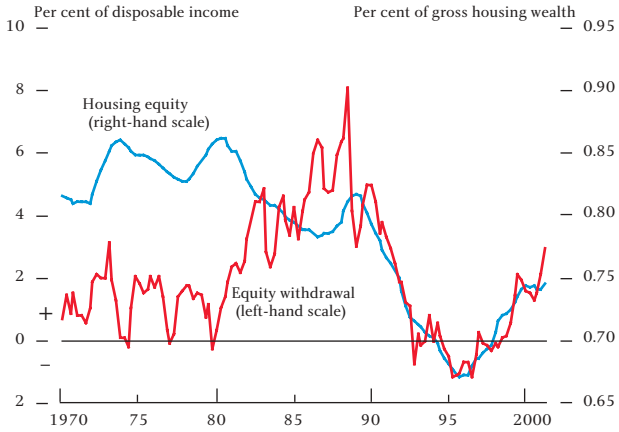


Chart 1.8
Net housing equity and MEW (as a share of disposable income)



Modelling the household credit channel

This section outlines the model we use to explore the implications for monetary policy of the recent structural changes in UK financial markets.(1)

Our analysis is based on the financial accelerator model of Bernanke, Gertler and Gilchrist (1999) (BGG).(2) The BGG model focuses on the macroeconomic effects of imperfections in credit markets. These imperfections generate premia on the cost of raising funds, which in turn affect borrowing decisions. The BGG framework links the cost of firms' external finance to the quality of their balance sheet and net worth. Our model applies the BGG framework to the household sector.

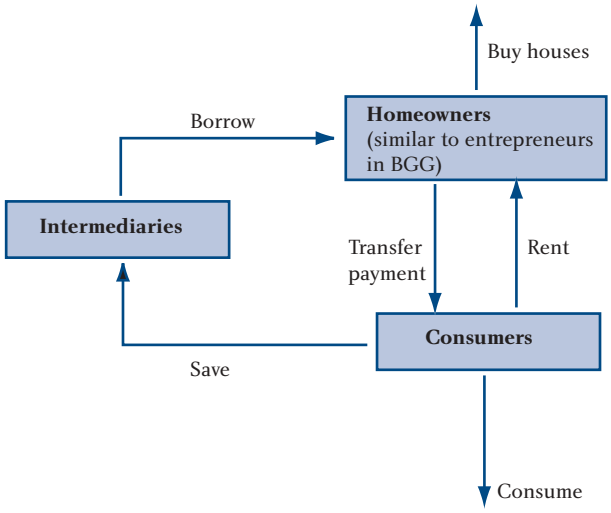
Credit frictions

In practice, fluctuations in the external finance premium can be thought of as follows. When house prices fall, households that are moving home have a smaller deposit available than they otherwise would for the purchase of their next home, and so they obtain less favourable interest rates when renegotiating their mortgage. A fall in house prices also offers less scope for extracting additional equity to finance consumption. Since house prices determine the collateral value of houses, fluctuations in house prices significantly affect the borrowing conditions that households face.

Modelling 'households'

We think of each household as a composite of two behavioural types: homeowners and consumers. This strategy allows us to consider separately the costly process of borrowing to finance a home from the lifetime consumption decision.(3) Modelling households in this way captures the ideas that some elements of the household sector save while others borrow, and that this process is intermediated through financial markets with credit frictions. Diagram A, which illustrates the flows of funds within our model, emphasises the idea that consumers and homeowners form part of the same composite household.

Diagram A



(1) See Aoki, Proudman and Vlieghe (2001) for a full description of the theoretical model.
(2) This model is explained in more detail in Hall, 'Credit channel effects in the monetary transmission mechanism', on pages 442–48.
(3) The solution of household optimisation problems under liquidity constraints and uncertainty is complex, which makes the construction of a tractable general equilibrium model very difficult. Our approach captures many of the implications of this literature for the transmission mechanism of monetary policy in a relatively simple way.

Structural change in the retail credit markets and its effect on the pattern of household debt

There has been a series of major institutional and legislative changes in the UK retail financial markets since 1979. First were the removal of exchange controls in 1979 and the direct control of bank lending ('the Corset') in 1980. And a number of measures (such as the Building Societies Act (1986)) have lifted the restrictions on how building societies operate to give them the same status as banks. Other non-bank entrants—particularly department stores, retailers and insurance companies—have also increasingly been able to offer selected retail financial services, such as credit cards, unsecured loans and mortgage products. For mortgages in particular, the restrictions in place in the 1970s and early 1980s had the effect of making withdrawal of equity difficult, if not impossible: homeowners generally needed to move house to increase the value of their loan, and even then binding loan-to-value restrictions may have limited the extent of the increase (see Wilcox (1985)).(1)

In the mortgage market, the range and flexibility of products have increased. Lock-in clauses in mortgage contracts have become increasingly rare. More firms now offer variable-repayment mortgages, the facility for lump-sum withdrawals against net housing equity, and flexible mortgage products, which allow the borrower to change the loan principal at low or zero transactions cost. A recent survey by MORI for the Council of Mortgage Lenders showed that 16% of respondents now have mortgages with at least some degree of flexibility, defined as those mortgages offering over and under-payments, daily or monthly interest calculation, and the option of payment holidays. In recent months, several major lenders have introduced such flexibility into all of their new and outstanding mortgage loans. And some lenders have introduced 'current account mortgages', where a range of savings and borrowings can be 'pooled' at a single rate, offering even greater flexibility.

Despite this increased competition, the standard variable mortgage spread has not shown a steady decline over long periods. But temporary discounts, usually offered to new customers for the first year or two of the mortgage, have risen, and reached their highest recorded level during 2000. Discounted mortgages have risen markedly as a share of total new mortgage lending, to more than half, which has reduced the average mortgage interest rate that customers pay. Remortgaging, ie obtaining a new mortgage to refinance an existing mortgage, has also increased as a share of total mortgage lending, perhaps reflecting the reduction in lock-in clauses.

The balance sheet of UK households has altered substantially as a result of these changes. The stock of debt as a fraction of annual household income increased from 30% in the late 1970s to more than 100% in 2000. The composition of debt also changed, with the share of unsecured debt increasing from 11% to 19%. So, in aggregate, UK households appear to have become less credit-constrained; more credit is available and more households that previously did not qualify for credit have been able to borrow.

Transaction costs associated with retail financial products have been falling since at least the early 1990s. In the mortgage market households have been able to extract equity more easily when house prices rise. Chart 1.8 shows the relationship between aggregate net housing equity and secured borrowing for consumption, or mortgage equity withdrawal (MEW). Prior to the mid-1980s, there was little relationship between housing equity and mortgage equity withdrawal. When the market was dominated by building societies and subject to rationing, withdrawing additional equity generally required homeowners to move house, which carried high transaction costs. MEW has become more closely linked to movements in net housing equity as new mortgage products allowing refinancing or additional borrowing at ever-lower transaction costs have become available. The increased use of flexible mortgages suggests that this trend is likely to continue. Such products drive the transaction cost of withdrawing additional equity to zero.

(1) There is another financial innovation, which we do not consider in this paper, that is likely to have had an effect on the behaviour of house prices. In the 1970s and early 1980s building societies collectively agreed the mortgage and deposit rates they offered, and were reluctant to change rates frequently. When market interest rates were rising, building societies would end up with interest rates below market rates. This reduced the supply of deposits, which was their main source of funding (see Pratt (1980) and Wilcox (1985) for an exposition of these mechanisms). Because building societies were also the main provider of mortgages, interest rate rises had a direct effect on the supply of mortgage loans, which is likely to have amplified any effect of interest rates on house prices.

'Homeowners' borrow funds to buy houses (from housing producers) and rent them to consumers.(1) Homeowners finance house purchases partly with their net worth ('internal' finance) and partly by borrowing from financial intermediaries ('external' finance). External finance is more costly than internal finance as lenders cannot perfectly observe or control the risks of lending. This asymmetry of information gives rise to an external finance premium.

'Consumers' consume goods and rent houses from the homeowners. Consumers and home owners are further linked by a 'transfer payment' from homeowners to consumers. This captures the fact that households use their housing equity to finance consumption as well as housing investment. When house prices increase—and so housing equity rises—the household faces a decision problem. It can increase the transfer payment and hence consumption today, which would increase current household utility. But if the household keeps the transfer payment constant, net worth would increase, reducing the external finance premium in the future. In other words the household faces a choice between current consumption and a cheaper future external finance premium. The optimal allocation—and hence optimal transfer payment—would depend on factors such as the elasticity of intertemporal substitution, the sensitivity of the external finance premium to household net worth, and uncertainty about future income. In general, there is a target level of net worth relative to debt (ie leverage), and transfer payments will depend on how far away the household is from its target leverage; payments are assumed to be increasing in the net worth of the households relative to their debt.

Fluctuations in transfers can be thought of as borrowing against housing equity to finance consumption (MEW).(2) Then the sensitivity of transfers with respect to housing equity will also depend on the transaction costs involved in MEW. Other things equal, if it is less costly to withdraw mortgage equity, MEW will be more sensitive to households' financial positions and hence to house prices. This sensitivity is captured in the model by an elasticity parameter on transfers with respect to housing equity. Lower transaction costs associated with MEW increase the elasticity, because for a given increase in house prices, mortgage equity becomes cheaper to withdraw.

Consumption behaviour

We also assume two types of consumer. Some consumers have accumulated enough wealth so that their consumption decisions are well approximated by the permanent income hypothesis (PIH).(3) Other consumers are assumed to be impatient or subject to borrowing constraints; their behaviour will be similar to rule-of-thumb (ROT) consumers, who spend their current income in each period. So their consumption in each period is equal to their labour income and transfers. The reason for this additional assumption is that PIH consumers can, by definition, borrow without frictions against their lifetime income. They are therefore not constrained by the amount of housing collateral in their consumption decisions.

The rest of our model is standard. We introduce nominal price stickiness in the consumption goods sector so that monetary policy has real effects. House prices are determined by a q-theory of investment.(4) And monetary policy is assumed to follow a feedback rule: the monetary authorities increase interest rates when inflation is above target, and decrease interest rates when inflation is below target.

Model simulations

How does the financial accelerator framework apply in our model? A positive shock to economic activity causes a rise in housing demand, which leads to a rise in house prices and so an increase in homeowners' net worth. This decreases the external finance premium, which leads to a further rise in housing demand and a rise in the transfer paid to consumers. This rise in the transfer payment captures increased borrowing by constrained (ie ROT) consumers, and increases consumption. As in BGG, credit market frictions amplify and propagate shocks to the economy.

We now consider the effects of an unanticipated interest rate reduction within our model, and show how these

(1) This flow of rental payments within households is captured in the UK National Accounts as imputed rents.
(2) See Davey (2001) for an explanation of the mechanisms by which consumers extract mortgage equity.
(3) The permanent income hypothesis states that consumption decisions are based on expected total lifetime income rather than period-by-period changes in income. Consumers are forward-looking and will vary consumption today when there are unexpected changes in future income.
(4) The q-theory of investment states that investment will rise if the marginal value of an additional unit of capital exceeds its replacement cost. In practice, measures of q are often constructed as the ratio of the market value (as measured by share prices) of capital relative to its replacement cost. The market value of capital will reflect future expected profitability. In housing terms, this means that if the expected future return to housing increases, the market value of the housing stock, and therefore housing investment, will rise.

effects are altered by the financial innovations considered in this paper.(1) The steady-state annual external finance premium is assumed to be 200 basis points and the target ratio of net worth to debt is 0.7, the average historical leverage ratio of UK households.(2) The elasticity of the transfer payment with respect to housing equity is set at 3. This is the estimated average elasticity of mortgage equity withdrawal with respect to the net worth ratio; we experiment with changes in this parameter below. And the share of rule-of-thumb consumers is set at 0.5. The literature suggests a range of between 0 and 0.6; we experiment with changes in this parameter also.

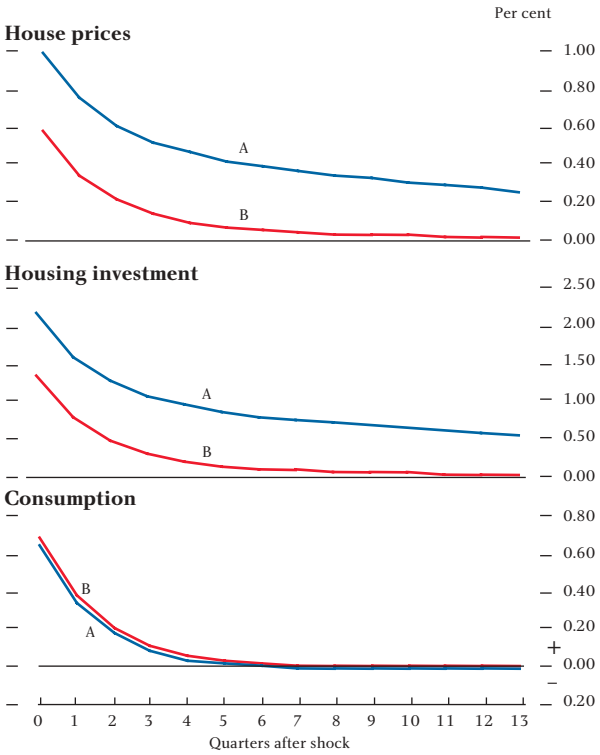
Better access to housing equity

The transaction costs of extracting equity from housing have fallen in recent years, and new product development is likely to reduce costs further in the coming years: MEW and net housing equity have become more closely linked (see Chart 1.8). We examine the implications for monetary policy of this structural change.

In our model, households can either withdraw additional equity for consumption or they can use their stronger balance sheet to lower the rate at which they can finance housing investment. This trade-off is captured by the elasticity parameter on the transfer rule between the house-owning and the consuming elements of the household. Better access to housing equity is simulated as an increase in the elasticity parameter, so that for a given increase in house prices, consumers will borrow more to finance consumption.

Chart 2 shows the effects of an unexpected interest rate cut when the elasticity of transfer payments with respect to housing equity is set to 3 (Case A) and then when it is increased to 10 (Case B). The net effect on housing investment of reducing transaction costs is to dampen the response to the interest rate cut. Its effect on consumption is to heighten the response. This is because, when transaction costs are lower, households consume more of the increased housing equity. The balance sheet improvement is therefore smaller and shorter-lasting than it would otherwise have been, and this dampens the response of housing investment and house prices.

Chart 2
Better access to housing equity



Note: Response of model economy to an unanticipated cut in interest rates of 0.5 percentage points.

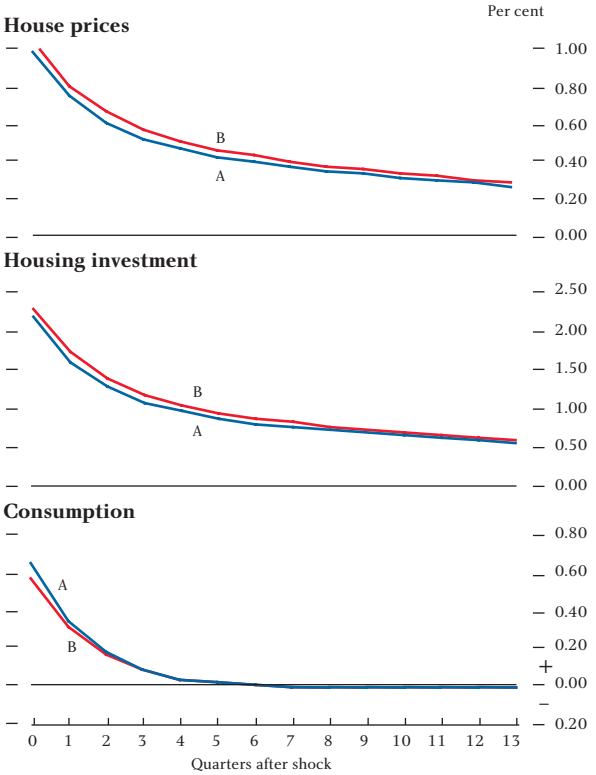
Other sources of lower liquidity constraints

We also examine the increased availability of unsecured consumer credit, which may have lowered liquidity constraints independently of changes in house prices. It is likely that households now have better access to credit regardless of the general level of economic activity. We proxy these developments by varying the share of ROT consumers.

Chart 3 analyses the effects of a reduction in interest rates when the share of ROT consumers is lowered from 0.5 (Case A) to 0.2 (Case B). When there are fewer ROT consumers, the responses of investment and house price are larger, while the consumption response is dampened. This is because ROT consumers react strongly to changes in current income, so with fewer ROT consumers, a given unanticipated interest rate change will have a smaller effect on consumption demand, and therefore a smaller effect on inflation. Since the increase in consumption is smaller following the unanticipated interest rate reduction, housing investment is crowded out by less. So housing

(1) The parameter values chosen for the model underlying the simulations are discussed in Aoki, Proudman and Vlieghe, *op cit.*
(2) Financial innovation may have lowered the target net worth ratio, for example if banks are better able to monitor the riskiness of their loans. We assume here that the target has remained constant.

Chart 3
Lower liquidity constraints



Note: Response of model economy to an unanticipated cut in interest rates of 0.5 percentage points.

investment and house prices increase by more than in the baseline scenario.

Increased access to both housing equity and lower liquidity constraints

In order to find out which of the two offsetting effects is likely to dominate, we consider the two structural changes simultaneously. We compare the consumption, house price and housing investment responses after both changes have taken place. Because there is considerable uncertainty about how much we need to vary the parameters to reflect the changes that we believe have taken place, we examine a range of parameters that we regard as plausible.(1) The result that house prices and housing investment will move by less when credit constraints are relaxed holds across a wide range of parameter combinations. The result for consumption is more sensitive to the particular parameter choice: consumption can become more sensitive or less sensitive to changes in interest rates, depending on how we calibrate the structural changes.

But the effect of the structural changes on consumption responses is generally small. On the other hand, the reduction in the housing investment and house price responses as a result of the structural changes is substantial. So it appears to hold more generally in this model that changes in consumption will be associated with smaller changes in house prices and housing investment.

Conclusion

This article has examined a credit effect of house prices in the monetary transmission mechanism. We have constructed a model in which house prices affect consumption directly by changing the interest rate at which households can borrow. When house prices rise in response to, for instance, an unanticipated interest rate reduction, this increases the value of collateral available to borrowers, which reduces the external finance premium. With a lower external finance premium, households increase housing investment and borrow to finance additional consumption. We further show that the link between house prices and consumption may have changed as a result of recent structural changes in the UK financial markets. Developments in the mortgage market have increased the response of consumption to an unanticipated interest rate change, but have reduced the response of housing investment and prices. We also simulate the effect on consumption of a general loosening of credit constraints unrelated to housing, proxied by a reduction in the number of rule-of-thumb consumers in the economy. In this case, the effects are reversed: the response of housing investment and house prices is larger, but the effect on consumption is dampened. For a range of parameters, the aggregate effect of the financial innovations combined is that the magnitude of house price responses to unanticipated interest rate changes has fallen relative to consumption responses.

This has important implications for the information content of house prices and the stability of estimated econometric models that do not take these changes into account. Even if the economic shocks facing the economy had remained the same, the relationship between house prices and consumption would have changed over time.

(1) The elasticity of MEW with respect to housing equity over the whole sample period is approximately 3, which we use in our baseline model. Over a more recent period, ie 1986–99, elasticity is much higher at 20. We therefore define the plausible range as 0 to 1 for the share of ROT consumers, and 1 to 20 for the transfer adjustment elasticity. Full details are given in Aoki, Proudman and Vlieghe, *op cit*.

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Band-pass filtering, cointegration, and business cycle analysis

Working Paper No. 142

Luca Benati

In recent years, band-pass filtering—the non-structural, frequency-domain based decomposition of economic time series into trend and cyclical components—has become more and more popular among macroeconomists, as a way of capturing and describing business cycle stylised facts. Compared with the Hodrick-Prescott filter, the band-pass filter offers the advantage of allowing the researcher to target a specific frequency band, thus extracting from the series of interest all the components associated with that band, while essentially discarding all the others. The growing interest of the macroeconomics profession in band-pass filtering techniques is demonstrated, first by the number of recent papers on business cycle stylised facts that make use of the band-pass filter, second, by the inclusion in the recent *Handbook of Macroeconomics* of a chapter on US post-World War II business cycle stylised facts entirely based on band-pass filtering, and third, by the continuing attempts to develop new and better approximations to the ideal band-pass filter.

This paper critically assesses the practice of band-pass filtering, making two main points. First, it is shown that, depending on the stochastic properties of the filtered process, the band-pass filtered cyclical component could be entirely authentic, partly or mostly spurious, or even entirely spurious. While, in general, there does not exist any universally valid measure of authenticity for band-pass filtered cyclical components, it is shown that for unobserved components (UCARIMA) processes there does indeed exist such a natural measure, based on the integral of the spectral density of the band-pass filtered process. Taking a simple sticky-price DSGE model as the data-generation process, it is shown that: (a) under a number of circumstances, band-pass filtered output may provide a surprisingly bad proxy for the structural output gap; and (b) as a technique for extracting a proxy for the output gap, band-pass filtering suffers from the distinct disadvantage that, as a simple consequence of the Lucas critique, the accuracy of the approximation is not invariant to the monetary rule followed by the policy-maker, and in fact crucially depends on it.

Second, taking some alternative macroeconomic models as data-generation processes, it is shown that band-pass filtering: (1) may markedly distort key business cycle stylised facts, as captured by the cross-correlations and the cross-spectral statistics (gain, phase angle, and coherence) between the cyclical components of the variables of interest and the cyclical component of GDP; and (2) may well create entirely spurious stylised facts. For example: (a) the Phillips correlation between inflation and the cyclical component of economic activity will in general appear weaker than it is in reality; (b) both money supply and productivity may appear procyclical even when they follow random walks by construction; (c) the real wage may appear procyclical when in fact it is countercyclical. These results are not peculiar to a particular class of model, but instead illustrate a general problem: the presence of stochastic trends, and possibly of cointegrating relationships among macroeconomic variables, may significantly alter the business cycle stylised facts as captured by the band-pass filter. Again, the degree of authenticity of business cycle stylised facts uncovered via band-pass filtering crucially depends on the monetary rule followed by the policy-maker.

The general conclusion emerging from the paper is that, far from being the neutral, atheoretical, and objective approach to the study of business cycle stylised facts that it is often claimed to be, band-pass filtering may markedly distort those very same stylised facts in unpredictable ways, simply because such distortions crucially depend on the unknown true structure of the economy that the researcher is investigating.

Does it pay to be transparent? International evidence from central bank forecasts

Working Paper No. 143

Georgios Chortareas, David Stasavage and Gabriel Sterne

Is central bank transparency associated with lower inflation? This paper provides the first international evidence on if and how the degree of transparency in monetary policy affects policy outcomes. We focus on one particular form of transparency, namely the publication of inflation forecasts and forward-looking analysis. The recent theoretical literature suggests that transparency in publishing forecasts will reduce inflation to the extent that it makes central bank credibility more sensitive to policy actions. Recent policy debates have also highlighted the potential importance of the publication of the central bank's inflation forecasts.

We use a unique cross-country data set covering the detail with which central banks explain forecasts in 87 countries and we construct an index for transparency based on the publication of forecasts by central banks. We then assess how our index of transparency is related to inflation, inflation variability, output, and output variability. After controlling for a number of other institutional and macroeconomic variables we find that an increase in the detail with which central banks publish forecasts is associated with lower average inflation. The result holds regardless of whether the domestic nominal anchor is based more on an inflation or money target. Furthermore, we do not find evidence that the publication of forecasts is associated with greater output volatility.

One conundrum emerges, however: why, given the apparent benefits, do not more central banks publish forecasts in greater detail? We base a detailed discussion of the robustness or our results around this question. The discussion blends extensive econometric testing with a detailed assessment of how such tests relate to theory and practice of monetary frameworks. We offer three main explanations:

First, theory asserts the publication of forecasts will have a smaller impact on inflation when credibility is secured by other means, a prediction that is supported by the results in the paper. We do not detect a significant impact of transparency on inflation for those countries with inflation targets, and the effects are smaller for lower inflation countries whose credibility may be relatively strong.

Second, the result may have been biased by reverse causality, ie it is the attainment of low inflation that leads central banks to become more transparent, and not the other way round. Our statistical tests cannot completely reject such a possibility but demonstrate that it is unlikely to undermine the results. Furthermore, there are few if any examples of either (a) a framework in which policy-makers have reduced transparency in response to an increase in inflation, or (b) a transparent framework in which inflation has markedly increased.

Finally, we argue that many central banks have not yet completed the transition to greater transparency. The theoretical and empirical evidence on the effects of transparency is relatively new. And the practical precedents of frameworks in which published forecasts made important contributions to credibility-building emerged only in the 1990s.

In summary, we argue that the robustness tests have gone far enough to make us confident that we have identified empirically a channel for reducing and maintaining low inflation. Furthermore, there are global policy implications: there remain many central banks around the world that may achieve lower average inflation by publishing their forecasts in greater detail.

Costs of banking system instability: some empirical evidence

Working Paper No. 144

Glenn Hoggarth, Ricardo Reis and Victoria Saporta

Over the past quarter of a century, unlike the preceding 25 years, there have been many banking crises around the world. Although there is now a substantial empirical literature on the causes of such crises, there have been fewer studies measuring their potential costs. Yet it is a desire to avoid such costs that lies behind policies designed to prevent, or manage, crises.

This study considers the ways in which banking crises can impose costs on the broader economy and presents cross-country estimates of the direct resolution costs and the broader welfare costs, approximated by output losses, associated with banking crises.

In a sample of 24 banking crises estimated resolution costs are found to be bigger in lower-income countries and those with higher degrees of banking intermediation. Countries with large fiscal costs of crises have in the past often experienced a simultaneous currency crisis, especially those that had in place a fixed exchange rate regime.

However, resolution costs may simply reflect a transfer of income from taxpayers to bank 'stakeholders' rather than necessarily the cost to the economy as a whole. An alternative, albeit still imperfect, proxy for the latter is the impact of crises on output.

Cumulative output losses (relative to trend) incurred in a sample of 47 banking crises are also investigated in this study. Output losses are found, on average, to be large—around 15%–20% of annual GDP. Losses are usually much larger in the event of a twin banking/currency crisis than if there is a banking crisis alone, particularly in emerging market countries. Crises have also typically lasted longer in *developed* countries than in emerging markets. Because of this, on some measures, output losses during crises are larger in developed than in emerging market countries.

However, a crucial issue in measuring output losses is deciding whether they are caused by the banking crises, and are thus *costs* of banking crises, or whether recession caused the crises. In an attempt to answer this question output losses in a sample of 29 *systemic* banking crises are compared with neighbouring countries that did not at the time face severe banking problems. Banking crises but not currency crises were found to significantly affect output in developed countries, while the opposite was true in emerging market countries. These results also seem to hold up after allowing for other factors that may have caused output to fall.

It seems to be the case that regardless of whether banking crises cause or are produced by recession, they exacerbate subsequent output losses and are often costly to resolve.

The prospects for the UK and world economies

In this speech[1] the ***Governor*** *explains how, in the face of a slowing world economy and a continuing strong exchange rate, the Monetary Policy Committee have cut UK interest rates to encourage the growth of domestic demand and so keep on track to hit the inflation target. Although the events of 11 September may have set back the prospects for global recovery somewhat, the United Kingdom remains relatively well-placed to withstand the slowdown.*

I should like to say a few words this evening about the state of the economy, and in particular to account to you —as stakeholders—for the Bank's conduct of monetary policy.

If you look back, since the recession of the early 1990s the United Kingdom has enjoyed nine years of steady progress.

Inflation over that period, on the Government's target measure, has averaged just 2.6%—and has been more stable than at any time in our history. Now some people think that's all we care about at the Bank of England—and we certainly do care about it—it is after all what we are paid for. But it is certainly not all we care about. Low inflation is not simply an end in itself—it is a necessary means to the end of sustainable growth, to sustained high levels of employment, and to rising living standards which are, of course, the really good things of economic life.

And what gives me personally—and my colleagues—real satisfaction is the fact that stable, low inflation has over this period been accompanied by steadily increasing overall output and employment, and by a progressive fall in unemployment.

GDP growth since the spring of 1992 until this summer has averaged just about 3% a year—which is well above most estimates of our trend rate of $2^1/_4$%–$2^1/_2$%, and the longest period of sustained quarter-by-quarter growth we have enjoyed since quarterly records began in the United Kingdom in 1955.

Employment increased steadily from a low point of $25^1/_2$ million people in the spring of 1993 to a peak of over 28 million in the summer of this year. And the rate of unemployment has fallen from a peak of over $10^1/_2$% on the LFS measure to around 5%; while on the claimant count measure it has fallen from some 10% to just over 3%, which means that the number of people claiming unemployment benefit, at under 950,000, is the lowest for 26 years.

And what has been a good period for the UK economy as a whole, has also been good—in an absolute sense—for Wales. Here, on an LFS basis, the rate of unemployment fell from the recent peak of over $10^1/_2$% in November 1992 to below 6% in July this year for the first time since these data were collected; and, on the claimant count basis, unemployment, which touched 10% in the winter of 1992–93, had fallen to 3.8% in August, the lowest rate since June 1975.

But I freely acknowledge that it doesn't necessarily feel like that today—certainly not to everyone. I am only too well aware that there are a lot of people in every part of the United Kingdom—both business people who've been under real pressure and employees who have lost their jobs—who will react to these statistics by saying 'Well you could have fooled me!'. That may well be true of some of you here this evening. The Bank receives detailed reports every month from each of our twelve agencies throughout the United Kingdom, including reports from Sue Camper based in Cardiff.

Many of you will know Sue already—and I encourage those who don't to make yourselves known to her. The reports which she and her fellow agents make each month, based on their direct, first-hand, knowledge of what's happening in their area, are fed directly into our

(1) Given at the Welsh Development Agency/Bank of England Dinner at Brangwyn Hall, Swansea on 16 October 2001. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech145.htm

Monetary Policy Committee process. They play a vital part in informing our understanding of the macroeconomic statistics, which in themselves can only capture the overall, aggregate, picture. So we do know, I promise you, about the job losses and plant closures particularly in manufacturing.

Those on the receiving end won't thank me for saying this but some of those problems at the microeconomic level are an inevitable characteristic of every economy. Needs, tastes, technologies and productive techniques are constantly changing even in the most benign macroeconomic environment, and the rise and fall of individual businesses or business sectors, as comparative advantage shifts—nationally and internationally—is a painful but necessary facet of economic progress. Obstructing such change cannot help in anything but the short term. The more constructive approach is to encourage the redeployment of resources to alternative activities where there is a prospect of comparative advantage. Happily that is the path—the path to greater supply-side flexibility—that is increasingly being followed by UK regional and national authorities. And it's the path being followed here in Wales by the National Assembly under First Minister Rhodri Morgan. It is the path that is being followed by the WDA and its subsidiary Finance Wales, as well as ELWa. If we know at the Bank about plant closures and job losses, we know, too, about NEDS (the Welsh National Economic Development Strategy) and we know about the new activity, creating new jobs, including, for example, Technium.

I said a moment ago that some of the current microeconomic problems are inevitable—a normal and necessary facet of economic progress. But the pressures we currently face go well beyond that. The effects of BSE and then of foot-and-mouth disease on agriculture, and the impact on the rural economy more generally, have been wholly abnormal. And the pressures on the wider economy have recently been hugely aggravated by the international economic environment—first, by the persistent strength of sterling against the euro; then, by the global economic slowdown—including the dramatic contraction of activity in the previously booming high-tech sectors, and most recently by the vicious terrorist attacks in the United States.

With the best will in the world, there is nothing that we can do—certainly not through our domestic monetary policy—that goes to the causes of these problems. That's obviously true in the case of the problems in agriculture.

Many people suppose that interest rates would have a predictable effect on exchange rates, but in fact it's not as simple as that. Many other factors influence exchange rates which can respond perversely to interest rate changes even for quite long periods of time. Despite the 4% cut in the US rates this year the dollar is still stronger against the euro—where rates have fallen by only 1%—than before the interest rate cuts started. And sterling, too, rose against the euro even though we cut interest rates earlier, and by more, than the ECB. The conundrum in fact has been the persistent relative weakness of the euro, since its introduction, and I very much welcome its modest recovery since the summer.

But on top of this exchange rate effect, external demand for goods and services produced in this country has been adversely affected by the unusual simultaneous slowdown in the world's three largest currency areas—the United States, the eurozone and Japan—that we have seen this year. And the terrorist attacks—with their inevitable effect on business and consumer confidence at least in the short term—could not have come at a worse time.

We can't, as I say, do anything directly ourselves to reduce the negative impact on the economy of these exogeneous shocks. What we can do is to try to compensate for them by encouraging the growth of domestic demand, and in particular consumer spending. And that in effect is what we have been trying to do through six cuts in interest rates so far this year, which have brought the mortgage rate, for example, to its lowest level for years. In the year to June final domestic demand grew by $3^1/_2$%; but a fall in external demand helped to reduce the growth of total output to just over $2^1/_4$%. Overall UK manufacturing output in particular fell by 2% in the year to August, and while that is substantially less than the equivalent fall in Japan (of over 11%) and in the United States (of $5^1/_2$%), that's cold comfort to British industry.

The imbalance within the economy which these figures reflect—notably the continuing imbalance between the internationally-exposed companies and sectors, which are having a really rough time, and the domestically-orientated sectors which are doing much better—is certainly not ideal.

The continuing imbalance is not without risks. On the one side, we may find it increasingly difficult to offset the negative impact of the global slowdown in the face of increasing domestic private sector debt; and if the slowdown in the United Kingdom spreads beyond manufacturing to the services sectors it may cause unemployment to rise, which in turn could slow the growth of consumer spending. But, on the other side, we may find it difficult to moderate the growth of domestic demand when the international environment improves.

There is no doubt that if we could simply redraw the map, we would opt for stronger external demand and weaker consumption growth. That would represent a more sustainable balance within our economy. Sadly that is a choice that we are not immediately free to make. Doing what we can to encourage domestic demand growth to compensate for the global economic weakness is certainly preferable to an unnecessary slowdown in the economy as a whole. And that is the path we must for the time being continue to pursue.

So what then are the prospects? Before the 11 of September the chances were that the US economy—which is of course key to the whole global outlook—was close to the bottom of its cyclical slowdown, and that we would see a gradual pick-up into next year. The eurozone, which is a particularly important trading partner for the United Kingdom, was also expected to recover lost momentum. That prospect may well have been set back by the terrorist attacks. These clearly had a direct impact on some sectors, including, for example, air travel and the aerospace industry. And they had an effect on consumer and business confidence more generally. But the degree and duration of the set-back is very far from clear.

We need to be careful not to exaggerate the likely consequences. The effects on confidence, particularly consumer confidence, are already showing signs of abating; and global equity markets, although they remain volatile, quite quickly recovered much of their initial losses. Nor should we underestimate the swift and strong policy response both in the United States and elsewhere. Looking further ahead it is difficult to see that the supply side of our economies has been materially affected: in particular the potential for modern technology to spread across different sectors, with the promise of improving productivity, remains intact, even if this is delayed by earlier excesses and by the more recent damage to business confidence. There is little reason that I can see to suppose that global growth will not recover to at least its earlier trend rate over the next 2–3 years once the immediate shock has been absorbed.

But in the meantime, the United Kingdom cannot be wholly immune from a more pronounced or prolonged global slowdown in the short term than we had previously expected—if that is indeed what occurs—even though we are better placed than some others to withstand it. Inflationary pressures remain well contained. Domestic demand appears to have been sustained into the third quarter, underpinned by increasing government spending in line with the Chancellor's intentions and by the easing of monetary policy. And consumer confidence in this country—on most of the evidence—seems to be holding up well despite the terrorist attacks. While business confidence generally weakened further in the third quarter, it remains stronger in the service sectors than in manufacturing. And on the basis of last week's BCC survey, it is notable that confidence in the service sectors here in Wales actually increased quite strongly.

No one can know quite how things will turn out in the present climate of uncertainty. We cannot rule out a further slowdown here in the United Kingdom. But all-in-all I am still persuaded on the evidence that we will avoid the overall recession that is widely spoken of in the media—though it may be a bumpy ride for a time. But there is one thing of which you can be absolutely sure. And that is that the Monetary Policy Committee will continue to track all the evidence as it becomes available with the utmost attention; and if it suggests that the overall economy is weakening unnecessarily, so that overall demand is falling short of our supply-side capacity to meet that demand, with the implication that inflation will fall materially below the Government's symmetrical $2^1/_2$% target, then we will not hesitate to ease monetary policy further try to reduce that effect. That is what we are required to do; and that is what we would anyway wish to do.

The corollary, of course, is that as and when external demand recovers, we will be equally vigilant in ensuring that domestic demand is reined back to accommodate it! But that may be now somewhat further ahead.

Maintaining financial stability in a rapidly changing world: some threats and opportunities

*In this speech,[1] David Clementi, **Deputy Governor**, explains the Bank of England's role in maintaining the stability of the overall financial system, reviews recent threats to that stability and outlines some of the ways in which they can be tackled. Despite the severe loss of life and damage to financial infrastructure following the terrorist attacks on the United States on 11 September, the financial system recovered remarkably quickly. The Deputy Governor salutes the US firms and authorities who made this possible, and notes that all firms will want to look again at their contingency plans in the light of the attacks. To guard against all forms of risk, financial institutions need to hold adequate capital. Mr Clementi reviews some of the ways in which regulators setting capital requirements have learned from private sector risk management techniques in recent years, and discusses some aspects of the proposed new Basel Accord.*

Introduction

It is a great pleasure to be here this evening, and to be part of the launch of the Oxford Centre for Computational Finance. Responding to new types of risk demands an increasingly sophisticated combination of technology and intellectual thought, and I can think of few places as well suited to this exciting and challenging task as Oxford. As an honorary Fellow at Lincoln College, I know that the drive for excellence remains as high as ever, and I have to say that I look back at my time here as an undergraduate with great affection. That was some time ago, of course—back in the 1960s, when a photocopier or calculator was pretty high tech—and if you knew the current prices of equities on the exchange you had a five-minute information jump on most of the market. The world today of course is much more complex and the risks correspondingly more difficult to analyse.

What I'd like to do tonight is to cover three main topics. First, I want to explain the Bank of England's role in financial stability issues, and discuss some of the threats to that stability which have emerged recently. I want to say a little about the tragic events of 11 September, which have further underlined the complex nature of the world we live in. Second, I would like to look at some of the ways in which formal models of market and credit risk of the type you will be studying here have already influenced the design of our regulatory regimes. Much has been achieved here, but much also remains to be done, and the current state of the art by no means captures every type of risk run by financial firms. So, third, I want to talk about some other safeguards which will continue to be necessary to improve the chances of maintaining financial stability.

The Bank of England's role in financial stability

The maintenance of stability in the overall financial system is one of the Bank of England's three core tasks—the other two being responsibility for monetary stability, and promotion of the efficiency and effectiveness of the UK financial system. That concern for system-wide financial stability does not reflect a paternalistic belief that central banks know better than the markets—indeed market disciplines have a very important role to play in maintaining stability. Rather, it derives from the fact that some types of problem which initially affect only individual financial institutions may subsequently threaten the stability of the system as a whole. This contagion may not be fully in any individual firm's interests—or powers—to resolve, and it is this 'gap in the market' which creates the need for public involvement via central banks. Fortunately, banking crises do not occur every day of the week. But they do happen: an IMF study counted 54 across the world between 1975 and 1997, of which 12 were in developed countries. Such crises can have enormously harmful

(1) Given at the launch of the Oxford Centre for Computational Finance, University of Oxford on 10 October 2001. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech144.htm

effects: recent Bank of England analysis suggested that, over the past quarter-century, total output losses during banking crises have averaged around 15%–20% of GDP in the countries in which they occurred.

Whilst the Bank has responsibility for maintaining systemic stability, the day-to-day supervision of individual banks and other financial firms in the United Kingdom has been the responsibility of the Financial Services Authority (FSA) since 1997. Co-ordinating our system-wide perspective with the FSA's supervision of individual institutions and the Treasury's legislative responsibilities is essential to the smooth functioning of the new arrangements. A Memorandum of Understanding, signed by the Bank, the FSA and the Treasury in October 1997, sets out our respective responsibilities, both in 'normal' times, and in a crisis. And we work hard to foster these relationships, helped by the fact that I am a member of the FSA Board and Howard Davies is a non-executive director of the Bank. The three institutions also get together each month in the so-called 'tripartite Standing Committee' to exchange information and discuss current threats to financial stability. I say once a month, but we meet more frequently than that when needed, as we have done for example over the past few weeks.

What are some of those threats as I speak here today? We are, of course, still working our way through the implications of the dreadful events in the United States last month. Uncertainty about the near-term outlook increased quite markedly following the attack, and this—together with the possibilities of supply-chain and market disruption, particularly in the United States—contributed to some sharp adjustments in equity values. A number of sectors most closely affected by the terrorist attacks—in particular air travel and insurance—were badly hit. More recently, equities have rallied somewhat, suggesting that some of the earlier concerns may have been overdone. But the market is still clearly lower than it was at the start of September.

These factors have potentially important implications for the inflationary outlook, and therefore for monetary policy. The Bank of England's Monetary Policy Committee—in common with a number of other central banks around the world—reduced interest rates last month, citing in our press release the increased risks of a further slowdown in world growth. Interest rates were cut by a further quarter of a per cent following our meeting last week, and you will be able to read about our reasoning for this decision when the minutes are published on 17 October.

In other ways, though, the aftermath of the attacks on the United States has highlighted the robustness of the international financial system. Although several firms suffered grievous losses of staff and destruction of equipment, overall the market place was back up and functioning remarkably quickly. I think there were a number of reasons for this. In the first place the Federal Reserve System did an excellent job in making the necessary liquidity available to markets, both in the United States and in other financial centres through swap arrangements with the ECB, the Bank of England and other central banks. Second, the authorities and systems providers were able to keep the main payment systems (Fedwire and Chips) open during and after the evening of 11 September itself. This was a significant achievement, enabling the huge daily volume of dollar payments to be made, including of course substantial dollar flows from the foreign exchange and other dollar markets based in London. Equally impressive was that most of the big firms affected were using their back-up contingency sites very quickly, allowing them to continue in business with a minimum of obvious disruption. Some of those contingency sites were in New Jersey, others put increased volumes through their London office. In New York itself, connectivity of telephone traffic was initially badly affected because of the routing of so much traffic through connections located downtown. But this problem was short-lived. Overall, we salute the US firms and the US authorities for their actions, achieved at a time which for many involved was one of acute personal anxiety.

There are a number of lessons for firms based in this country. All of those firms, including in particular those providing key infrastructural services, will want to review the robustness of their contingency and back-up plans.

Risk modelling and regulatory capital

That takes me to my second topic this evening. The damage to physical infrastructure in the United States represents an extreme example of a particular type of risk—'operational risk' in the jargon of financial regulators. But the more general question of risk measurement and risk management has assumed a central position in both private and public sector efforts to reinforce the stability of the financial system.

From the regulators' point of view, perhaps the first attempt to answer this question at a global level came with the 1988 Basel Accord, which required that all internationally active banks should—at a minimum—carry capital equivalent to 8% of risk-weighted assets. The risk weights were very broad-brush, and related only to credit risk. Set against the background of a concern about decline in the capital held by banks in the late 1980s, however, the Accord was a clear success. The average capital ratios of G10 banks rose substantially in the following ten years, and a more level playing field was established between banks based in different countries. That success was due in no small measure to the Accord's simplicity. But over time it did become clear that the lack of very precise differentiation between different kinds of borrower was introducing serious distortions by opening up gaps between the capital required for regulatory purposes and the 'economic' capital suggested by banks' own increasingly sophisticated risk management systems.

Another weakness in the 1988 Accord was the lack of any proper treatment of market risk—that is, risk associated with fluctuations in interest rates, exchange rates and so on. The intensive application of information technology and advances in the theory of finance drove significant improvements in the ability of larger banks to measure and manage market risk during the 1990s. Of particular importance was the development of 'Value at Risk' (VaR) models, which allowed banks to calculate measures of the aggregate risks being run on entire portfolios. Using the latest thinking on how to price individual assets, and exploiting data on past movements and correlations in asset values, these models provide estimates of the statistical distribution of value for an entire portfolio of marketable assets. Estimates of the amount of capital at risk can then be read off from the lower tails of these distributions.

VaR models have proved enormously useful to firms in managing the day-to-day risk on parts of their business. And the Basel Accord was modified in 1996 to allow VaRs to be used as an input to the regulatory capital calculation for market risk. But care is needed, not least because these models tend to be least robust in precisely the circumstances of most interest—ie those rather rare cases in which losses are very large, hidden away in the lowest parts of the bottom tail of the probability distributions. The evidence suggests that such events are not well captured by the normal distributions typically used in standard risk models. Markets tend to behave in highly non-linear ways—moving within relatively narrow ranges for long periods, but then adjusting quite sharply. Sometimes these adjustments can be related to clear external events—such as the World Trade Centre attack. But often there is no such trigger. The types of circumstances that generate these outcomes are not particularly well understood. This is, I believe, a central theme of the recent work of some of your founder members, and it is one with significant operational as well as theoretical implications.

I noted a few minutes ago that the original Basel Accord had given rise to a number of distortions between economic and regulatory capital. This problem came to a head during the course of 1990s as banks increasingly engaged in so-called 'regulatory arbitrage'. Better credits, over-weighted by the Accord, were progressively being securitised, leaving relatively poorer credits on the banks' balance sheets. And banks were getting little allowance for risk reductions achieved through portfolio diversification and the use of risk mitigation instruments.

To address these issues, the Basel Committee has proposed a new Accord which would allow firms to use externally or internally generated credit risk ratings to differentiate more precisely between different risks. There would also be a significant expansion in the recognition of collateral, credit derivatives and guarantees as means of reducing overall risks. These proposals are currently under discussion by central banks, regulators and market practitioners. Given our financial stability responsibilities, the Bank of England has been closely involved in this process. A team led by Patricia Jackson at the Bank has been providing technical and policy support to the Basel Committee, and we hope to have an agreement in the course of next year.

The new Accord does not, however, go to the point of recognising VaR-type models for measuring credit risk on portfolios as whole. At present, these models are not judged to be sufficiently robust to form the basis of a regulatory regime. A central issue is the sheer lack of information. Many types of loan have no publicly visible price, so the models lack a large and reliable data base. The behaviour of loans under different scenarios, and the correlations between different assets—both key inputs to any VaR model—have in many cases to be assumed rather than measured. And testing the *ex post* performance of the models is

difficult. Where credit instruments lack market prices, model predictions can only be compared to data in the event of defaults, which are relatively rare. Investment horizons are usually so long that it would take many years to gather sufficient data for a statistically reliable test.

Credit risk models have clearly improved banks' understanding of the risks they face, and are slowly being implemented into their own internal systems. But the main challenge here in the next few years will be to refine the operation of these models, and seek answers to some of the questions I have raised. This is a fascinating research agenda, and I have no doubt that academics will treat these questions as challenges rather than causes for despair!

Ensuring adequate safeguards for the system as a whole

That leads me to my final topic tonight—how, given our imperfect knowledge, we design a regulatory capital regime which adequately captures the full range of risks run by financial firms.

There are, first, a number of important points which remain unresolved in the discussions on the new Basel Accord. One issue relates to the appropriate overall level of capital in the banking system. Overall capital, as with many regulatory issues, is at root a public policy choice about the balance between safety and economic efficiency. Higher capital requirements increase the costs of financial intermediation. Against this, the total pool of capital coming out of the new Accord must be large enough to protect the system against reasonable levels of risk.

Second, we need to be sure that the new rules do not give rise to movements in bank capital which excessively reinforce cycles in the real economy. Bank capital is inherently somewhat procyclical. In an economic downturn, banks will increase provisions and tighten loan standards. In some circumstances, this could reduce the supply of credit, intensifying the decline in activity. But the introduction of a regime in which regulatory capital is linked to ratings could amplify that effect to the extent that those ratings themselves deteriorate rapidly in a downturn. There are various ways round these problems of procyclicality, but they will need to be resolved before the new Accord can be finalised.

I have talked a lot about the structure of public regulation. But it is also important to remember the powerful role that effective market discipline can play in maintaining financial stability. Both the new Accord, and a number of other, broader international initiatives, put substantial emphasis on improving the disclosure of information by financial firms. Disclosure of an appropriate kind should help the market distinguish clearly between well-managed and adequately capitalised banks on the one hand, and their less sound counterparts on the other. This should act as a spur to the weaker firms to improve their performance. Disclosure should also help to reduce uncertainties, which may mitigate the tendency of financial markets to lurch into periodic self-fulfilling crises. It is certainly arguable that greater, and earlier, disclosure of the exposures of Long-Term Capital Management, for example, could have avoided the problems seen in world financial markets following its collapse in the autumn of 1998.

I would like to end by raising a couple of questions about the future shape of financial markets. The first is the extent to which we should be integrating both our analysis of risk and our approach to regulation between the insurance industry on the one hand and capital markets on the other. Quite apart from the increasing institutional interlinkages, the extent of risk transfer now going on between different parts of the financial sector demands a consistent approach to capital requirements across the sector as a whole.

A second issue is the need to reflect liquidity conditions in determining the appropriate level of capital. If an asset can be disposed of quickly—that is if there is a robust liquid market for the asset concerned—the capital needed to guard against unexpected price movements will be less than if the prospective holding period is long. Liquidity conditions can of course vary dramatically not just between different instruments but over time and understanding how and why they vary will, I think, be an important area of investigation for the future.

Conclusion

That concludes a quick summary of some of the financial stability issues relating to risk and capital levels that we at the Bank of England are working on at the moment. Central bankers are by their nature a worrying breed (in both senses of the word!), and commentators often note the regularity with which the Monetary Policy

Committee says that it finds the outlook 'more than usually uncertain'. Well—if ever there were a time when that phrase were true, it is now. I have spoken a little tonight about operational risk, and then about different types of financial risk. These are all areas where I believe this Centre can make an important contribution. The Bank of England is a voracious consumer of such analysis and expertise, and I very much hope that we will retain a close working relationship going forward.

Thank you for asking me here this evening—I wish you all the best in your future work.

Monetary policy: addressing the uncertainties

In this speech,(1) Ian Plenderleith, Executive Director and member of the Monetary Policy Committee, discusses the uncertainties facing the UK economy and considers what role monetary policy can play in contributing towards a more stable macroeconomic environment. He argues that the slowdown in the global economy poses a difficult task for the Bank's Monetary Policy Committee since it has led to imbalances in the UK economy, with weakness in those sectors that are directly exposed to the slowdown in world growth and continued buoyancy in domestic consumption. The challenge for the Monetary Policy Committee is to try to continue to strike a balance between these divergent conditions such that inflation remains low and steady, thereby enabling the economy to grow at a sustainable rate.

The thoughts of all of us have turned, repeatedly over the past ten days, to the recent tragic events in New York and Washington. I want to touch on those events later in my remarks. But I want at the outset to express deep sympathy for the traumatic loss so many innocent people are suffering, but also admiration for the resilience and determination the American people are displaying. Our hearts and hopes are with them every step of the way.

Even before those tragic events, the UK economy, and the world economy as a whole, were facing many uncertainties. Grappling with these uncertainties is a difficult task, both for business enterprises trying to manage their own activities, and for policy-makers trying to maintain an environment in which business can flourish. The road through will inevitably be a bumpy one; and there are undoubtedly risks that the process will not be as comfortable as we would wish. But in my view, there are good grounds to believe that we can meet the challenge of steering through the present uncertainties and reaching more stable ground.

I want tonight to look at some of these uncertainties and explain how we are addressing them; and in particular, what monetary policy—the setting of interest rates—can contribute to the process—but also, what it cannot. In doing so, I want to offer some grounds for believing that we are well placed to weather the present uncertainties and that, if we can strike the right balance in setting monetary policy, there is a reasonable prospect of our coming through them in good shape to resume the path of sustained growth looking ahead.

It is undoubtedly helpful that the UK economy has, for the past several years, enjoyed an extended period of strong performance. Output has grown strongly at around the sustainable trend rate that we can hope to achieve. Employment has continued to rise and unemployment is at its lowest level for over a quarter of a century. Living standards have risen substantially. The strong fiscal position has enabled a planned programme to be pursued of increased public expenditure, designed to improve public services. Structural improvements in the economy have helped us in the challenge to maintain our competitiveness internationally, notwithstanding the strains that many businesses—including important sectors here in Scotland—have felt from the high exchange rate. Application of technological advances, particularly in the area of ICT, have helped improve the supply capacity of the economy, even though the extent of the improvement is, as yet, hard to judge.

Alongside all of this, inflation has remained low. It remains the Bank of England's particular task to keep inflation in line with the Government's target of $2^{1}/_{2}$%. That is the part we play in trying to maintain the economy's strong performance. In doing so, we try to keep growth in overall demand in the economy broadly in line with the growth in its supply capacity, and thus help to ensure that the economy can continue to grow

(1) Given to the Fort William Chamber of Commerce in Scotland, on 20 September 2001. This speech may be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech143.htm

over time at a steady, sustainable rate that can be maintained on a continuing basis over the medium term. In this way, we can hope to provide a stable framework within which businesses throughout the economy can plan for the future on a long-term basis and thus deliver the steady growth in output and employment that is our common aim.

This task—setting interest rates to maintain low inflation, as a means to enable the economy to continue growing steadily at its sustainable rate—is a key contribution. But it cannot on its own insulate the economy from all the normal influences that affect its performance, be they cyclical shifts or sudden shocks. We are at present facing uncertainties from a number of influences of this kind, and I want therefore to look at some of them and explain how we are trying to address them.

Undoubtedly the major influence we, in common with other economies, are experiencing at present is the economic slowdown in the United States and its impact across the world economy as a whole. For the past several years the US economy has experienced a period of exceptionally strong growth, helped by productivity gains engendered by the application of information and communication technologies throughout the US economy. This has been an enormously important factor in enabling the world economy as a whole to grow in recent years, and to come through the emerging markets crisis of the late 1990s. But during the course of last year it became clear that, with the US economy growing at around 5%, the pace was running faster than could be sustained. Some slowdown was therefore needed, and that is what we have seen happening during the course of this year. In addition, we have seen slower growth than expected in the euro area, continued weakness in Japan, and a number of the emerging market economies severely impacted by these developments. The question is how substantial and prolonged the global slowdown will be and what will its effect be on the United Kingdom.

Making that judgment is particularly difficult because the nature of the slowdown the United States, and the world as a whole, is currently experiencing is somewhat different from previous cycles. The rapid growth the United States was exhibiting up until last year was driven in major part by high levels of investment, seeking high rates of return in a rapidly expanding economy. Inevitably, especially in a prolonged period of exceptionally strong growth, the process can become over-exuberant and not every investment achieves the rate of return expected of it. The slowdown we are seeing now reflects the judgment that investment had run too far. So we are for the moment seeing a sharp contraction in investment, and it is hard to see how far this adjustment will need to run before competitive pressures and the continuing rapid advance of technology leads firms to see the need to resume investment at levels necessary to sustain and grow their businesses. It may be helpful in that context that, given the pace of change, ICT investments typically have a relatively short economic life, so that today's systems may need replacement or upgrading rather sooner than conventional investment in basic machinery and equipment.

The strength of investment in ICT in recent years has not been confined to the United States. It has been a worldwide phenomenon, with many firms significantly stepping up investment in the application of ICT to their businesses or in developing new products and services harnessing ICT technology. Across the world, too, many countries have developed electronics and ICT businesses focused in particular on supplying this rising global demand for ICT investment. Now, all too evidently, the pace of demand has, for a period, slackened. So, alongside the pervasive general effect of slower US growth, we are experiencing a worldwide sectoral slowdown in the ICT-related area. This has impacted particularly on many of the Asian economies; but its effect has also been felt around the world, including here at home in the highly competitive electronics businesses which Scotland has developed.

The question looking forward, even before last week's shocking events, was how long this adjustment was likely to take to run its course and how quickly we could reasonably look for some signs of recovery. This remains an area where no one can make any confident judgment. But the evidence has been far from entirely negative. In many of the major economies, there have been tentative signs that we might be at, or approaching, the low point. In the United States, the impact of the necessary adjustment so far has been significantly cushioned by consumption spending continuing to grow relatively strongly, helped by a strong housing market. Importantly, with inflation remaining low, the US authorities have been able to cut rates substantially; that and the tax cuts currently being disbursed should provide an important support for domestic demand. We

may be unsure how long the process will take, but my own view is that no one should underestimate the resilience of the American people and the underlying strengths of the US economy. There remains every reason to be confident that those strengths will come through.

In the past ten days we have had to bring into the equation the impact of the tragic events last week in New York and Washington. We have been working closely with the Federal Reserve and other central banks to help the financial system overcome the immediate dislocation, and it bears testimony to the resilience of the financial infrastructure that essential financial activity, and importantly the critical processing of payments and settlements, has continued to function without significant problems. No one can yet judge the scale of the longer-run impact this trauma may have on consumer and business confidence and on the prospects for economic activity. But the direction of that impact and the associated risks are clear. Central banks have responded in recent days by cutting interest rates—in our case a $^1/_4$% cut announced on Tuesday, to $4^3/_4$%.

This is the fifth time this year we have cut rates. This reflects the fact that the slowdown in world growth has inevitably had its impact on the United Kingdom. The impact has been evident in slower, though still positive, growth in the first two quarters of this year and in continued weak business conditions since then. The impact has been felt particularly by businesses focused on supplying overseas markets—initially predominantly manufacturing, but now also evident in the service sectors. Moreover, the impact—again principally on manufacturing and externally orientated businesses—has been accentuated by the continued strength of the exchange rate. In fact, sterling has over the past year depreciated against the dollar. The high exchange rate has essentially been a product of the weakness of the euro against sterling and other currencies, the reasons for which have lain in perceptions about the euro itself rather than anything directly relating to sterling. That, of course, does not mean that the impact of sterling's high rate against the euro has not been a significant source of strain on businesses exporting to the euro area, and on those competing with euro-area businesses. But it does mean that there is little the United Kingdom could itself do to alleviate these strains, other than to recognise them and take them fully into account in our assessment of the prospects for the UK economy, and hence for interest rates, as we do. On the domestic front, too, we have had to face, over the course of the past year, difficulties arising from flooding and transport dislocation during last winter and the lingering persistence of foot-and-mouth disease. Taken as a whole, business has undoubtedly faced difficult circumstances. I know this is true particularly of parts of Scotland, where agriculture, manufacturing and tourism have all experienced setbacks.

Against this background, the effect of the cuts in interest rates we have made has inevitably been to add impetus to domestic spending, and particularly consumption spending by the household sector. Thus we have seen sustained strong growth in retail sales, high growth rates in personal borrowing and a buoyant housing market. This in turn has helped to sustain demand in businesses supplying consumer goods and services to the domestic market.

It was of course precisely in order to sustain domestic demand in this way, and help to counterbalance the softening in external demand, that we have cut rates. The strength of consumer spending helps explain why employment overall has continued to rise; and the process has been reinforced by the continued expansion in planned public expenditure on better public services, evidenced for example in strong construction activity. Overall, this has helped to sustain activity in the economy as a whole. But it has inevitably served to increase the imbalance in the economy, between the weakness being experienced in those parts of the business sector directly exposed to the slowdown in world growth and the continued buoyancy of domestic consumption spending.

For monetary policy going forward, the challenge we face is to try to continue to strike a balance between these divergent conditions faced in different parts of the economy. We have one considerable advantage in trying to strike this balance—inflationary pressures have remained low. Notwithstanding some upward pressure on earnings, inflation has remained close to our target of $2^1/_2$%. Our target, moreover, is a symmetrical one: it is just as important that we be ready to ease our stance if we see inflation, looking ahead, likely to run below target, and the economy under-performing its potential, as it is for us to apply restraint if we were to see inflation likely to exceed the target over the medium term. We have, I believe, shown our commitment to this symmetrical approach in the way we cut rates three years

ago in the wake of the emerging markets crisis, and in the cuts in rates we have made so far this year.

But assessing where to strike the balance remains a difficult judgment. If in the short run we go too far in boosting domestic consumption, we may find that, when world growth begins to recover, we have to act correspondingly more forcefully to restrain domestic demand in order to leave room for the recovery in external demand. Equally, we have to remember that interest rate changes work through the economy with a lag. The effect of the cuts we made earlier this year is still with us; and the impact of further cuts now will continue to be felt during next year and beyond.

This is not to say that we should not respond promptly to the changing picture as best we can see, looking forward; but it does mean that we cannot expect to be able to fine-tune the pace of demand in the economy in the short run. We have to look ahead and try to strike the best balance we can between the current slowdown in the world economy and the prospects for some recovery next year, on the one hand, and the current strength of domestic consumption and the risks of that faltering as the current external slowdown works through the economy, on the other hand. That may sound complicated. But it can be put another way, much more simply: looking across the economy as a whole, and taking fully into account all the regional and sectoral variations we see across the country—which is why I am here in Fort William—we have to set interest rates to continue to try to keep inflation in line with our target looking ahead over the medium term.

I have tried to explain why, given the uncertainties we currently face, this is bound to be a difficult task. But equally I believe it is one we are well placed to tackle. The fact that inflation remains low, and that the underlying competitive strengths of the major economies remain in place despite the present slowdown, are in my view reasons to believe that we can steer our way through the present uncertainties to more stable conditions of sustained growth. The road, as I have said, will inevitably be a bumpy one, but if we continue to try to strike an appropriate balance in our policy stance, I believe that we can meet the challenge.

Economic imbalances and UK monetary policy

In this speech,[1] Christopher Allsopp[2] discusses UK monetary policy in the context of emerging global and domestic imbalances, outlining the kinds of responses that should be anticipated under the present monetary policy framework. Negative shocks from the world economy bear particularly hard on the manufacturing and traded goods sectors but, since they lower inflationary pressure, lead to an offsetting policy of lower interest rates. To an extent, the present two-speed economy is the result. But the domestic imbalances also reflect the more long-standing problem of the rise in sterling since 1996, especially relative to the euro. It is argued that a significant depreciation of sterling, a risk given present imbalances, need not, under present circumstances, lead to a major increase in RPIX inflation and, moreover, that a once-and-for-all rise in prices due to a depreciation is not inconsistent with the United Kingdom's inflation target, provided policy is non-accommodating against second round effects. On a third aspect, it is suggested that the main risk from buoyant consumer demand and low savings in the short term is a substantial slowdown later which could imply an undershoot of inflation below target unless corrected by policy action. It is stressed throughout that a major stabilising force in the world economy and in the United Kingdom is the expectation that policy will act to keep output close to potential and inflation on target.

Introduction

It is a great pleasure to be asked to contribute to the Scott Policy Seminar Series. This talk was prepared largely before the devastating events of Tuesday, 11 September 2001 in the United States.

My theme today is UK monetary policy—in the context of emerging imbalances in the world economy and within the United Kingdom. It seems to be the consensus that the MPC, after a remarkably successful period since the start of the new arrangements in 1997—with above-trend growth, falling unemployment and stable inflation close to the Government's target—now faces considerably greater difficulties and challenges in the period ahead.

Economic commentaries are full of stories about the 'two-speed economy' and about the imbalances between manufacturing and services, the traded goods sectors and the non-traded, as well as worries about consumer indebtedness and the balance of payments, which raise the spectre of a late 1980s style 'boom and bust' for the UK economy.

There is no doubt that the talk of imbalances reflects genuine worries about the world economy—especially about the United States, but also about Japan, now sinking again into recession, and about the slowdown in the euro area—and about the United Kingdom. But the pessimism needs to be tempered. One obvious point is that the past four years of relative UK success have also been years of major international shocks and uncertainties—most notably the Asia crisis and the Russian default and its aftermath. Monetary policy, on the whole, managed to adjust to offset some of the problems, which looked particularly dire at the time. Might it not be the same this time?

Clearly, however, the shocks and uncertainties are very different now. That does not mean that policy actions, at home and abroad, can have no influence. But it does mean, if light is to be thrown on the issues, that it is necessary to pick apart the different impacts and

(1) Delivered in the Scott Policy Seminar Series of the Northern Ireland Economic Research Centre on 19 September 2001. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech142.pdf

(2) Member of the Bank of England's Monetary Policy Committee. I thank Amit Kara and Edward Nelson for helpful discussions and advice in the preparation of this talk. The views expressed are personal and should not be interpreted as those of the Bank of England or other members of the Monetary Policy Committee.

uncertainties to see what each might imply for monetary and other policy. Only then, I shall argue, can a reasonable overall assessment be made.

There is a lot going on. A rough classification, which does less than justice to the interactions between the parts, might be as follows:

(a) International

- The world slowdown and the risks of world recession.
- The international ICT shock and associated stock market falls.
- Imbalances within the United States and the international economy, and the implications for (possibly large and sudden) changes in major exchange rates.

(b) Domestic

- Within the United Kingdom, the implications of the 'high' exchange rate, against the euro in particular, which has been one of the major sources of imbalance—for example between the more exposed sectors of manufacturing and the more sheltered sectors of services. Added to this is the worry that the exchange rate might change quite substantially as events in the world economy unfold or because of developments within the United Kingdom.
- Also within the United Kingdom, the fact that domestic demand has been growing substantially more rapidly than GDP, with the difference accounted for by a deterioration of net trade. A consequence has been a worsening in the current account of the balance of payments—partly masked, however, over the past few years by the rise in the exchange rate and an 'improvement' in the terms of trade.
- Related to this, the surprising buoyancy of consumption and retail sales despite a falling stock market—reflected in an extremely low saving rate (comparable to that in the late 1980s boom). Consistent with this has been strong growth in credit to households and a high and rising level of household debt. Meanwhile, the housing market has picked up again—after a pause in the second half of last year—with house prices now about 11% higher than a year ago.

UK monetary policy needs to be set with one eye on the various impacts from the world economy and with the other eye on developments and tensions within the United Kingdom itself. It is worth reiterating that the Monetary Policy Committee's statutory duty is to try to meet the Government's $2^1/_2$% target for RPIX inflation; and that the target is symmetric.

International impacts

Much has been said and written about developments in the world economy, so I can be brief. In the first half of last year the world economy was booming, with industrial countries (OECD) growing at about 5.0% per year and domestic demand in the United States rising at about 6.5% per year—a rate which clearly looked unsustainable, though the turning point was hard to predict. A US slowdown appeared not only inevitable, but desirable. It is worth recalling that consensus forecasts at the time involved a 'soft landing', with a moderate slowdown in the United States balanced by a pick-up in growth in the euro area and in Japan.

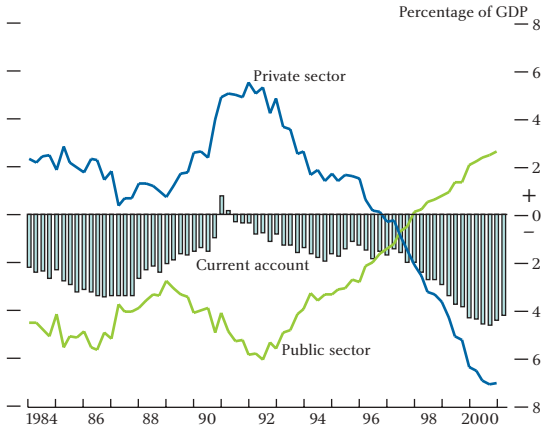
In the event, the United States has slowed much further than that, with GDP growth barely positive in the first half of this year. There are obvious linkages to other countries via the trade flows.(1) The slowdown has been associated with a major shock from the ICT sectors and a large stock market fall in the technology sectors. The ICT shock is effectively global, and there are substantial linkages via financial markets as well. Far from taking up a locomotive role, the euro-area countries as a group have also slowed, with Germany in particular facing strong recessionary forces, and the latest data suggesting a substantial slowdown in France and Italy. Japan, strongly affected by the ICT shock in the midst of serious domestic difficulties, is, according to most forecasts, facing the prospect of renewed recession.

The brunt of the slowdown in the United States has been borne by the manufacturing sectors (and more generally by the corporate sector). Consumer demand has held

(1) Trade as a proportion of GDP is of the order of 10% for the United States, for Europe (excluding intratrade) and for Japan. It is widely argued that these figures tend to understate the international linkages. A revealing statistic is that US import growth, which was about 16% per year in the first half of 2000, is estimated to have fallen to about -6% per year in the first half of 2001. The fall in US export growth was almost as large: from about 10% per year to about -6.5% per year.

up reasonably well compared with expectations—so that outright recession has been avoided so far—but at the expense of a continuation of domestic and foreign imbalances. The private sector deficit is running at over 6% of GDP—well out of line with previous post-war experience. The main counterpart is the United States' external current account deficit which, at about 4.5% of GDP, is substantially higher than the imbalances of the mid-1980s. (See Charts 1 and 2.) Most commentators agree that one of the main downside risks for the United States and the world economy is a major reaction of the private sector (households and corporations) towards financial prudence as balance sheets get stretched. (Such a reaction would be the more likely if further stock market falls were to materialise.)

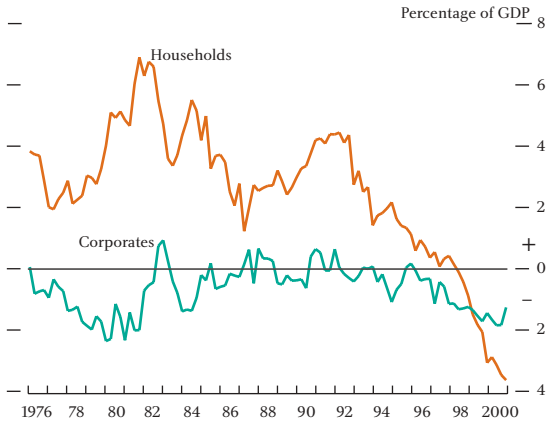
Chart 1
US sectoral balances



Note: Private sector balance series are those prior to the recent US national accounts revisions.

Sources: Bureau of Economic Analysis and Bank of England.

Chart 2
US household and corporate sector balances



Source: Federal Reserve Board.

As the extent of the United States and world slowdowns has become manifest, monetary policy has reacted in an offsetting way. Starting in January, the Fed has cut US short-term interest rates by 3.50 percentage points—and there may be more to come. Here, interest rates have been cut by 1.25 percentage points.(1) In the euro area, interest rates so far have been cut by three quarters of a percentage point. In Japan, the zero interest rate strategy, briefly abandoned, has been reinstated.

Prospects remain, however, extremely uncertain. Consensus forecasts have tended to suggest a moderate recovery in the United States in the second half of this year, and a resumption of moderate growth in the United States and trend growth in the world economy in 2002, but the risks are obviously great. Monetary policy needs to be set on the basis of forecasts which are highly uncertain: that is, on the basis of an assessment of the balance of risks.

The impact on the United Kingdom

How should monetary policy in the United Kingdom react to shocks from the world economy? To clarify thinking, it is useful to put aside problems regarding the composition of UK demand and output—such as those emanating from the exchange rate—and imagine that UK policy-makers simply have to react to shocks from abroad in a situation which is otherwise benign—with inflation close to target and output growing at potential.

We are concerned mainly with two types of impact or shock. The first is a (substantial) fall in world demand (weighted towards particular sectors, especially ICT)—impacting, in the first instance, on exports. The second, to be discussed only briefly, is a shock to world exchange rates and, in particular, a fall in the dollar relative to the euro. (Here, we assume that this change leaves the UK effective exchange rate more or less unchanged—a change in the effective rate for sterling, which might also be triggered by international developments, is discussed in the next section, below).

Taking the downward impact from international demand first, the impact on the United Kingdom would be a fall in demand and output as net trade worsened, with excess supply and an output gap likely to be created, tending to increase unemployment. In turn, this would indicate reduced inflationary pressure looking forward so that, if uncorrected, inflation would tend to fall below target. The policy response via the MPC's *reaction*

(1) These numbers include the interest rate reductions in the week following the 11 September terrorist attacks on the United States.

function is entirely predictable: interest rates would be set lower than otherwise. Broadly speaking, the MPC would be trying to stimulate other components of demand to compensate for the reduced demand from net trade and the negative impact on domestic demand of the global slowdown,(1) so as to keep prospective inflation in line with the Government's target of 2½%. That is what the symmetrical set-up of the monetary arrangements in the United Kingdom implies.

Of course, things are unlikely to be so simple in practice, due to major uncertainties, not just about the shocks that are occurring and will occur, but also about how the economies respond to those shocks and to policy changes such as movements in short-term interest rates. But some important points follow.

The first, and most important, is that the system is intended to be *stabilising* and *offsetting*. Over the medium term, policy is meant to undertake the adjustments needed to meet the inflation target and—since meeting the inflation target implies running the economy at productive potential—the economy should grow at about its potential rate. If the system is credible and transparent, then not only should inflation expectations be stabilised around the target rate set by the Government, but also it should be expected that large deviations of output from potential will not be permitted. It is also the case that if the objective is understood, then the policy actions taken to achieve the objective should be reasonably predictable.(2) Such a set of beliefs by the private sector in the efficacy of policy over the medium term would itself be a major contribution to macroeconomic stability even if—as is now the case—individual sectors are suffering major adverse impacts.

The second point is that, in the face of the sort of shocks that have arisen from the international environment, such a policy is almost bound to appear *unbalanced*. In the UK context, supporting demand to offset negative impacts from net trade and investment means supporting consumption (and the housing market, due to the effect of interest rate cuts on the cost of housing finance). To an extent the 'two-speed economy' is just what one would expect to observe from the offsetting strategy outlined.

Third, there are of course risks which need to be weighed. One, which was referred to by the Governor in his Mansion House speech on 20 June 2001,(3) refers to the possibility that, in the event, the United States and world economies might recover rapidly. Then an over-zealous stimulation of domestic consumption by the UK authorities could, if not reversed in a timely manner, lead to inflationary pressure further out, requiring a more painful correction later on. Other risks arise from the possibility that the world recession is prolonged. Then, the cumulative effects of the 'imbalance' could lead to a large current account deficit and, possibly, a sharp change in the exchange rate. This issue is further discussed in the context of the domestic imbalances below.

Clearly, it is likely that policy will need to adjust as events unfold and as further information becomes available. But this leads to a further important point about the overall context. As is especially obvious in the case of the United States, policy-makers in other countries too are trying to mitigate the effects of domestic and international shocks. In the United States, short-term interest rates have been cut aggressively precisely to generate the anticipation that the slowdown will be relatively short-lived, and that the US economy will soon return to full potential with stable inflation. The anticipation of such an outcome makes it more likely that it will be achieved. There has been and there still is considerable uncertainty about how far policy will have to adjust, but little doubt that if the problems appear bigger, then further action will follow. (Thus, bad news about US prospects leads to the market anticipation of lower interest rates.) The more other countries succeed in putting in place offsetting strategies, the smaller the impact on the United Kingdom. The decision of the ECB to lower interest rates in August in the face of weakening prospects in the

(1) As the MPC has discussed, net exports are only one potential channel through which international shocks are transmitted to the UK economy. From paragraph 7 of the February 2001 MPC Minutes: 'some members thought that there could be an impact on foreign direct investment in the United Kingdom by the many US firms with affiliates here whose home profitability and cash flows would be under pressure.'

(2) Mervyn King, in a lecture at the London School of Economics, famously suggested that if the MPC was doing its job well, then interest rate decisions would become boring as they would be anticipated by the private sector (King (1997, page 440)). In fact there are bound to be surprises since assessments and judgments are likely to vary even on the basis of similar information. It remains the case, however, that there is no virtue in surprising markets though it may be necessary if it is judged that markets have 'got it wrong'. A complication is that market commentators are trying not just to assess the situation and the appropriate policy response, but also to predict how the MPC will assess the situation.

(3) 'Balancing domestic and external demand', *Autumn Quarterly Bulletin*, pages 323–26. The speech is also available on the Bank's web site at www.bankofengland.co.uk/speeches/speech135.htm

euro area is greatly to be welcomed, not just from the point of view of the euro zone itself, but also from the point of view of the United Kingdom.

What this indicates is that the biggest risk from the world economy is that policy-makers might, in some sense, fail. I would hesitate to put a probability on this. In the United States, the main danger arises from the domestic and external imbalances. These pose a risk not just to the looked-for US recovery—in the bleakest scenario, monetary policy might simply be too weak, at least in the short term, to offset a major reaction by consumers—but, as has been suggested in a recent meeting of the Financial Stability Forum, to financial instability in the world economy. One possibility which cannot be ruled out would be a major fall in the exchange rate of the dollar versus the euro.

No one wants financial instability, and it is profoundly to be hoped that it will be avoided. Clearly, however, one of the reasons for the United Kingdom's two-speed economy, and the intense pressure on large parts of manufacturing industry, has been the weakness of the euro relative to the dollar. A fall in the dollar relative to the euro with sterling somewhere in between, if achieved in an orderly way, would do much to ease some of the imbalances in the United Kingdom. So far, however, despite a large cut in interest rates in the United States as compared with the euro zone, the recovery of the euro has been fitful and modest. The looked-for revival of the euro still seems some way off.

This takes us to the situation in the United Kingdom.

Domestic issues

One, imperfect, indicator of the 'two-speed' economy is the divergent rates of growth of manufacturing and services in the recent past. Over the past year manufacturing output (measured by industrial production, which is available monthly) has fallen by 3%, whilst services (which now account for about two-thirds of GDP) grew by 3.4% from mid-2000 to mid-2001. The comparison is even more dramatic for the first half of this year: manufacturing output in July 2001 was more than 4% below its December 2000 peak, while in 2001 Q2 services output was 1.7% higher than 2000 Q4. (See Table A.) And as is well known, retail sales, an indicator of what is happening to consumption, have been continuing to grow very fast over the summer—the latest figure (for August) is an increase of 6.3% over a year ago.

Table A
Indices of production in the United Kingdom

Index, 1995 = 100

	2000		2001		
	Q3	Q4	Q1	Q2	July
Total GDP	115.5	116.0	116.5	116.9	n.a.
Manufacturing	104.2	104.8	104.0	101.8	100.7
Services output	120.3	121.1	122.2	123.1	n.a.

n.a. = not available.

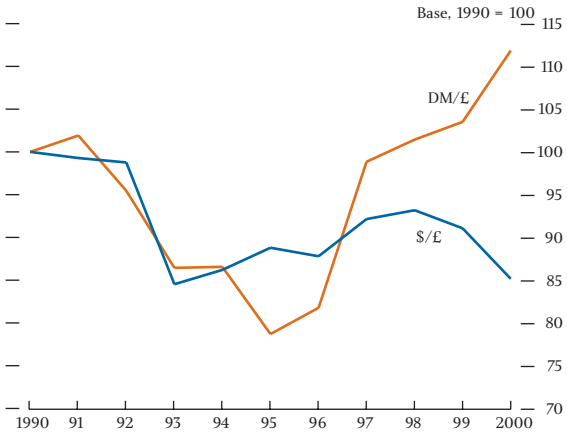
Sources: GDP, ONS series YBEZ; services output, ONS series GDQS; manufacturing output, ONS series CKYY (quarterly averages except July figure).

Some of this is due to the US downturn and the ICT shock—and I have argued that an offsetting strategy is desirable. But the imbalance is more long-standing than that, and has a great deal to do with the exchange rate.

The exchange rate

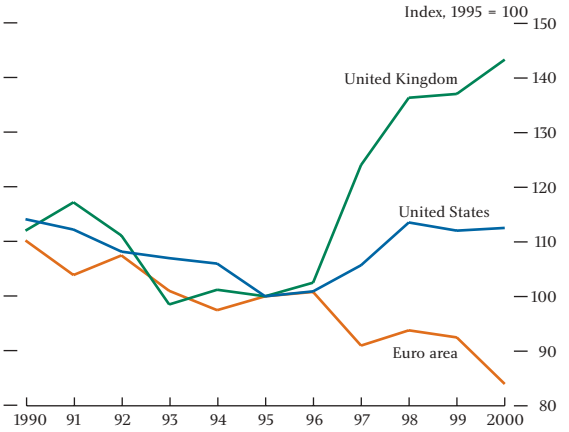
Chart 3 shows what has happened since 1990 to the United Kingdom's nominal exchange rate—against the dollar and against the Deutsche Mark (which of course tracks the euro since the beginning of 1999). Chart 4 shows indicators of cost competitiveness. The picture is

Chart 3
UK nominal exchange rate



Source: OECD; average of daily rates.

Chart 4
Competitive positions (relative unit labour costs)



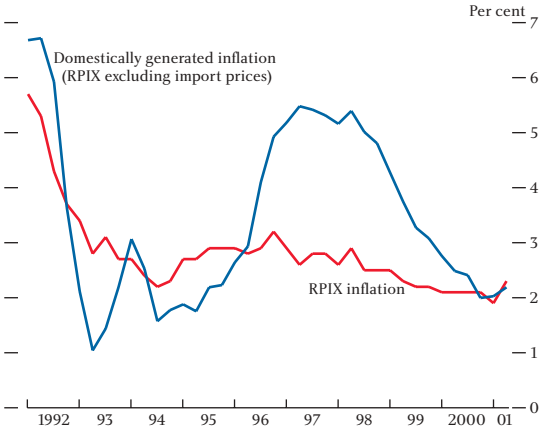
Source: OECD.

one of a major shock to competitiveness starting in about 1996 relative to Germany and Europe and a much smaller shock relative to the dollar. The shock to competitiveness, bearing on euro-exposed sectors of the economy, has been very large.

The MPC cannot target both inflation and the exchange rate but, of course, exchange rate developments do have a major bearing on interest rate decisions. The exchange rate has a direct influence on prospects for RPIX inflation via import prices as well as indirect effects on demand, output and unemployment (and hence onto inflation).

During the period when the exchange rate was rising, overall RPIX inflation was held down by the dampening of import price inflation—as can be seen in Chart 5, which compares RPIX inflation to domestically generated inflation (DGI), as measured by RPIX excluding import prices. DGI has tended to be higher than the target rate for the RPIX series, and higher than what is consistent with the long-term maintenance of RPIX inflation on target. Importantly, however, more recently the picture has changed, and indicators of domestically generated inflation have been broadly consistent with the inflation target. In the period when the exchange rate was rising, real household incomes were boosted by the exchange rate rise—the effect on real incomes coming through via a lower cost of living than otherwise due to lower import prices.

Chart 5
UK RPIX inflation and domestically generated inflation

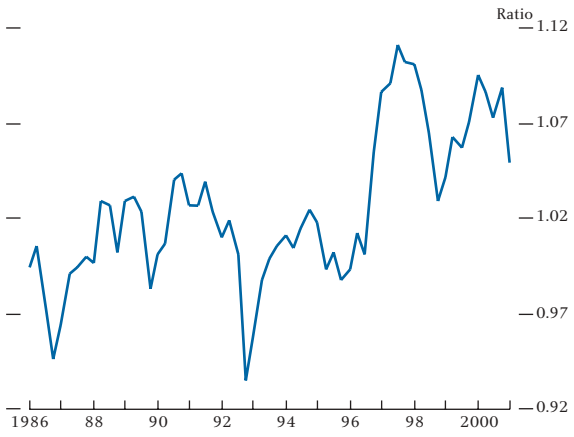


Sources: ONS and Bank of England.

It may be useful to think of the impact of the exchange rate rise in terms of three different channels—though they are all closely interrelated. First, there is a favourable impact on prices, because import prices, measured in sterling, will be lower. Second, because of this, households' living standards improve. (The weight of import prices in the RPI and in RPIX is about one quarter). Other things equal, real personal disposable income will be higher, supporting consumption. But, third, consumers and businesses will substitute cheaper imports for home-produced goods—putting downward pressure on volumes and margins in the import-competing sectors—and exporters will be under similar pressure, affecting volumes and margins, since their costs, relative to overseas competitors, will have increased. In short, the traded goods sectors will come under severe pressure. The volume effects on exports and on production in the import-competing sectors, and hence on net trade, feed through to lower demand and output in the domestic economy. If we think of the (real) exchange rate change as happening suddenly and then being maintained for some time, then one can summarise the impacts as involving a step fall in the price level (which raises real income and demand in the short term), which is then followed by lower demand and output and reduced inflationary pressure as the volume effects come through.

Broadly speaking, this is the picture of the recent past since 1996. One important detail is that import prices have not reacted to the exchange rate change as much as might be expected on the basis of such simple figuring—see Chart 6, which suggests that import prices are still about 6% higher than might be expected on the basis of sterling-adjusted world export prices. This suggests that, in some sectors at least, foreign suppliers have raised profitability and margins in the United Kingdom. At present exchange rates, this could lead to further downward pressure on import prices as these margins are eroded by competition: it also

Chart 6
UK import prices relative to world export prices



Sources: ONS and Bank of England.

suggests that a (moderate) fall in the exchange rate from the present level might have relatively limited consequences on inflation in the short term, as some of the impact will be absorbed by foreign suppliers.(1)

An exchange rate fall

I have already referred to the possibility that there could be a move down of the dollar relative to the euro, with the UK effective rate somewhere in the middle and relatively little affected. Most analysts would welcome such a change in the dollar/euro rate as a move towards the 'economic fundamentals'—though forecasts based on the 'fundamentals' have had a poor record in recent years, as most economists know to their cost.(2) I do not want to say much about this except to say that, taken by itself, a moderate move would be extremely welcome: some of the pressure would be taken off the sectors most exposed to competition from the euro area—with, of course, a downside for those exposed to the dollar area. Within much of the export sector, there would be a move in relative profitability in favour of exports to the euro area and against exports to the dollar area and, since it is the euro-exposed sectors that are most under pressure, this would be a move towards 'balance'.

Here, I am concerned with a fall in the effective rate—say by 10% from the rate assumed in the August *Inflation Report* (which was 106.7). Another way of getting a feel of the magnitude is that the present rate against the Deutsche Mark—which is about 3.2—would fall to about 2.9. It goes without saying that the implications for monetary policy would depend on the context—all the other things that were going on at the same time.

Taken by itself, the implications of such an exchange rate fall would, broadly speaking, be the reverse of the effects discussed above. The impact effect, assuming full pass-through to import prices, would be a rise in import prices of 10%, implying a rise in the price *level* of about 2½%.(3) There is an analogy here, as far as the private sector is concerned, with the effects of a rise in indirect taxes (such as a rise in VAT of about 2½% of GDP).

Measured inflation would rise as the impact came through, but then fall back. With an unchanged nominal wage path, real wages would fall—by 2½% relative to what they would have been otherwise. The effect on the labour cost competitiveness of exporters would, however, be the full 10%, allowing a reconstitution of margins of up to 10% of the selling price, or lower selling prices in foreign currency.(4) This sort of figuring makes it clear that a depreciation of sterling, by, say, 10%, would make a major difference to hard-pressed exporters—especially those exposed to euro-area competition.

From a monetary policy point of view, however, the situation is more complex and the impact effects are far from the end of the story. First, although the impact effect on real demand could well be negative (due to the effect on real incomes),(5) volume effects on net trade would soon come through, which would need to be offset by higher interest rates than otherwise to maintain a given output gap. Second, the assumption that prices rise and real incomes fall without an effect on inflation further out is extreme. There are a number of ways of putting the general point. Measured inflation would rise during the pass-through period, and if this affected inflation expectations and wage settlements then an inflationary spiral could result. Alternatively, the implied squeeze on real incomes could be resisted, leading directly to wage and price inflation. In either case the inflationary pressure would need to be checked for a time by higher interest rates (and a larger output gap) than otherwise. The MPC has, however, some 'constrained discretion' about how quickly to bring inflation back to target in the face of such shocks. Clearly, the task of the MPC would be the easier the less the extent of real wage resistance and the smaller the effect on inflation expectations.

I expect that you will have noticed that what I have just said dodges what many will see as the most interesting question. Should a price level change arising from an assumed permanent change in the real exchange rate (or, for that matter, an indirect tax change) be

(1) Consistent with this, work in the External MPC Unit of the Bank of England finds 'threshold' patterns in the degree of pass-through of exchange rate movements to import prices in the United Kingdom.
(2) The Bank routinely calculates how much of a change in the sterling exchange rate and of a change in the dollar/euro exchange rate can be explained by changes in fundamentals, such as interest rate differentials. The answer, unfortunately, is 'not much'.
(3) Of course, in practice, there would be substantial lags in the responses, complicating the picture.
(4) For a seller all of whose costs are UK costs, the margin on sales could, if the price were unchanged in foreign currency, increase by the full 10 percentage points. Typically, however, exports have an imported component, and the cost advantage applies only to UK value added. Whether the cost advantage would lead to higher margins or lower prices would depend on conditions in the industry and on the competitive situation.
(5) The depressing impact of euro depreciation on real incomes (together with higher food and energy prices) is one of the explanations commonly heard for the slowdown in domestic demand in the euro area.

accommodated or resisted? (There is general agreement, of course, that a non-accommodative policy should be taken to the second-round effects.) If it were possible to distinguish clearly between the real impact (affecting some, but not other price level measures)(1) then it seems clear that under an inflation target regime—as opposed to a price level target regime where the price level includes import prices—the level effect should be allowed to come through.(2) In practice, however, it is not easy to distinguish between level effects and inflation effects, and the key issues are likely to centre on the reaction of expectations and of real wage resistance. All this argues for a high degree of transparency and explanation on the part of policy-makers if such impacts occur.

The above account of the effects of an exchange rate fall is clearly oversimplified and lots of qualifications could be made. (For example, the exchange rate would depend on the monetary policy response and on market anticipations of the MPC's reaction function.) Nevertheless, an exchange rate move could quite easily present itself as an exogenous (and possibly unexplained) shift at (say) the beginning of an MPC inflation-forecasting round, in which case questions such as the extent of pass-through to import prices, the reaction of wages and the effect on expectations would be at the centre of discussion.

Were an exchange rate fall to occur under conditions something like the present, one question that would certainly be in my mind would be the likely effect on import prices. As we have seen, there are some indicators that suggest they are presently 'out of equilibrium' in the sense of being abnormally high in relation to world export prices. A depreciation of about 5%–6% would bring them back in line with historical averages—suggesting that, at least for a relatively small depreciation the pass-through to inflation and the implied downward effect on living standards might be attenuated. This is an issue that requires more research.

Finally, before moving on to look at other aspects of the UK imbalances, let me stress that I have been discussing the potential effects of an exchange rate fall, were it to occur. It is certainly not a forecast. (Since I am concerned about the imbalances in the United Kingdom, I would, in fact, certainly welcome such a fall if it occurred in an orderly way.) But it has been argued, by those who contend that sterling is fundamentally overvalued, that a sharp fall will occur—say, sometime over the next couple of years—though the timing is extremely uncertain. Should monetary policy now react to that future possibility—and the possible upward effects on inflation when it happened? I for one would be content to wait to assess the situation if and when it happened.(3)

Consumer demand and savings

I turn now to my third major topic—what is happening in the United Kingdom to consumer spending and savings, and the question of whether the buoyancy of consumer spending poses threats to the future. The view that it might is easily understandable, given some of the similarities to the situation in the late 1980s, when savings fell dramatically before rising equally dramatically as boom turned to bust.

In fact though there are similarities (see Chart 7), there are equally important differences. (See Table B.) For example, house price rises have been much less dramatic and debt servicing—as stressed in the August *Inflation Report*—is much smaller than in the late 1980s (reflecting, amongst other factors, considerably lower interest rates). But the main difference that I would stress is that, whereas the late 1980s were clearly a situation of excess demand, and the deterioration in net trade was largely a consequence of that, the situation now is one where domestic demand is being kept up to compensate for the deterioration in net trade. From a policy point of view, it is fully recognised that consumption growth would have to slow if the external situation were to improve or if other components of

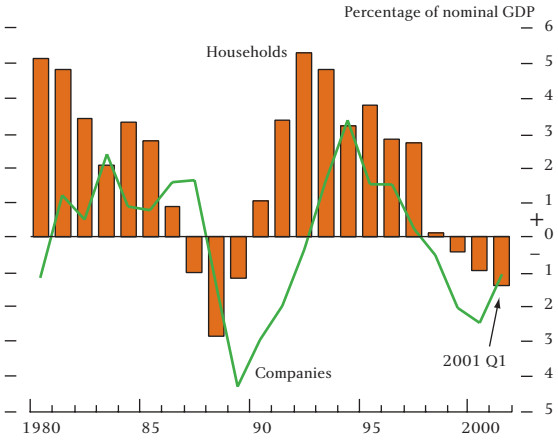
(1) Clearly, consumer price indices would be affected but the GDP deflator (the price of domestic value added or production) would not be. RPIY, which excludes tax effects, would also be unaffected. There is no mechanical impact on nominal wage inflation either. In the indirect-tax-increase case, the GDP deflator at market prices would be affected whilst that at factor cost would not.

(2) Meltzer (1977, page 183) observes that 'a one-time change in tastes, the degree of monopoly, or other real variables changes the price level… [W]e require a theory that distinguishes between once-and-for-all price changes and maintained rates of price change.' Meltzer argues that Friedman's proposition that 'inflation is always and everywhere a monetary phenomenon' does not refer to the movements in measured inflation that are due to once-and-for-all price level changes.

(3) In the MPC forecasting process, exchange rates are projected forward on the basis of a simple average of two forecasting assumptions. The first is that exchange rates will evolve according to the predictions of uncovered interest parity (UIP), and the second assumes the exchange rate is a random walk—ie that the best predictor of the exchange rate is the present exchange rate. The assumption of an asymmetric downside risk of the type described would result in an upside skew to the inflation forecast arising from the exchange rate—an assumption that has been adopted from time to time.

demand, such as public expenditure, were to expand faster than envisaged. The focus of policy is on meeting the inflation target. Putting it at its simplest, this implies aiming to keep overall demand rising broadly in line with potential, which in turn implies that there will be imbalances if some parts of the economy are adversely affected by the exchange rate and by shocks to the world economy.

Chart 7
UK net financial balances of households and companies



Source: *Inflation Report*, August 2001.

Table B
The Lawson boom vs today

Per cent

	Average per year for: 1986–89	1997–2001
Real GDP growth	3.8	2.7 (a)
Consumption growth	5.3	3.9 (a)
Current account balance, percentage of GDP	-2.5	-0.5 (b)
Change in current account over period	-3.8	-2.3 (c)
Saving ratio	5.6	6.0 (d)
Change in saving ratio over period	-3.5	-4.6 (d)
Unemployment rate	9.6	6.3 (c)
Change in unemployment rate over period	-4.2	-2.7 (c)
RPIX inflation	4.6	2.4 (a)
Nominal wage inflation	8.3	4.6 (a)
House price inflation (Halifax)	15.7	7.1 (a)

(a) To 2001 Q2.
(b) To 2001 Q1.
(c) 1997–2000.
(d) Includes 2001 OECD projection.

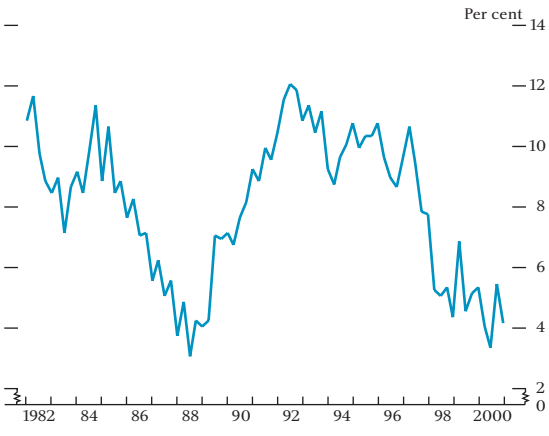
But this certainly does not mean that there are no risks in the present situation. One, which is frequently mentioned, is that a continuation of strong consumer demand, spilling over into a deterioration in the external current account deficit, could trigger a sharp fall in the exchange rate. Were that to happen, monetary policy would need to adjust—and I will say more about this in my closing remarks. But the main risks, I would argue, concern the course of consumer demand itself. Forecasting the likely path of consumption is difficult in present circumstances and it is worth recalling that some of the largest policy errors in the past (notably during the late 1980s) have been due in large part to misforecasting the behaviour of consumers.

So one possibility is that the strength of consumer demand looking forward is being underestimated. Given what is happening elsewhere in the economy, this would involve stepped-up borrowing and show itself as a continuation or further fall in household savings. If the buoyancy of consumer demand were great enough (and other things did not change enough to compensate), this would be a situation of excess demand, a tightening labour market, and rising inflationary pressure. It would need to be checked by a rise in interest rates. It is important to be clear that the problem would not be the continuing or increasing 'imbalance' itself, but the excess spending leading through to inflationary pressure.

Given that savings are already low and borrowing has been high, such a scenario may not appear very likely. But consumer behaviour has surprised in the past, and the example of the United States does suggest that imbalances can go on, and can go on getting worse, for a long time.

The downside risk for consumer demand is equally apparent. The saving rate is, as shown in Chart 8, historically low. In the late 1980s, low savings were followed by a major slowdown in consumer demand. The growth rate of private consumption fell from 7.5% in 1988 to -1.7% in 1991. I have argued that the situation is *not* like the late 1980s; but it is clear that a 'correction' of the imbalances—a reversion of saving behaviour towards a longer-term norm—could involve a substantial slowdown in consumption spending, perhaps involving an excessive degree of slowdown and implying an undershoot of the inflation target unless corrected by policy action.

Chart 8
UK household saving ratio



Source: *Inflation Report*, May 2001.

Uncertainty is, of course, always a feature of the policy environment. A complicating factor, however, is that the two risks, of excessive consumption or consumer retrenchment, are not independent. If consumers have some 'normal' relationship between their assets and liabilities on the one hand and their flows of income and expenditure on the other, then a period of balance sheet deterioration (a build-up of debt or run-down of assets) is likely to be followed by retrenchment and the greater the deterioration, the greater the retrenchment subsequently. What this means is that abnormally high consumption in the short term would increase the risk of abnormally low consumption subsequently.

At present, consumer demand appears to be strong, but is expected to slow. A continuation of high spending carries the risk of a greater fall in demand later. This poses awkward questions of timing for interest rate policy.

The overall picture

My discussion so far has focused on three rather different issues that bear on UK monetary policy at the moment—namely, the international impacts from the world economy, issues surrounding the exchange rate and the effects of a possible future fall in the sterling exchange rate, and the buoyancy of consumer demand in the face of the adverse developments in those parts of the economy most exposed to international shocks and the high exchange rate. Monetary policy needs to take all of them—as well as many other things—into account. I have purposely tried to separate the issues. Now it is time to put them together. Evidently, there are major uncertainties—but that is not a very helpful remark. I want to argue that there is some structure to the overall picture and it is possible to get a feel for what might go with what. The main reason for this is that policy is not passive in the face of the shocks that might eventuate, and so reaction functions are, to an extent, predictable.

Let me illustrate this in the simplest possible case. In the August *Inflation Report*, the forecast for inflation is presented (as always) as a fan chart indicating the assessed probabilities of different outcomes. For the rate of inflation in the year to 2003 Q3 the range of possibilities displayed is from 1% to 3.6% per year—which is intended to indicate that there is a 90% probability that inflation at that horizon will be in that range. The most probable outcome is, however, close to the 2½% target. All this is conditional on a particular assumption about interest rates—that they will remain at 5%. But what is the best expectation about inflation in 2002 Q3? Clearly, if the MPC is doing its job, the best expectation is that it should be close to 2½%. And, I am happy to say, there is now a lot of evidence that the expectations of the public about future inflation are in fact converging on 2½%. There is, it is to be hoped, much less uncertainty about future inflation than is displayed in the fan chart, and that is because the likely reactions to shocks that would push inflation up or down would be for the MPC to move interest rates up or down to bring it back in line with the target. And, since meeting the inflation target implies that output should grow broadly in line with productive potential, expectations of growth should also be stabilised.

Let me apply this line of reasoning to some of the uncertainties I have discussed.

I have already mentioned the importance of policy responses to the slowdown in the US and in the world economy. Although I have concentrated in this talk largely on the underlying situation as it existed around the time of the previous *Inflation Report*, we are all aware of the appalling events of Tuesday last week and of the huge shock to confidence and expectations that is reverberating round the world economy. This serves to reinforce the point about policy responses and, whilst it is still far too early to make a balanced assessment, it is notable that interest rate declines are already priced into financial markets. The threat to US consumer confidence and to demand that was already present has been much intensified. The fact that policy can be expected to respond—in the United States and elsewhere—does not of course mean, in a world of uncertainty and lagged responses, that large shocks can be or will be completely offset.

Turning to the United Kingdom, I will close with a few remarks about the exchange rate and about the consumer imbalances and their possible interaction.

Consider first a substantial fall in the exchange rate (say a 10% fall as discussed earlier) which comes out of the blue—say because of a change of sentiment in the international economy. To make the obvious point, the monetary policy reaction that can be anticipated depends on the circumstances when it occurs. If it occurred in a situation where demand was already high (and expected to remain so) and the labour market was tight, then everything would point to a rise in interest

rates—which would be necessary to avoid excess demand and also to check the inflationary effects via import prices. My own view is that the likelihood of a substantial exchange rate fall in such circumstances would perhaps not be very great, in part due to the anticipation of the predictable interest rate response. If it were to occur, there are many, including myself, who would welcome the trade-off between a lower exchange rate—taking some of the pressure off the exposed sectors of the economy—and higher interest rates.

In a situation of low demand and thus a tendency for inflation to undershoot the target, the same trade-off between exchange rate falls and higher interest rates (than otherwise) would exist, but the situation would appear more benign. Inflation expectations would be less likely to be disturbed, and it would be more likely that wage pressure would be avoided. Putting it simply, an exchange rate depreciation would, were it to occur, seem easier to manage with some spare capacity in the economy than at the top of a boom.

The situation in the United Kingdom at the moment, however, is not straightforwardly one of either excess demand nor of deficient demand. Since the August *Inflation Report*, consumer spending appears to have been stronger than expected and the labour market has remained tight. There is the possibility that this situation continues or intensifies. The *Inflation Report* makes clear, however, that the main risk from the low saving rate and the consumer 'imbalances' identified by the Committee is on the downside. Indeed, there is the distinct possibility that the longer the consumer boom goes on, the greater will be the subsequent correction.

Forecasting is a hazardous business. But let us suppose that the present strength of consumer demand were to give way to a considerably sharper slowdown than suggested in the central projection of the August *Inflation Report*. By itself, this would mean that interest rates would have to be cut to keep prospective inflation on target. If at the same time the exchange rate were to weaken substantially the need for further interest rate cuts would be mitigated or reversed. From an economic point of view, this combination of events would look particularly favourable, offering simultaneously an improvement in both consumer and external imbalance problems.

I hope I have indicated some of the issues and risks that concern us in formulating monetary policy. There are worrying imbalances in the economy and the risks and uncertainties are very great. My theme, however, has been that these risks need to be considered alongside the likely policy reactions which are embodied in the monetary policy framework and the government's target for inflation. Taking account of likely policy reactions does not remove the risks, but it does change them. Thus a risk of a large fall in consumer demand is turned into a risk of lower interest rates. And the risk of a substantial exchange rate fall is not, over the medium term, to inflation but to higher interest rates. The combination of a tapering off of consumer spending and a fall in the exchange rate would, I have suggested, be rather benign, with offsetting effects on the prospects for inflation.

None of this suggests that economic conditions will be easy over the next few years and we may, as others have suggested, be in for a bumpy ride.

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Do we have a new economy?

In this speech,[1] Sushil B Wadhwani,[2] argues that the US and UK economies are 'new' in that structural changes have led to a breakdown of some of the historical relationships that help inform the setting of monetary policy. Evidence is presented suggesting that the equilibrium rate of unemployment has fallen in both countries, and that the underlying rate of productivity growth has risen in the United States. Dr Wadhwani also argues that an intensification of product market competition and mis-measurement of capacity utilisation might help to explain why conventional price equations have tended to overestimate inflationary pressure.[3]

1 Introduction

The acts of terrorism this week in the United States were both tragic and unexpected. If these events did appear to lead to a significant deterioration in consumer confidence, monetary policy can reasonably be expected to respond. However, in the longer term, the underlying strengths of the US economy are undiminished. Today, we are here to discuss the longer-term forces that have affected our economies in recent years.

The very significant fall in Internet-related stock prices, the global economic slowdown and the fall in corporate investment appear to have led many to assert either that we never had a new economy (NE), or that the NE is now dead. There is however, no generally accepted definition of what one means by the NE.[4] There are those who see the NE as being synonymous with an acceleration in the diffusion of information and communications technology (ICT)—see, for example, Gordon (2000). However, I regard that as a rather narrow definition. Indeed, much that might be different about the economy today relates not just to ICT advances, but also to the effects of globalisation, intensifying product market competition, labour market reform, financial market liberalisation and several other factors.

I am primarily interested in the possibility that these factors have reduced the equilibrium rate of unemployment and/or increased the potential growth rate of the economy. Typically, such structural changes lead to a breakdown of the historical econometric relationships that are embedded in many of the models that help inform the setting of monetary policy. This then makes the economy appear to be 'new' or 'different' relative to the description of the economy that resides in many of our models.[5] What I will not discuss today is the version of the NE hypothesis which asserts that the world has changed so much that one now needs a new kind of economics to analyse it (see, for example, Kelly (1998)).[6]

I shall therefore discuss today some of the important ways in which some of our economies seem to be operating differently compared with, say, the 1970s

(1) Delivered at the CEPR/ESI Conference 'Old Age, New Economy and Central Banking' in Helsinki on 14 September 2001.

(2) Member of the Bank of England's Monetary Policy Committee and Visiting Professor at the City University Business School and the London School of Economics. I am extremely grateful to Jennifer Greenslade, Nick Davey and John Henderson for their help with this speech. Joanne Cutler, Kathy McCarthy, Edward Nelson, Stephen Nickell, Peter Rodgers and Andrew Wardlow provided me with helpful comments on an earlier draft. Of course, this speech reflects my personal views. This speech may be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech141.pdf

(3) Since this speech was delivered, the Bank has received new estimates of the capital stock from the Office for National Statistics. The new data suggest that the amount of spare capacity in the economy during the past two years was greater than previously implied by the Bank's medium-term macroeconomic model. This is consistent with the view (expressed later in the speech) that the level of capacity was higher than previous estimates had implied. When the new capital stock data are incorporated into a re-estimated equation for the GDP deflator, the residuals after 1998 are considerably smaller, though alternative treatments of the residual can still lead to economically significant differences in the inflation forecast.

(4) See Browne (2000) for an extensive discussion of this issue.

(5) This definition appears similar to one adopted by Chairman Greenspan, who, earlier this year, in testimony before the Senate Banking Committee (23 February 2001), said 'it is certainly true that we have a new economy. It is different. It is behaving differently and it requires a different type of monetary policy to maintain its growth than we had in the past'.

(6) Stiroh (2001) contrasts a moderate interpretation of the NE, which refers only to changes of parameters in the context of existing economic theories, with a more extreme version of the NE which suggests that basic economic relationships have changed, and, therefore, a reworking of economic theory is required. His preferred definition is similar to the one adopted here.

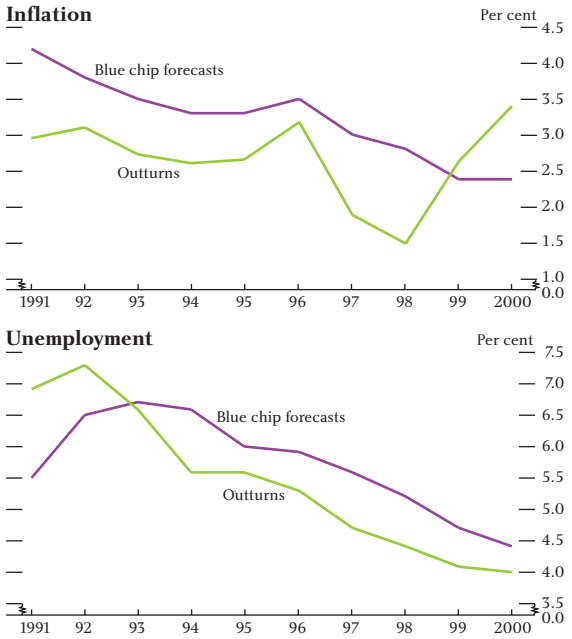
and 1980s. Although I do not believe some of the more extravagant claims that are made for the NE, my best guess is that enough has changed for it to be material to the setting of monetary policy. Indeed, many of us were driven to looking more carefully at the NE hypothesis because some relationships used for forecasting purposes appeared to break down.

2 The recent forecasting record—some cross-country evidence

In recent years, economists and central bankers alike have devoted much time to investigating the possibility that some of the parameters of the historical economic relationships that we rely on may have shifted. This is because, in some countries, forecasts of inflation, unemployment and GDP growth have been systematically biased.

Chart 1 compares the forecasts by blue chip panellists for unemployment and inflation in the United States with the actual outturns over the 1993–2000 period.(1)

Chart 1
Blue chip forecasts vs actual outturns



Note that forecasters have, for most of the period, overpredicted the level of the unemployment rate in the United States. Nonetheless, they have simultaneously overpredicted inflation until recently.

A conventional view holds that if the unemployment rate is lower than expected over a sustained period of time, then this is a symptom of excess demand and so,(2) on average, actual inflation must also be higher than expected. However, the actual inflation outturn over this period was, on average, lower than the 'consensus' inflation forecast.

Table A displays more formal evidence on forecast errors for the G5 countries.(3) The first two columns report the average forecast error for each country and associated t-statistics based on a simple regression.(4) The final column in Table A reports an alternative test, which also considers whether the unit coefficient on the forecast is a valid assumption.(5)

Table A
Average forecast errors,(a) 1993–2001(b)

	Average error (per cent)	t-statistic (c) [probability]	Joint Wald test (c) F-statistic [probability]
United Kingdom			
Output growth	0.51	2.07 [0.046]	10.84 [0.000]
Inflation	-0.45	-2.39 [0.023]	5.92 [0.007]
United States			
Output growth	0.97	2.96 [0.006]	30.95 [0.000]
Inflation	-0.24	-1.27 [0.212]	11.78 [0.000]
Japan			
Output growth (d)	-0.37	-0.83 [0.410]	5.30 [0.010]
Inflation	-0.18	-1.32 [0.195]	1.32 [0.281]
Germany			
Output growth (d)	-0.04	-0.10 [0.921]	10.60 [0.000]
Inflation	-0.15	-0.69 [0.493]	0.30 [0.745]
France			
Output growth (d)	-0.37	-0.96 [0.345]	1.28 [0.291]
Inflation	-0.38	-2.50 [0.017]	28.34 [0.000]

(a) Four-quarter-ahead forecast errors based on consensus forecast taken from Consensus Economics. The forecasts for output initially use GNP and then GDP. For inflation, CPI is used, except for the United Kingdom which uses RPI until 1996 Q4 and then RPIX. The forecasts are evaluated against the relevant measure.
(b) Sample period 1993 1–2001 II, unless otherwise stated.
(c) Using Newey-West standard errors, which are robust to serial correlation.
(d) Sample period 1993 1–2001 I.

Taking the United Kingdom first, a similar pattern to the United States emerges. On average, the consensus forecast has underestimated GDP growth by as much as 0.5% per year over the period, while simultaneously overestimating inflation by around the same amount. Moreover, these forecast errors are statistically significant even when one allows for the fact that successive forecasts are not independent of each other.

The degree to which the consensus has underestimated GDP growth in the United States is even greater (around

(1) Kohn (1999) presented a similar picture of the 1991–97 period.
(2) Conditional on the equilibrium rate of unemployment having remained constant.
(3) I am grateful to Nick Davey and Jennifer Greenslade of the External MPC Unit at the Bank for their help with this work.
(4) A simple way to consider bias involves testing the hypothesis that $\alpha = 0$ in the regression $A_t - {}_{t-i}F_t = \alpha + \varepsilon$, where A is the actual outturn for GDP growth or inflation and F is the forecast for this period made at time $t-i$ ($i = 4$).
(5) This involves a joint Wald test of the null hypothesis that $\alpha = 0$ and $\beta = 1$ in the regression $A_t = \alpha + \beta_{t-i}\ F_t + \varepsilon$.

1%), with the average degree to which inflation has been overestimated smaller at around -¼%.(1)

Once we move away from the Anglo-Saxon countries, the consensus forecasts appear to have been more accurate, or at least more readily explicable. If anything, forecasters of the Japanese economy have been too optimistic about GDP growth, rather than too pessimistic. Inflation forecasts for Japan have, on average, showed no significant bias. A similar picture emerges for Germany, where average inflation has only been overestimated to a rather modest degree and the average GDP forecasting error has been close to zero. Finally, there is statistically significant evidence that the consensus forecast in France has tended to overestimate inflation (by around 0.4% per year) since 1993. However, unlike the United States and the United Kingdom, this overprediction of inflation has been accompanied by a tendency to simultaneously overestimate GDP growth as well (though not at a statistically significant level), so that a tendency for growth to come in lower than expected might well explain the tendency for inflation also to surprise on the downside.

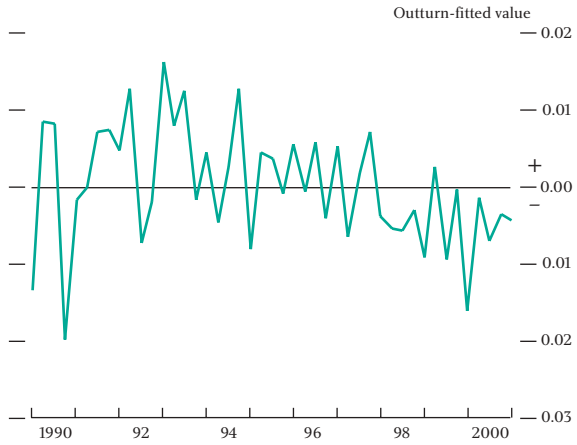
The evidence on forecasting errors suggests that 'something different' might have happened to historical economic relationships in the United States and the United Kingdom in the 1990s, but there is no evidence of this being true for the rest of the G5. This may explain why financial markets and central bankers alike have been more interested in the possibility of a NE in the United States and the United Kingdom, rather than in continental Europe or Japan.(2) Whether or not you believe there is a NE depends crucially on which country is being discussed.

3 The recent behaviour of conventional price equations: some econometric evidence

The tendency for economic forecasters in the United States and the United Kingdom simultaneously to underpredict growth and overpredict inflation is potentially consistent with a breakdown in the structural relationships that underlie our forecasting processes. NE-style hypotheses that could explain such a breakdown include changes in the equilibrium rate of unemployment, the underlying rate of productivity growth, or the degree of competitive pressure. Therefore I turn to an examination of the evidence for a breakdown of 'structural' relationships next.

Purely for illustrative purposes, note that the medium-term macroeconometric model (MTMM) used at the Bank of England (see Bank of England (2000)) has a conventional specification for prices (the GDP deflator) as a function of unit labour costs and capacity utilisation. In recent years, there has been a persistent tendency for prices to come in below what the conventional determinants have predicted—specifically, note the tendency for the residuals to be negative since around 1998 in Chart 2. Further, these residuals are statistically significantly different from zero (a t-test since 1998:1 yields a value of -2.19).

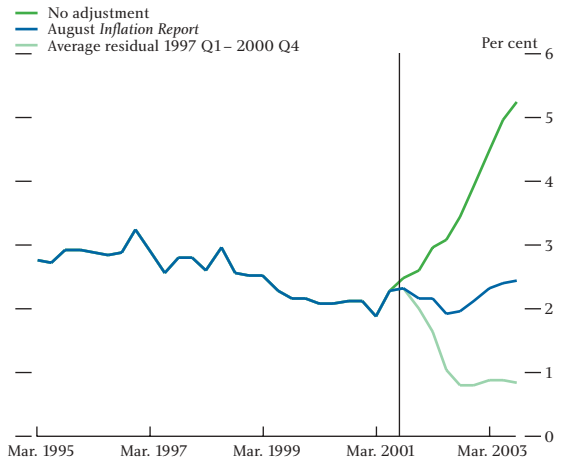
Chart 2
PGDP equation residuals



These residuals are also economically significant. Understanding why this particular equation has significantly overpredicted inflation in recent years is very important to forming a judgment about where inflation is headed. For example, if we made no additional adjustments, but just used the price equation mechanically,(3) then, other things being equal, the resulting inflation forecast in the August 2001 round would have been around 5% rather than just under 2.5% (see Chart 3). Indeed, depending on the precise judgment made about the treatment of the residuals on this equation, an alternative assumption that the recent average level of the residual since 1997 persists

(1) Note that if one were conducting this exercise for the period 1993–99, then the average forecast error for inflation would be almost -½%, which is significant at the 1% level of testing.
(2) This might also explain why the US dollar and sterling have appreciated against the European currencies and the yen. See Wadhwani (1999) for further discussion of this possibility.
(3) The only adjustment that is retained for this simulation (which was carried out within the External MPC Unit) is one relating to the treatment of past GDP revisions. Removing this adjustment would yield an even higher inflation forecast.

Chart 3
Alternative 'inflation forecasts'



generates an overall inflation forecast as low as around 1%. I do want to emphasise that, of course, the published inflation forecast is not just based on the output of an econometric model, but is based on the judgment of the Committee.(1)

The recent persistent overprediction of UK inflation does not appear to be restricted just to the above equation for the GDP deflator in the United Kingdom. Other structural relationships also appear to have broken down. It is notable that if one takes the wage equation that is to be found in the MTMM, then there is evidence that it has over-predicted wage growth in recent years (ie since around 1992).(2)

4 Has the NAIRU fallen?

A fall in the so-called non-accelerating inflation rate of unemployment (NAIRU) for labour market related reasons is an example of a structural change which might partially explain the pattern of observed forecast errors in the United States or the United Kingdom. Of course, an intensification of product market competition would also lower the NAIRU, and I shall discuss this possibility in a later section.

Certainly, the recent performance of the labour market in the United States and United Kingdom has been impressive. One striking feature of recent US experience is that, over the period 1992–2000, the rate of price inflation was essentially constant even though unemployment fell from 7.5% in 1992 to 4.1% in 1999. Moreover, when the unemployment rate first fell below 6% (the then prevailing consensus estimate of the NAIRU), many economists predicted an acceleration in inflation which failed to materialise. UK experience has been quite similar. In 1995, the consensus estimate of the NAIRU was that it was around 6$^{1}/_{2}$%–7% (using the claimant count definition). Yet, unemployment has fallen steadily to the current 3.2% without, as yet, triggering any discernible rise in inflation.

Of course, various alternative hypotheses have been advanced in an attempt to explain these facts. In the United States, they include:

- *Temporary factors.* It is argued that lower import prices (associated with a higher dollar, the Asian crisis, etc) and decelerating health insurance costs have played an important role in temporarily depressing inflation, and that the NAIRU is actually higher than the current unemployment rate.(3) A variant of this view argues that the acceleration of productivity growth in the 1990s has not, as yet, been fully reflected in wages because wage aspirations respond slowly to increases in productivity growth.(4) As aspirations catch up, inflation will rise so the fall in unemployment may only be partially sustainable.

- *Permanent factors.* One might expect the fall in unemployment to be sustainable if the NAIRU has actually fallen for NE-type reasons. In terms of the labour market, changes in how people look for work (eg temporary help agencies) or differences in the demographic composition of the workforce have been suggested as possible explanations for a fall in the US NAIRU.(5)

Turning to the United Kingdom, I have previously discussed the far-reaching changes that have occurred in the labour market over the past two decades (see Wadhwani (2000a)), so I will not have much to say on

(1) Given the extraordinarily wide range of forecasts that can be produced by alternative assumptions about adjustments made to this poorly performing price equation, it is hardly surprising that one might want to inform one's judgment by using a price equation that has performed better. Such an equation is discussed in Section 6 below, and represents one reason why I, personally, had a projection for inflation that differed from the best collective projection in the August *Inflation Report*.
(2) See, for example, Wadhwani (2000a).
(3) See, for example, Blinder and Yellen (2001).
(4) See, for example, Ball and Moffitt (2001).
(5) See Katz and Krueger (1999) for a discussion of some of these hypotheses in the United States and Barwell (2000) for the United Kingdom.

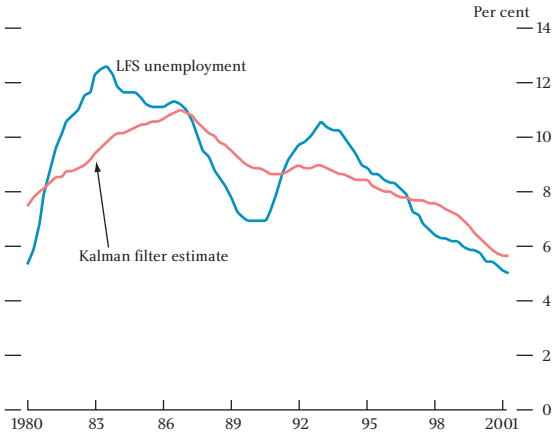
that topic today. Union membership and strike activity are much lower. Imbalances in the pattern of labour demand and supply have diminished significantly. Turning to the unemployment benefits regime, the conventional replacement ratio (ie the ratio of out-of-work benefit to estimated in-work income) has fallen. Further, the New Deal and other measures which have tightened the availability of benefits have also probably been influential. Of course, none of this is to deny that, as in the United States, lower import prices have also played a role.

Various approaches have been used over time to estimate the NAIRU.(1) One approach that has become more popular in recent years is to use Kalman filter techniques to estimate a time-varying NAIRU jointly with a Phillips curve. Staiger, Stock and Watson (2001) argue that their Kalman-filter-based estimate of the time-varying NAIRU in a price-based Phillips curve for the United States fell by about 1.6 percentage points over the 1992–2000 period. Interestingly, their estimate of the decline in the NAIRU is relatively insensitive to the inclusion/exclusion of the supply shock variables.

Chart 4 displays Kalman-filter-based estimates of the time-varying NAIRU from a price-based Phillips curve for the United Kingdom since 1993.(2) Note that, on these estimates, the NAIRU has fallen from around 9% in early 1993 to around 5½% in mid-2001,(3) even though this price equation allows for temporary factors like import prices and oil prices. As has been pointed out in various studies (including Staiger, Stock and Watson (1997) and Cross, Darby and Ireland (1997)), NAIRU estimates (using a variety of techniques) have very large standard errors around them, and so should be used with care. However, interestingly, my colleague Stephen Nickell, using a different method, recently concluded(4) that the NAIRU had fallen from an average of just under 9% in 1991–97, to around 5¾% over 1997–2000.

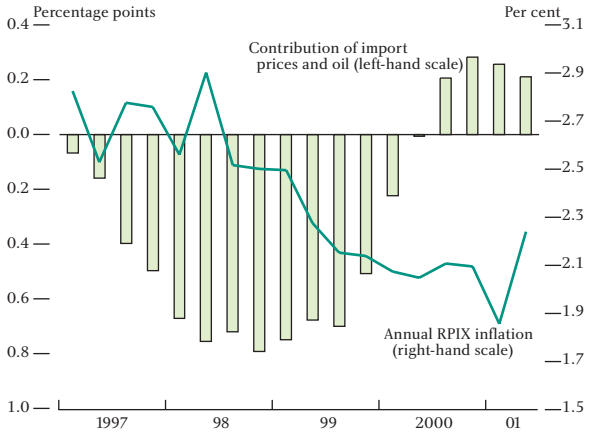
Of course, all methods of estimating the NAIRU are pretty imprecise, and for policy purposes one is not just interested in the estimate of the NAIRU today, but also in how it might evolve over the next few years.

Chart 4
Estimates of the NAIRU in the United Kingdom



Recall that many observers have argued that the apparent improvement in the wage-unemployment trade-off during the late 1990s was largely attributable to temporary factors like lower import prices. Chart 5 displays the estimated contribution(5) of oil and

Chart 5
Contribution of import prices and oil prices to UK inflation (RPIX)



import prices to UK inflation, and the actual inflation rate. Note that the estimated contribution of these external factors has switched from being highly negative in 1998–99 to being positive in recent quarters. Yet price inflation has remained broadly trendless over this period. Since inflation has stayed low even as the temporary factors have reversed, the model attributes the low inflation to a decline in the NAIRU.(6)

(1) See Coulton and Cromb (1994) or Robinson (1997) for various estimates.
(2) This estimation has been done by Jennifer Greenslade in the External MPC Unit (based on updating previous joint work with Jumana Saleheen and Richard Pierse). It assumes a signal-to-noise ratio (which measures the volatility or variance of the NAIRU relative to the variance of changes in inflation) of 0.16.
(3) Using the LFS definition of unemployment. Note that if the signal-to-noise ratio were set at 0.09, so that the NAIRU would be less volatile, the NAIRU would still show a marked fall of almost 2.5 percentage points over the 1993 to mid-2001 period.
(4) See Nickell (2001).
(5) From the estimates of a price-based Phillips curve.
(6) Note that most economists did not predict the extent of any such possible fall in the NAIRU. Indeed, preliminary analysis of the MPC's forecast errors since 1997 concluded that we had failed to anticipate a fall in the NAIRU.

While there is compelling evidence that the NAIRU fell significantly in the United States (by around 1½%) and the United Kingdom (perhaps by 3%–3¼%) during 1992–2000, few believe that the NAIRU fell by much, if at all, in the rest of the G5 during the 1990s as a whole. For example, the recent OECD *Economic Outlook* suggests that the NAIRU rose sharply in Japan in the second half of the 1990s, whereas in Germany there was a marginal rise during this period. For France, the OECD estimates that there was a fall during the second half of the 1990s, broadly offsetting the increase that the OECD estimates took place earlier in the decade.

5 The new economy and productivity growth

The recent rise in US productivity growth

The rise in US productivity growth since 1995 is one of the most eye-catching aspects of the NE. Official estimates suggest that average labour productivity rose from around 1.4% per year during 1973–95 to around 2.5% per year over 1995–2000.(1) Until the recent data revisions, labour productivity growth for 1995–2000(2) was estimated to have grown at an even higher rate of 2.8% per year. At first sight, the new slightly lower estimate remains impressive. A large number of academic studies have investigated this rise in productivity growth.(3)

As long ago as 1995, the argument was made in some quarters that the NE had led to an acceleration of productivity growth in the United States. This view was initially resisted by many economists.(4) Then the view gradually evolved, as a mixture of data revisions and the passage of time appeared to lead to a discernible change in the trend rate of measured productivity growth. Even then, there was some further resistance to accepting the possibility of a change in the rate of structural productivity growth. The rise in actual productivity growth was initially characterised as cyclical, then said to be confined only to the ICT-producing area, and then only to the durables manufacturing sector, and so on.(5)

Suffice it to say that now a majority of the more recent studies agree that both the production and the use of information technology (IT) have contributed substantially to the rise in US productivity growth. Moreover, Stiroh (2001) supports a moderate NE interpretation of the productivity upsurge in arguing that:

> 'The recent productivity gains largely reflect familiar economic forces like technological progress, input substitution and capital deepening, and there is little evidence that the gains reflect extreme new economy concepts like spillovers, increasing returns, or network effects.'

The rise in US productivity growth in a historical context

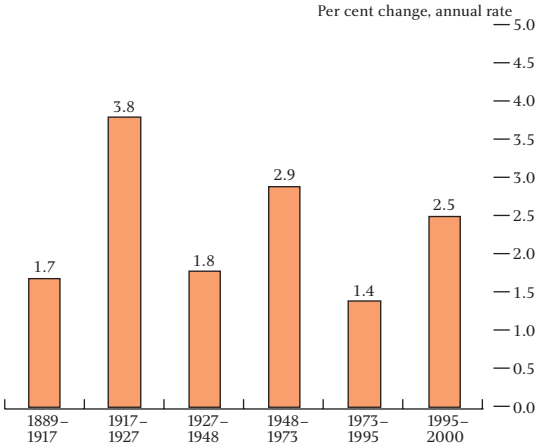
Of course, one must recall that the post-1973 period was one of relatively slow productivity growth, which spawned a large number of studies that attempted to explain the US productivity 'slowdown' that occurred from around that date. Hence, the post-1995 acceleration of growth has occurred in the context of productivity growth having been weak in the preceding period. The spurt in productivity growth since 1995 is by no means historically unprecedented, eg non-farm business productivity grew faster in 1960–65 than in 1995–2000.

However, from a policy-making perspective, what matters is not whether the rate of productivity growth is historically unprecedented. Instead, if the rate of structural productivity growth changes relative to its recent historical past, and is likely to persist for a few years, it is likely to have an impact on many of the econometric relationships that we typically rely on.

It is therefore interesting that Laurence Meyer of the Board of Governors (see Meyer (2001)) has argued recently that the economic history of the United States can be viewed as a series of productivity cycles, ie relatively long periods of higher and then lower productivity growth. Chart 6 illustrates. Note that although over the entire 1889–2000 period productivity growth averaged about 2%, there were several relatively long-lasting periods when productivity growth was either significantly above or below this long-term average. From a policy-making perspective, it is important to know whether one has made a transition from a 'low' productivity growth period (eg the 1973–95 average of 1.4%) to a 'high' productivity growth period (eg the average of 2.5% since 1995). Setting policy on the basis

(1) Output per hour for the non-farm business sector.
(2) That is, the average of the annual growth rates for 1995–2000.
(3) Bosworth and Triplett (2000) or Stiroh (2001) both provide excellent surveys of the recent literature.
(4) A representative view was that of Blinder (1997), who characterised it as 'mostly poppycock'.
(5) See Gordon (2000) for discussion of some of these issues.

Chart 6
US productivity



Source: Meyer (2001), updated using latest Bureau of Labor Statistics figures where available.

of the long-term average growth rate of 2% would imply that policy was always inappropriate.

Although the growth rate since 1995 is not exceptional by comparison with other 'high' productivity growth periods, the contribution of ICT to productivity growth is, by historical standards, impressive. It is therefore significant that Crafts (2000) argues that '…. the growth contribution of ICT in the past 25 years outstrips that of electricity and even more so that of railroads over comparable periods ….'. This is documented in Table B, which shows that even before the post-1995 period, the contribution of ICT to growth compared favourably relative to these other innovations.

Table B
Relative contribution of different technologies to US growth

Percentage points per year

	1974–90	1991–95	1996–99
ICT	0.65	0.76	1.54
	1839–70	1839–90	
Railroads	0.21	0.35	
	1894–1929	1919–29	
Electricity	0.56	0.98	

Source: Crafts (2000).

A digression—does a higher depreciation rate make the US productivity surge less impressive?

As we have discussed above, an investment boom in IT has significantly contributed to the productivity acceleration in the United States. Since computers and software have relatively short economic lives, and the share of IT investment in total investment has risen, this has contributed to a rise in the aggregate depreciation rate. This has led some authors (eg Kay (2001)) to question whether welfare is rising at the same rate as productivity.

Conventionally, most analysis of productivity trends is based on gross domestic product (GDP) numbers. The part of gross investment that simply maintains the productive capacity of the existing capital stock at its current level does not add to welfare. This suggests that to measure welfare we should subtract depreciation (capital consumption) from GDP to obtain net domestic product (NDP). In addition, Professor Weitzman of Harvard University argues that an alternative measure of net domestic product (WNDP)[1] is likely to provide an even better measure of welfare. At first sight, one would think that a rising aggregate depreciation rate would imply that the gap between GDP and WNDP growth would be widening over time. However, the relationship between GDP and WNDP growth is more complex. Although the aggregate depreciation rate has risen, depreciation as a proportion of GDP has been approximately flat. In practice, net investment growth has accelerated by more than the growth of gross investment (Table C).

Table C
Acceleration in growth, 1995–99 versus 1973–95

Per cent

	1973–95 (a)	1995–2000 (a)	Acceleration 1995–2000 versus 1973–95 (b)
Gross investment	2.87	8.82	5.95
Net investment	0.94	12.31	11.37
GDP	2.75	4.02	1.27
WNDP	2.41	3.83	1.42

(a) Per cent per annum.
(b) Percentage points.

That, in part, explains why the acceleration in a measure of welfare (ie WNDP growth) in the post-1995 period is even greater than that in productivity growth (ie GDP). Hence, if anything, the rise in welfare is even more impressive than the rise in official measures of productivity growth.

Productivity growth—the international experience

If, as we have noted above, investment in IT is an important part of the productivity surge in the United

(1) Weitzman's measure of net domestic product is consumption plus net investment, deflated by the price index for consumption. Official measures of net domestic product tend to measure real investment by using a price index for investment.

States, and the IT revolution is a worldwide phenomenon, it may then be reasonable to investigate whether a similar IT-associated surge in productivity growth has occurred outside the United States. To the extent that higher-than-expected productivity growth in the United States can explain the tendency for economic forecasters to simultaneously underpredict GDP growth and overpredict inflation, it is of some interest to examine whether a similar phenomenon has been at work elsewhere.

At first sight, one finds no echo of the US productivity surge elsewhere. Among the G5 countries a comparison of the post-1995 period with the 1973–95 period suggests that the United States is the only country exhibiting a significant increase in labour productivity growth; indeed, it appears to have slowed in France, Japan and the United Kingdom (see Table D).

Table D
Labour productivity growth in the G5 countries(a)

Per cent per year

	1973–95	1995–2000
United States	1.0	2.5
United Kingdom	1.8	1.6
Japan	2.3	1.3
Germany	2.0	1.1
France	1.9	1.2

(a) Output per person employed.

There are those who attribute at least some of this difference to the fact that measurement conventions regarding both hedonic pricing and the classification of software spending vary across countries (see, for example, Vanhoudt and Onorante (2001)).

A study for the United Kingdom that attempted to restate UK labour productivity using US measurement conventions (see Oulton (2001a)) found that over the period 1994–98, labour productivity growth might have been about 0.33% per year faster than has been recorded in the official data. However, even on the adjusted data, the United Kingdom fails to display the productivity acceleration seen in the United States.

Table E sheds some light on the differences between the United States and the United Kingdom. It shows that while the contribution to growth from ICT capital has risen in both the United States and the United Kingdom, the main difference in the late 1990s between the two countries lies in the contribution to growth of 'other capital' and that of total factor productivity (TFP)

Table E
Productivity and the contribution of ICT: a US-UK comparison

	United States (a)			United Kingdom		
	1974–90	1990–95	1995–99	1979–89	1989–94	1994–98
Growth of output per hour (per cent per year)	1.37	1.53	2.57	2.75	3.01	1.48
Growth of output (per cent per year)	3.06	2.75	4.82	2.46	1.35	3.09
Contributions from (percentage points per year)						
ICT capital	0.44	0.51	0.96	0.37	0.40	0.64
Other capital	0.37	0.11	0.14	0.68	1.10	0.08
TFP plus labour quality	0.55	0.92	1.47	1.70	1.51	0.75

Sources: United States: Oliner and Sichel (2000).
United Kingdom: Oulton (2001a).

(a) US data do not include the latest data revisions.

growth. It is possible that the high level of the pound depressed investment in 'other capital' while the absorption of those who had been unemployed for a long period of time into the workforce may have depressed TFP growth. Hence, it would appear that the benefits of the ICT revolution on productivity have, so far, been obscured by other factors in the United Kingdom, though this issue clearly deserves further research. Interestingly, the phenomenon of a rising growth contribution of ICT co-existing with lower labour productivity growth for some other reason does not appear to be confined to the United Kingdom. If one considers the host country of this conference, Finland, then Jalava and Pohjola (2001) remind us that it ranks among the top countries in the world in terms of the number of Internet hosts and mobile phones per capita. It is also one of the leading ICT producers in Europe. However, labour productivity growth in the 1995–99 period is actually a little lower than in the 1975–95 period.

The growth accounting exercise presented in Jalava and Pohjola (2001) suggests that the contribution to growth of production and use of ICT has increased significantly during the 1990s. However, this has been offset by a significant fall in the contribution to growth of 'other capital', which the authors attribute to an 'inefficiently' high level of the pre-existing non-ICT capital stock.

Hence, to conclude, the data that we have so far do not suggest that higher labour productivity growth outside the United States is the reason why some of the economic relationships appeared to change in some countries. It remains possible that measured productivity growth in some of these countries (eg the

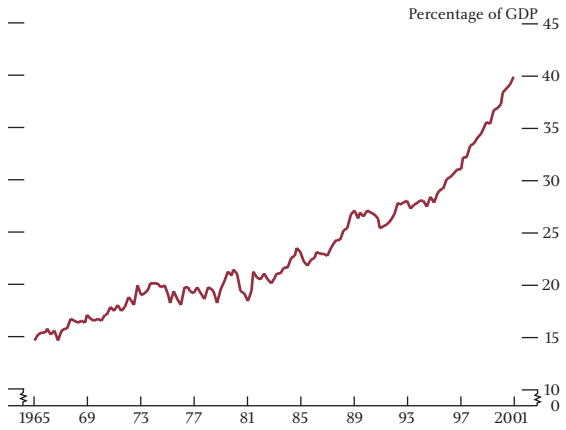
United Kingdom) significantly understates true productivity growth (see, for example, Wadhwani (2000b)). Alternatively, it is possible that the reasons for the apparent breakdown of some of the key economic relationships lie elsewhere.

6 An intensification of product market competition?

A commonly cited reason as to why some of our economies might be behaving differently is that the degree of product market competition has intensified over the past few years. I shall attempt to evaluate the validity of this claim in a UK context. Unfortunately, we do not have a direct measure of 'product market competition', so econometric testing is difficult.

A contributory factor may be globalisation, ie the increasing integration of global product markets. Chart 7 suggests a striking increase in the degree of import penetration in the United Kingdom, with the rate of increase having accelerated in recent years.(1)

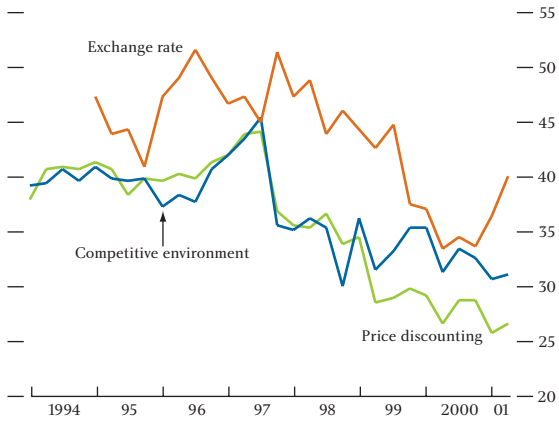
Chart 7
Import penetration in the United Kingdom



In the United Kingdom, evidence of increased product market competition has not just been confined to globalisation. Government action has also played a role here. Privatisation and/or regulatory changes in a whole host of industries including gas, water, telecoms, electricity, airports, rail, the docks and broadcasting have led to rather more competitive product market conditions.

A crude proxy for the extent of perceived competitive pressure is to rely on survey evidence. The Euler Trade Indemnity survey (which spans all the broad industry sectors) has asked questions relating to the extent to which price discounting and the competitive environment have been perceived as impacting on profitability since 1994. Chart 8 displays the responses. Note that a response below 50 suggests that the factor is having a negative impact on profitability. The responses appear to point to an intensification of perceived competitive pressures and the extent of discounting over this period (dating back to around mid-1997), as they have fallen further below 50, suggesting a greater negative impact on profitability. Note that while the level of the exchange rate has also been hurting profitability, its effect is deemed to have been less important than that emanating from price discounting or the more competitive environment.

Chart 8
Euler survey responses(a)



(a) A response of 50 indicates no change on the previous quarter.

It is sometimes asserted that an intensification of competition is a one-off event and must therefore only have a transient effect on inflation. Consequently, the argument goes, it should not affect one's perception of the medium-term outlook for inflation. My ex-colleague, Willem Buiter (2000), argues that a fall in the NAIRU which was associated with intensified product market competition would not, of course, reduce inflation in the long run, but he emphasises that there would be important short-run effects. Of course, the 'short run' in this case could last several years, since there can sometimes be a gradual improvement over a number of years in the structural factors that lower the NAIRU.

I noted above that conventional price equations (such as the one reported in Section 3) appear to have performed badly in recent years.

(1) Note also that over the same period, world trade growth has, of course, also risen at a much faster rate than world GDP growth, which is indicative of globalisation. For example, the ratio of world imports to world GDP was, in 2000, about 70% higher than its 1980 value.

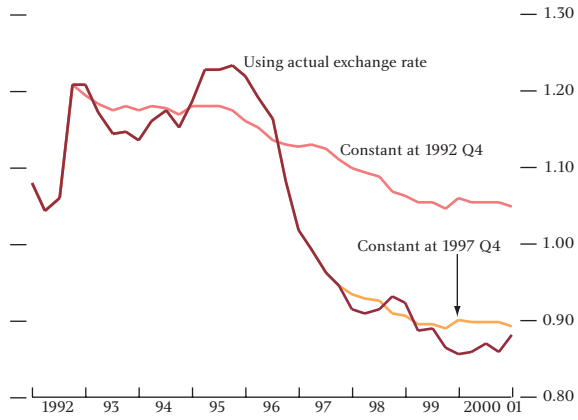
There is some suggestive evidence that an intensification of product market competition might have played some role.(1) For example, if we include the extent of import penetration in the conventional equation reported above, it is statistically significant ('t' = -1.99). Further, the residuals are somewhat better-behaved and are no longer systematically negative at conventional levels of significance ('t' = -1.5). It appears that the residuals from the above price equation are correlated with the 'price discounting' response from the Euler survey referred to above—formally, a t-test over the 1993–2000 period yields a value of 2.9.(2)

Further, it is plausible that the price mark-up on marginal cost should be affected by the weakness of foreign competition as proxied by, say, the ratio of world export prices (in sterling terms) to the GDP deflator.(3) This ratio is significantly lower than it was in 1992, though the fall in recent years has occurred, in part, because of the rise in sterling's exchange rate in 1996–97 (see Chart 9).

Work on this issue by Jennifer Greenslade of the External MPC Unit at the Bank of England suggests that world export prices are, indeed, an important, statistically significant, influence on domestic prices (the GDP deflator). Importantly, the residuals of the price equation are better-behaved in that, although they are, on average, still negative since 1998, this is no longer statistically significant ('t' = -0.38). This represents a considerable advantage over the existing price equation, since there is less need to choose between alternative treatment of past residuals which, as we saw in Section 3 above, can lead to rather large differences in the resulting inflation forecast.(4) Note, incidentally, that if one believes that world export prices directly impact on domestic prices, then, in the current conjuncture, when the global economy is weakening significantly, thereby leading to lower world inflation, one is also likely to be more confident that UK inflation will remain low. Hence, using the alternative price equation can have a significant impact on one's inflation forecast at a time when the global economy is slowing.

Chart 9A
Ratio of M6 export prices to GDP deflator

Chart 9B
Ratio of M6 export prices to GDP deflator: holding exchange rate constant



Returning to the issue at hand, a NE sceptic might argue that the appearance of the residuals in the price equation is entirely due to the appreciation of the exchange rate and is nothing to do with the longer-term structural factors that might have led to an intensification of product market competition. I would not wish to deny that the persistence of sterling's 1996–97 appreciation has had an important disinflationary effect on UK prices. However, it is unlikely to be the only explanation.

(1) Since the November 1999 *Inflation Report*, the majority of the MPC has, in fact, incorporated a 'structural' compression of price-cost margins within the central projection. Even before that, it was an assumption made by a minority of the Committee that included me.
(2) If based on the contemporaneous value of price discounting in the Euler survey, or 3.9 if based on this measure lagged one period.
(3) For example, Martin (1997) shows that domestic prices may be a function of both domestic costs and overseas prices. In such a model, world export prices impact on domestic prices either through an effect on perfect substitutes or through a pricing-to-market effect for imperfectly substitutable traded goods (whereby world export prices influence domestic prices through the mark-up). In terms of such a model, he assumes that the elasticity of demand for these goods is a function of their relative prices. This may be rationalised in several ways, including the model of Froot and Klemperer (1989).
(4) This is the reason why my personal projection for inflation was, in part, informed by simulations based on the alternative price equation.

First, not all of the recent fall in the ratio of export prices to domestic prices is directly attributable to the exchange rate. Indeed, Chart 9B shows that in a purely arithmetic sense, around one-third of the fall in the ratio since mid-1992 cannot be directly attributed to the exchange rate. Moreover, given that the exchange rate today is little different from where it was in 1997 Q4, the level of sterling cannot account for the continuing decline in relative world export prices since then.

Second, as already noted above, the Euler survey suggests that 'price discounting' and 'competitive pressure' have had a more significant impact on profitability than the exchange rate.

Third, some preliminary work suggests that in a general econometric price equation that includes sterling world export prices, the extent of import penetration might still play a statistically significant role.

Fourth, although the aforementioned econometric work includes world export prices denominated in sterling, some preliminary exploratory work suggests that in the short run, changes in the prices of world exports denominated in local currencies have a much more significant impact on the price-cost mark-up in the United Kingdom than variations in the exchange rate. Of course, in the short run, this would reflect rational behaviour if exchange rate changes were less persistent than changes in foreign prices. This deserves further investigation.

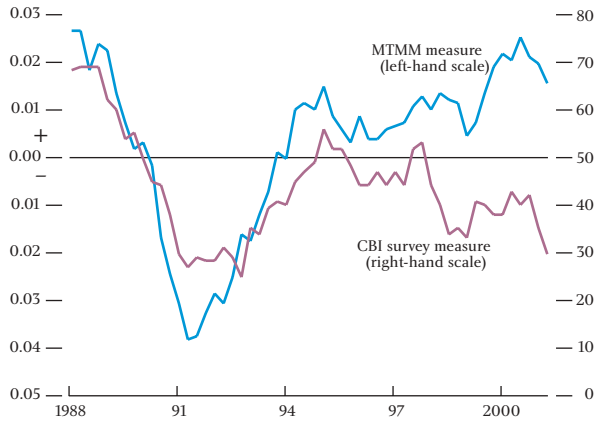
Fifth, as I have argued before (see Wadhwani (1999)), some of the re-rating of sterling (and the US dollar) versus the euro may, in any case, have been because of the markets' perception that NE forces were more important in the United States and the United Kingdom than in continental Europe. Note, incidentally, that this perception may have arisen because of the pattern of forecast errors in the United States and the United Kingdom being different from elsewhere (as we saw in Section 2 above).

Of course, this issue deserves further research. Among other things, it is likely that there are some other factors which can explain the tendency to overpredict prices.

A digression on measurement error

For example, it is possible that the measure of capacity utilisation that is currently used in the MTMM is misleading. Chart 10 compares the measure of capacity utilisation with a measure based on the CBI survey. Note that while the two measures appeared to move reasonably closely together until about 1995, they have diverged since.(1)

Chart 10
MTMM and CBI survey measures of capacity utilisation: 1988–2001



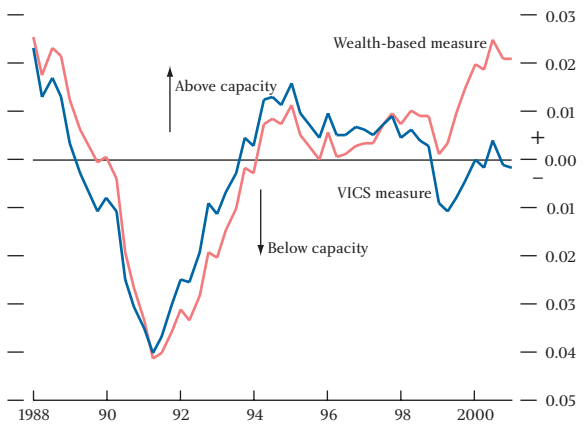
It is possible that the MTMM measure of capacity utilisation is misleading because it uses an inappropriate measure of the capital stock. In the light of that possibility, I await the forthcoming revisions to the capital stock in the *Blue Book* later this month with some interest. In addition, note that current estimates of the capital stock are a so-called 'wealth type measure', where each item is weighted by the current asset price. While this is a valid measure for balance sheet purposes, it will be less appropriate for an assessment of productive potential, where one might want to compute a volume index of capital services (VICS) instead. Note that in the VICS, each item of capital is, in principle, weighted by its contribution to output (ie its marginal revenue product) rather than its asset price. A consequence of using the VICS is that it increases the weight accorded to shorter-lived assets such as machinery, equipment and software, relative to buildings. If the stocks of shorter-lived assets (eg computers) are growing more rapidly than other types, then the VICS will, in turn, grow more rapidly than the wealth-based measure.

(1) The CBI measure used in Chart 10 is based on the Industrial Trends survey. We also produced a survey-based measure of capacity utilisation by combining different surveys (including the BCC survey on the services sector). The results were qualitatively similar to those in Chart 10.

Nicholas Oulton of the Bank of England has computed a preliminary measure of the VICS. Joint research with the ONS is ongoing on this issue. A preliminary VICS estimate has shown a rather higher growth rate in recent years, a period when we know that ICT investment accelerated (see Oulton (2001b)).

Of course, there is no straightforward link between the rate of growth of the capital stock and estimates of potential output because changing one's view of the appropriate capital stock will also affect one's estimate of what economists call total factor productivity (TFP). Nick Davey and Jennifer Greenslade of the External MPC Unit at the Bank of England have examined these issues in the context of the MTMM. Because they use alternative capital stock data, various relationships have to be re-estimated. Their work is ongoing, but some interesting results from their pilot study include the possibility that the alternative capital stock data would have yielded a different picture for 'capacity utilisation' in recent years—see Chart 11, which displays alternative proxy capacity utilisation series based on the wealth and the VICS measures, respectively.(1)

Chart 11
Wealth and VICS measures of capacity utilisation, 1988 onwards



Although the two measures moved broadly in line between 1988–97, they have diverged since then, with the VICS-based measure exhibiting a greater degree of consistency with survey-based measures. Moreover, the gap between the two series has grown over time, so the measurement error might not be innocuous. Indeed, these two different views about the absence (or otherwise) of spare capacity can have an important effect on an assessment of the degree of inflationary pressure.(2) Further, it is interesting to note that including the VICS measure of the capital stock in the conventional price equation reported above improves the recent pattern of the residuals. Of course, this area deserves further research. Note that this is an area where it is important that our measurement conventions keep pace with the 'new economy' out there, and I look forward to the ONS' future work on this issue.

To summarise, I have argued today that an intensification of product market competition for firms in the United Kingdom and mis-measuring changes in capacity utilisation have played a role in explaining why conventional price equations have tended to overpredict inflation. Some of the intensification of competition reflects secular factors, while some of it has almost certainly arisen from an 'overvalued' exchange rate.

7 The NE and the current conjuncture

I have argued today that:

(i) There is compelling evidence that the NAIRU fell significantly in the United States and the United Kingdom over the 1992–2000 period. This was almost certainly attributable to both improvements in the workings of the labour market and an intensification of product market competition.

(ii) Underlying productivity growth in the United States accelerated after 1995 to a level that compares favourably with the 1973–95 period, though not a level which is high in relation to previous surges in productivity growth.

These are genuine advances, and are consistent with why I believe we have a NE. But, with Internet-related stock prices down very significantly, and a global economic downturn, there has been much questioning of the NE. This, in part, is because the more extreme adherents of the NE made rather extravagant claims.

For example, in recent years, it had become increasingly fashionable to assert that recessions were a thing of the

(1) Note that data for 2000 are not yet available. In order to consider more recent events, it is assumed that the VICS estimate of the capital stock grows at around 1.6% per year faster than the wealth based measure in 2000. This is the average difference between the VICS and wealth-based annual growth rates for the 1993–99 period—note that this discrepancy is larger for example than the average over the whole sample (1979–99), but smaller than the average since 1997.

(2) This is one reason why my personal projection for inflation was lower than the best collective projection published in the August 2001 *Inflation Report*.

past. Now, it is true that output volatility has fallen in recent years (see, for example, McConnell and Quiros (2000)). However, there are many causes of recessions which are unaffected by the NE. For example, the sharpness of the fall of business and consumer confidence in the United States at the end of last year was a surprise. Chairman Greenspan reminds us that:

> 'The unpredictable rending of confidence is one reason that recessions are so difficult to forecast. …… Our economic models have never been particularly successful in capturing a process driven in large part by non-rational behaviour.'

Further, it is important to remind ourselves that significant volatility in share prices and the growth rate of corporate investment is not unusual around periods of rapid technological change. Indeed, historically, innovations often appear to have been associated with share price bubbles and overinvestment in the innovating industry. The industry then appears to become overcrowded, and one then sees a period of bankruptcies and a significant cutback in investment. Whether or not this has significant macroeconomic effect depends, in part, on the policy response.

In their discussion of the 1882 electrical 'mania', Kennedy and Delargy (1997) calculate that the average share price of their sample of quoted electrical companies fell by around 93% between the peak in 1882 Q3 and trough in 1884 Q4! The fluctuations in the stock market affected the ability of the electrical industry to raise money, and thereby develop. Kennedy and Delargy (1997) point out that while the prospective electrical supply undertakings raised over £2 million at the height of the mania in 1882 alone, they were only able to raise around £235,000 in the subsequent five-year period. Share price volatility almost certainly affected the time path of investment in electrical undertakings. However, it did not stop us from reaping the benefits of electricity eventually.

Similarly, Baines, Crafts and Leunig (2001) discuss the railway mania of 1844–47, and point out that 'there was huge speculation in railway shares followed by a spectacular crash in 1845 even in the shares of those companies that would become giants of the industry in later decades'. Indeed, notwithstanding the crash of 1845, railway mileage rose from about 2,000 miles of track in 1844 to nearly 14,000 miles by 1870. The authors argue that the railways made a growth contribution of about 0.25% a year during 1840–70.

Interestingly, a similar boom-bust phenomenon in the innovating industry was also associated with motor vehicles, radio and airline industry (see Meyer (2001) for a discussion of these examples).

I do not wish to imply that it will be plain sailing in the near term. The underinvestment in the British electrical industry following the share price crash in 1882–84 is widely regarded to have significantly slowed the pace at which Britain took advantage of the new innovation.

More generally, recessions or growth recessions that follow the bursting of speculative bubbles and which are associated with the elimination of investment overhangs have historically tended to be longer-lived than those recessions that have been associated with inflation-fighting by the central bank. Currently, the degree of excess capacity in the global telecoms industry is very high. Weak corporate investment and a significant drying-up of venture capital finance suggest that it might be some time before the US economy recovers convincingly, especially as the current level of share prices appears to be predicated on an implausibly sharp rebound in profits in 2002. A further fall in the US stock market would make consensus forecasts of a significant recovery in GDP growth in the next few months even less plausible.

Were the economy to remain weak, this might lead corporate investment to be even weaker, which would lower labour productivity growth further. This might, in turn, lead investors to reassess the level of equity prices—so, as I have argued before (see Wadhwani (2001)), a self-reinforcing, vicious cycle remains a downside risk.

Equally, though, it seems premature to be excessively gloomy about the potential, long-term productivity benefits of ICT, and the Internet in particular. Specifically, in reporting on a study of eight sectors which collectively account for about 70% of US GDP, Litan and Rivlin (2001) argue that 'the potential of the Internet to enhance productivity growth over the next few years is real'. De Long and Summers (2001) argue that if the rate of technological progress in the ICT sector remains high,(1) then economy-wide productivity

(1) There are many scientists who believe that this will be true over the next decade.

growth is also likely to resume a healthy rate of growth because the ICT sector is likely to become an increasingly important part of the economy. This is partially attributable to the likelihood that the income elasticity of demand for ICT products is greater than one, so, as we grow richer, the share of ICT expenditure in total expenditure will grow. Whether or not this potential is realised will, though, partly depend on the macroeconomic environment.

It behoves us to recall that, in recent US economic history, a period of rapid productivity growth (the 1920s), was followed by the Great Depression in the 1930s. Much therefore depends on macroeconomic policy being appropriate.

To summarise, it seems to me that the NAIRU did fall in the United Kingdom and the United States and that the underlying trend growth of productivity did accelerate in the United States. In that sense, we do have a 'new economy'. However, this is not an economy where the business cycle is dead thereby justifying sky-high equity valuations. The global economy probably has a difficult period ahead of it in the near future, but this does not diminish the fact that some gains have been made.

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Contents of recent Quarterly Bulletins

The articles and speeches which have been published recently in the *Quarterly Bulletin* are listed below. Articles from November 1998 onwards are available on the Bank's web site at www.bankofengland.co.uk/qbcontents/index.html

Articles and speeches (indicated S)

November 1998
Public sector debt: end March 1998
Inflation and growth in a service economy
The foreign exchange and over-the-counter derivatives markets in the United Kingdom
Recent changes to the national accounts, balance of payments and monetary statistics
Inflation targeting in practice: the UK experience (S)
The objectives and current state of monetary policy (S)
Economic policy, with and without forecasts (S)

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Price stability in the United Kingdom (S)
The impact of the international environment on recent monetary policy (S)

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Do we have a new economy? (S)

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No.	Title	Author
125	Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes *(February 2001)*	Andrew Clare Roger Courtenay
126	New estimates of the UK real and nominal yield curves *(March 2001)*	Nicola Anderson John Sleath
127	Sticky prices and volatile output *(April 2001)*	Martin Ellison Andrew Scott
128	'Oscillate Wildly': asymmetries and persistence in company-level profitability *(April 2001)*	Andrew Benito
129	Investment-specific technological progress in the United Kingdom *(April 2001)*	Hasan Bakhshi Jens Larsen
130	The real interest rate gap as an inflation indicator *(April 2001)*	Katharine S Neiss Edward Nelson
131	The structure of credit risk: spread volatility and ratings transitions *(May 2001)*	Rudiger Kiesel William Perraudin Alex Taylor
132	Ratings versus equity-based credit risk modelling: an empirical analysis *(May 2001)*	Pamela Nickell William Perraudin Simone Varotto
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135	Hybrid inflation and price level targeting *(May 2001)*	Nicoletta Batini Anthony Yates
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143	Does it pay to be transparent? International evidence from central bank forecasts *(November 2001)*	Georgios Chortareas David Stasavage Gabriel Sterne
144	Costs of banking system instability: some empirical evidence *(November 2001)*	Glenn Hoggarth Ricardo Reis Victoria Saporta

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No.	Title	Author
1	Monetary conditions indices for the United Kingdom: a survey *(September 2000)*	Nicoletta Batini Kenny Turnbull
2	Inflation dynamics and the labour share in the United Kingdom *(November 2000)*	Nicoletta Batini Brian Jackson Stephen Nickell
3	Core inflation in the United Kingdom *(March 2001)*	Joanne Cutler
4	A disaggregated approach to modelling UK labour force participation *(May 2001)*	Joanne Cutler Kenny Turnbull
5	Monetary policy for an open economy: an alternative framework with optimising agents and sticky prices *(October 2001)*	Bennett T McCallum Edward Nelson
6	The lag from monetary policy actions to inflation: Friedman revisited (October 2001)	Nicoletta Batini Edward Nelson

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Monetary and Financial Statistics (Bankstats) contains detailed information on money and lending, monetary and financial institutions' balance sheets, analyses of bank deposits and lending, international business of banks, public sector debt, money markets, issues of securities and short-term paper, interest and exchange rates, explanatory notes to tables, and occasional related articles. Bankstats is published quarterly in paper form, priced at £60 per annum in the United Kingdom (4 issues). It is also available monthly free of charge from the Bank's web site at: www.bankofengland.co.uk/mfsd/latest.htm

Further details are available from: Daxa Khilosia, Monetary and Financial Statistics Division, Bank of England: telephone 020 7601 5353; fax 020 7601 3208; e-mail daxa.khilosia@bankofengland.co.uk

The following articles have been published in recent issues of *Monetary and Financial Statistics*. They may also be found on the Bank of England web site at www.bankofengland.co.uk/mfsd/article

Title	Author	Month of issue	Page numbers
2000 gilt ownership survey	Bruce Devile	September 2001	7–9
Measuring the service earnings of financial intermediaries: the role of the balance sheet in the production process	Chris Wright	August 2001	5–6
Recent developments in statistical requirements for financial stability, and in their use—the perspective of a central bank of a developed country	Sarah Warmby	August 2001	2–4

Targeting Inflation book

In March 1995, the Bank hosted a conference of central banks adhering to inflation targets. The book draws together contributions from each of the countries represented at the conference. It details cross-country experiences of this monetary framework and the key operational and theoretical issues it raises. The price of the book is £20.00.

Index-linked debt book

In September 1995, the Bank held a conference to discuss a broad range of theoretical and practical questions raised by index-linked debt. This book contains revised versions of the papers presented at the conference, as well as the background papers circulated by the Bank ahead of the conference. The price of the book is £10.00.

Openness and Growth book

The *Openness and Growth* book, published in October 1998, contains the proceedings of an academic conference held at the Bank in September 1997, investigating the link between productivity growth and the international openness of the UK economy. The price of the book is £10.00.

Economic models at the Bank of England

The *Economic models at the Bank of England* book, published in April 1999, contains details of the economic modelling tools that help the Monetary Policy Committee in its work. The price of the book is £10.00. An update was published in September 2000 and is available free of charge.

Government debt structure and monetary conditions

In June 1998 the Bank of England organised a conference to discuss the interactions between the size and structure of government debt and monetary conditions. This book, published in December 1999, contains all but one of the papers presented at the conference, plus a background paper prepared within the Bank. The price of the book is £10.00.

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Inflation Report

The Bank's quarterly *Inflation Report* sets out the detailed economic analysis and inflation projections on which the Bank's Monetary Policy Committee bases its interest rate decisions, and presents an assessment of the prospects for UK inflation over the following two years.

The *Report* starts with an overview of economic developments; this is followed by six sections:

- analysis of money, credit and financial market data, including the exchange rate;
- analysis of demand and output;
- analysis of the labour market;
- analysis of costs and prices;
- summary of monetary policy during the quarter; and
- assessment of the medium-term inflation prospects and risks.

The minutes of the meetings of the Bank's Monetary Policy Committee (previously published as part of the *Inflation Report*) now appear as a separate publication on the same day as the *Report*.

Publication dates

From 2002, copies of the *Quarterly Bulletin* and *Inflation Report* can be bought separately, or as a combined package for a discounted rate. Current prices are shown overleaf. Publication dates for 2002 are as follows:

Quarterly Bulletin		*Inflation Report*	
Spring	18 March	February	13 February
Summer	17 June	May	15 May
Autumn	23 September	August	7 August
Winter	16 December	November	13 November

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Destination	2002						2001			
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	Annual	Single	Annual	Single	Annual	Single	Annual	Single	Annual	Single
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