

Quarterly Bulletin

Summer 2002



Bank of England Quarterly Bulletin

Summer 2002

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Volume 42

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Markets and operations (pages 125–46)

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 15 February 2002 to 17 May 2002.

Reports (pages 147–61)

Public attitudes to inflation. As part of a regular series, the market research agency NOP has been carrying out quarterly and annual surveys of public attitudes to inflation on behalf of the Bank since November 1999. This article describes the results of the full annual survey which took place in February 2002. It shows that public opinion remains fairly stable on most issues, though expectations of future interest rate movements do of course fluctuate. Those who think rates should stay where they are remain the largest group, but among the rest, the public was evenly divided over whether it would be better for Britain's economy for rates to rise or fall over the next few months. The proportion satisfied with the way the Bank is doing its job of setting interest rates is very little changed from November.

The Bank of England's operations in the sterling money markets. This article provides a full description of the Bank of England's arrangements for its money market operations. No changes to the operations are being announced at this time: the article updates the description provided in the May 1997 *Quarterly Bulletin* to take account of adaptations that have occurred over the past five years.

Research and analysis (pages 162–212)

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.

No money, no inflation—the role of money in the economy. In this article, Mervyn King, Deputy Governor, examines the apparent contradiction that the acceptance of the idea inflation is a monetary phenomenon has been accompanied by the lack of references to money in the conduct of monetary policy during its most successful period. The disappearance of money from the models used by economists is, however, more apparent than real, with official interest rates playing the leading role as the instrument of policy, with money in the wings off-stage. Nevertheless, there are real dangers in relegating money to this behind-the-scenes role.

Asset prices and inflation (by Roger Clews of the Bank's Monetary Instruments and Markets Division). This article is one in a series on the UK monetary policy process. It discusses some of the interconnections between inflation, monetary policy and asset prices. The Monetary Policy Committee is extensively briefed on asset market developments, along with other developments in the economy, before it makes its policy decisions.

Durables and the recent strength of household spending (by Robert Hamilton of the Bank's Structural Economic Analysis Division and Beverley Morris of the Bank's Inflation Report and Bulletin Division). Household consumption in the United Kingdom grew by about 4% during 2001. This was largely accounted for by unusually strong spending on durable goods—growth in spending on other goods and services

slowed to around a six-year low. This article discusses why spending on durable goods needs to be analysed differently from that on other types of goods, and provides some possible explanations for its recent unusual strength. In addition, an alternative estimate of consumption is presented that replaces the expenditure on durable goods with the flow of services derived from them. Over the past year, this alternative measure has grown less strongly than the standard expenditure series.

Working time in the United Kingdom: evidence from the Labour Force Survey (by Fergal Shortall of the Bank's Structural Economic Analysis Division). This article examines the evolution of working time from a macroeconomic perspective using data from the Labour Force Survey. Average hours worked are still falling, after abstracting from the effects of overtime. This can largely be accounted for by the rise in the proportion of part-time workers. Above and beyond the full-time/part-time split, changes in employment composition by industry, gender, occupation, employment status and age explain little of the downward trend in average hours worked. Overtime has shifted from being paid towards being unpaid. Changes in the occupational mix can account for some of this shift. The article shows that paid overtime is the only component of hours with strong cyclicity. All other components lag GDP and in some cases lag employment too. This is consistent with aggregate changes in hours being the result of compositional effects, rather than employees in the same job changing their hours.

Why are UK imports so cyclical? (by Valerie Herzberg, Maria Sebastia-Barriel and Simon Whitaker of the Bank's Structural Economic Analysis Division). The recent economic slowdown in the United Kingdom has been characterised by declines in business investment and exports. The impact on domestic output has been alleviated by robust household spending, but also by a sharp decline in imports of goods and services. This article shows that these divergent trends in the components of demand, and differences in their import content, can help explain the weakness in imports during 2001. More generally, close attention to the relative contribution of the components to aggregate demand can help explain fluctuations in imports. The analysis has been aided by the recent publication of updated information from the ONS on the import content of different expenditure categories.

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 15 February to 17 May 2002.

- The dollar, euro and sterling money market yield curves remained steeply upward-sloping during the period.
- Long-term interest rates rose in the United States, Germany and the United Kingdom.
- Effective exchange rates for the dollar and sterling depreciated, while the euro and the yen appreciated.
- Most major international equity indices rose slightly, while Japanese equity indices rose more strongly.

Macroeconomic background to market developments

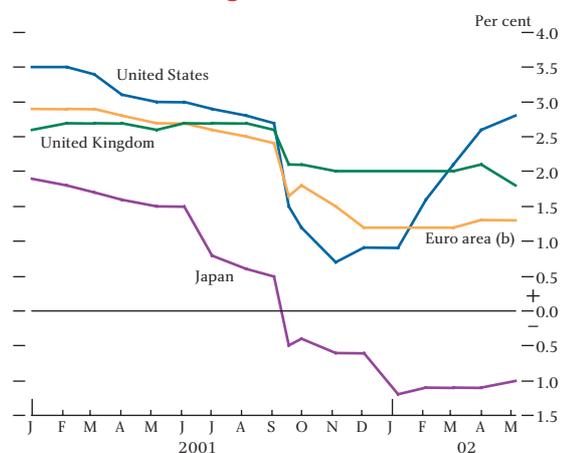
Consensus GDP growth expectations for 2002 increased further for the United States, but were altered little for the United Kingdom and the euro area (see Chart 1); expectations for 2003 were little changed for these three regions. Consensus growth expectations for 2002 increased slightly for the Asia/Pacific region, but fell for Latin America. Consensus expectations for consumer price inflation in 2002 and 2003 increased or were unchanged in all these regions (see Table A).

Short-term interest rate expectations

The Federal Open Market Committee (FOMC), the European Central Bank (ECB) and the Bank of England's Monetary Policy Committee (MPC) left official interest rates unchanged during the period. The Bank of Japan (BoJ) also kept its monetary policy unchanged.⁽¹⁾ The Bank of Canada and the Reserve Bank of Australia increased their official interest rates by 25 basis points, and the Reserve Bank of New Zealand by 75 basis points.

The steepness of the money market futures curves, as measured by the difference in interest rates implied by three-month futures twelve and three months ahead,

Chart 1
Forecasts for GDP growth in 2002^(a)



Source: Consensus Economics.

(a) Means of survey samples.

(b) Weighted average forecasts for France, Germany and Italy for the interim survey of 25 September 2001.

increased by around 50 basis points in the United States, to historically high levels, but changed relatively little in the United Kingdom and the euro area (see Chart 2). The steepness of money market yield curves continues to reflect market participants' views that official rates are likely to rise. In the United States, the further steepening reflected both a fall in the level of interest rates expected in the near term and a rise in the level expected further out. Near-term interest rate

(1) The main operating target for the BoJ's money market operations is the outstanding balance of the current accounts at the BoJ.

Table A
Forecasts for consumer price inflation

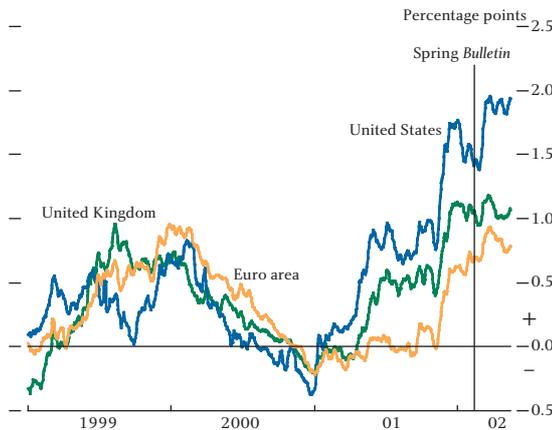
Per cent; percentage points in italics

	2002 forecasts			2003 forecasts		
	February	May	Change (a)	February	May	Change (a)
United States	1.4	1.6	<i>0.2</i>	2.4	2.4	<i>0.0</i>
Euro area	1.7	2.0	<i>0.3</i>	1.8	1.9	<i>0.1</i>
United Kingdom	2.0	2.2	<i>0.2</i>	2.3	2.3	<i>0.0</i>
Asia/Pacific	0.0	0.1	<i>0.1</i>	0.4	0.5	<i>0.1</i>
Latin America	12.1	15.6	<i>3.5</i>	6.9	8.6	<i>1.7</i>

Source: Consensus Economics.

(a) Changes between February and May 2002 surveys.

Chart 2
Steepness of US, UK and euro-area money market yield curves^(a)

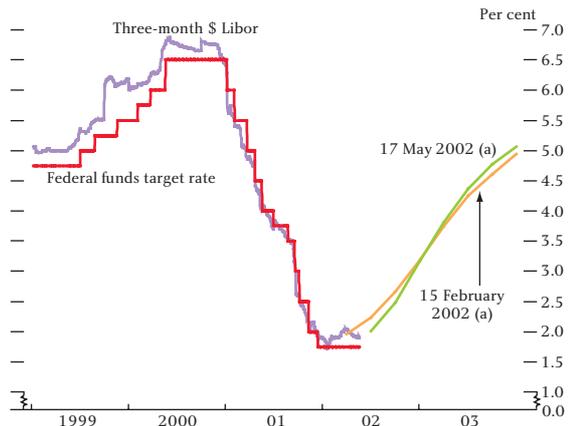


(a) Difference between three-month forward rates twelve months and three months ahead, derived using the Bank's bank liability curve. For further details, see Brooke, M, Cooper, N and Scholtes, C (2000), *Bank of England Quarterly Bulletin*, November, pages 392-402. Excluding the week of 14 September 2001. Five-day moving average.

expectations also fell in the United Kingdom. Financial market participants revised outwards their expectations for how long the FOMC and the MPC would keep their official interest rates unchanged (see Charts 3 and 4). But near-term rate expectations rose in the euro area (see Chart 5).

Changes in the future interest rate levels implied by interest rate futures contracts maturing in December 2002 are shown in Chart 6. Market participants' perception of the resilience and speed of the economic recovery in the United States played an important role in these changes. In late February and early March, a series of stronger-than-expected US data releases was followed by testimony from Federal Reserve Chairman Greenspan on 7 March, which market participants interpreted as being more optimistic about the US economy. These contributed to an increase in implied future interest rates in all three regions. In the United Kingdom, stronger-than-expected domestic economic data were also influential in March (see Table B).

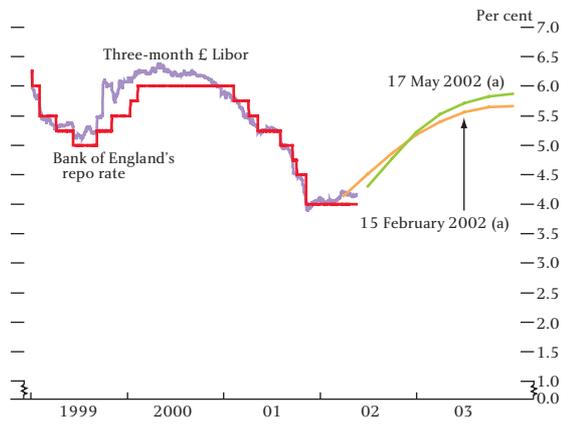
Chart 3
US interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by eurodollar futures contracts at the dates specified. From February 2002 onwards, the horizontal axis relates to contract expiry dates.

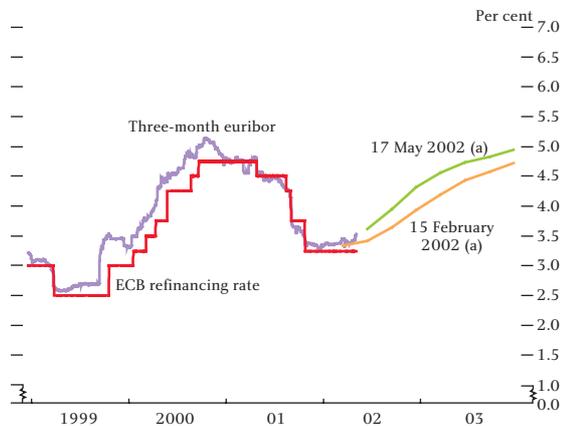
Chart 4
UK interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by short sterling futures contracts at the dates specified. From February 2002 onwards, the horizontal axis relates to contract expiry dates.

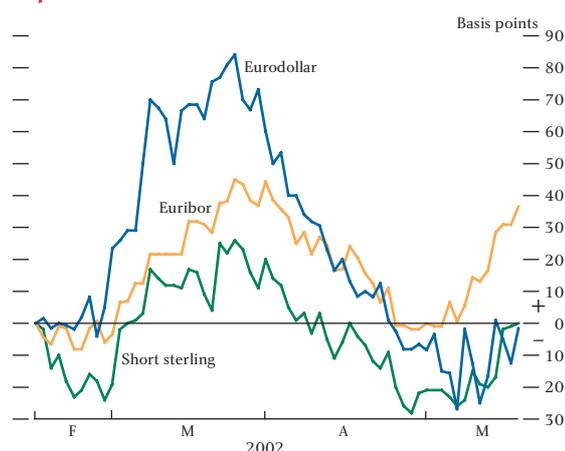
Chart 5
Euro-area interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by euribor futures contracts at the dates specified. From February 2002 onwards, the horizontal axis relates to contract expiry dates.

Chart 6
Cumulative changes in short-term interest rate expectations for December 2002^(a)



Sources: Bloomberg and Reuters.

(a) As indicated by changes in interest rates implied by futures contracts maturing in December 2002.

Table B
Market interest rate reactions to some economic news and official publications and comments^(a)

	Expected (b)	Actual	Intraday change (basis points) (c)	Daily change (basis points)
Governor's <i>Euromoney</i> speech (19/2)	-	-	-7	-5
MPC minutes (20/2)	-	-	-4	-6
UK retail sales (m-o-m) (21/2)	0.7%	-0.3%	-8	-4
Halifax house prices (m-o-m) (7/3)	-	1.5%	4	8
Chairman Greenspan's testimony (7/3)	-	-	3	8
RPIX (y-o-y) (19/3)	2.4%	2.2%	-4	-6
FOMC announcement, and Governor's comments (19/3) (d)	-	-	-5	4
UK retail sales (m-o-m) (21/3)	0.5%	1.5%	7	11
US consumer confidence (March) (26/3)	98.0	110.2	5	-3
US weekly initial jobless claims (4/4)	380,000	460,000	-5	-5
US unemployment rate (March) (5/4)	5.6%	5.7%	-4	-3
CBI industrial trends survey (23/4)	-	-	4	3
UK Q1 GDP (q-o-q) (26/4)	0.4%	0.1%	-7	-8
UK manufacturing production (m-o-m) (8/5)	0.3%	-0.8%	-4	1
US retail sales (m-o-m) (14/5)	0.6%	1.2%	4	8
<i>Inflation Report</i> (15/5)	-	-	8	10

Source: Bloomberg.

- (a) Reactions in rates implied by short sterling futures contracts (June 2002 contract up to 20 March, subsequently September 2002 contract).
 (b) - indicates unavailability of data.
 (c) Change in rates implied by short sterling from 15 minutes before to 15 minutes after the economic news release, publication of document or start of speech, or for overnight news from closing price to 30 minutes after start of trading the following day.
 (d) These occurred after close of London trading. Therefore daily change is from 19 March to 20 March.

From late March, decreases in implied future short-term interest rates in all three regions largely reflected market concerns about the pace of the economic recovery in the United States. This followed a series of weaker-than-expected data releases. Concerns about the conflict in the Middle East and a possible adverse effect of higher oil prices on the US economic recovery contributed to the fall. Official comments were important in leading market participants to revise their

expectations about how long official rates would remain unchanged, particularly in the United States and the United Kingdom.

In early May, the fall in implied future interest rates was partly reversed in the euro area and to a lesser extent in the United Kingdom. In the euro area, higher-than-expected inflation data in some member states followed comments by ECB President Duisenberg on the inflation outlook. In the United Kingdom, publication of the *Inflation Report* led to significant increases in interest rates implied by short sterling futures contracts expiring up to early 2003; market participants noted that the MPC's projection for inflation was slightly above its target at the two-year horizon, with risks on the upside. Unexpectedly strong US retail sales data published on 14 May led to increases in implied rates in all three areas.

Implied future short-term interest rates in Japan fell slightly over the period, by up to 10 basis points out to the end of 2003 (see Chart 7). While the Bank of Japan kept its monetary policy unchanged during the period (see footnote 1 on page 125), it announced several changes to its open market operations at its meeting on 28 February, including an increase from ¥0.8 trillion to ¥1.0 trillion per month in its Rinban operations⁽¹⁾ and a pledge to provide ample liquidity towards the fiscal year-end. It also announced that it would ease the restriction on the use of its Lombard-type lending facilities and consider broadening the range of eligible collateral used in its operations (this was later approved).

Chart 7
Japanese interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by euroyen futures contracts at the dates specified. From February 2002 onwards, the horizontal axis relates to contract expiry dates.

(1) In its Rinban operations, the BoJ provides funds to the banking system through outright purchases of Japanese government bonds.

These changes were made partly in response to the re-emergence of the 'Japanese premium' ahead of the financial year-end.⁽¹⁾

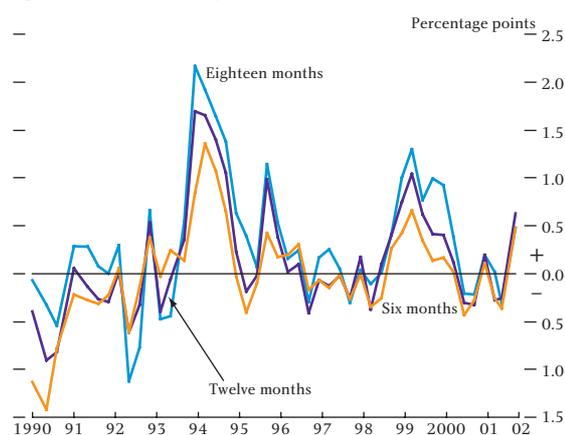
Term premia

As Charts 3 to 5 show, interest rate futures maturing to the end of 2002 reflect market participants' mean expectation that official rates will be increased before the end of 2002 Q3 in the United States, the euro area and the United Kingdom. However, over the period, market contacts have suggested that rates implied by interest rate futures have tended to be somewhat higher than market participants' mean expectations.⁽²⁾ In part, this may reflect risk premia, and more specifically 'term' premia.⁽³⁾ There are several possible explanations for the existence of term premia, which are not mutually incompatible, and three of them are described below. Risk premia may also reflect liquidity, credit and inflation risk, which might vary across different instruments. However, the box on pages 130–31 presents a comparison of the steepness of the sterling money market yield curve derived from cash and derivative instruments, which suggests that such differences are small.

Chart 8 compares three-month UK forward rates derived from the Bank of England's 'bank liability curve' (BLC)⁽⁴⁾ with economists' expectations of the three-month sterling Libor rate (from *Consensus* surveys) to provide estimates of term premia over time at various horizons. The term premia are estimated as the difference between the market forward rates and survey expectations. The chart shows that term premia have more often been positive than negative since 1993, when the period of downward-sloping yield curves of the early 1990s came to an end. It also indicates that, although positive, recent term premia are not extreme by historical standards. The survey-based estimates of term premia shown in Chart 8 also indicate that term premia have tended to increase with maturity since 1993.

Chart 9 compares market and survey-based measures of the steepness of the UK money market yield curve. Survey-based term premia changed relatively little over the period, but were somewhat higher in March and

Chart 8
Survey-based term premia^(a) at the 6, 12 and 18-month horizons^(b)

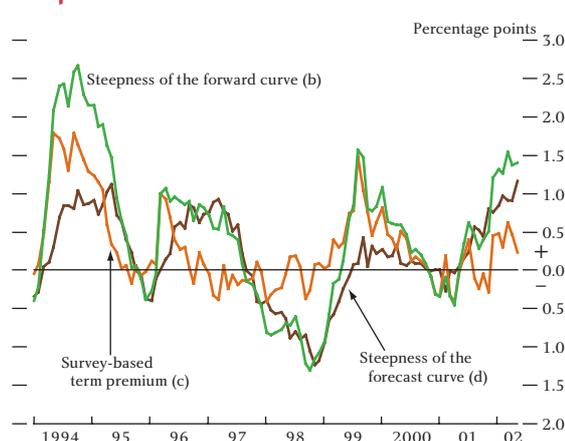


Sources: Consensus Economics and Bank of England.

- (a) Quarterly *Consensus* forecasts of three-month interbank rates at each horizon, minus three-month interbank rates at the same horizon (derived using the Bank's bank liability curve).
 (b) Slightly less than 7, 13 and 19 months from 1994 on. Before this, 5 to 6, 11 to 12, and 17 to 18 months.

April. It is broadly consistent with a view expressed by some market participants in April that only around 70% of the steepness in the short sterling yield curve out to one year at that time might have been explained by interest rate expectations.

Chart 9
UK survey-based term premia and yield curve steepness^(a)



Sources: Consensus Economics and Bank of England.

- (a) Observations are on *Consensus* survey dates.
 (b) Three-month interbank rate twelve months forward minus current three-month interbank rate.
 (c) Three-month interbank rate twelve months forward minus comparable *Consensus* forecast rate.
 (d) *Consensus* forecast of three-month interbank rate twelve months forward minus current three-month interbank rate.

(1) The Japanese premium is the interest rate premium over market interbank deposit rates which Japanese banks have to pay to attract uncollateralised funding.

(2) On using interest rate futures as a guide to expectations of official rates, see Brooke, M, Cooper, N and Scholtes, C (2000), 'Inferring market interest rate expectations from money market rates', *Bank of England Quarterly Bulletin*, November, pages 392–402.

(3) See the box on interest rate term premia in 'Markets and operations' (2002), *Bank of England Quarterly Bulletin*, Spring, page 9.

(4) The BLC data are derived from money market instruments and interest rate swaps. For more information, see Brooke, M, Cooper, N and Scholtes, C, *op cit*.

Finance theory suggests that term premia might be related to the steepness of the yield curve.⁽¹⁾ For example, if investors require a higher return on assets which pay out in states of the world in which they expect to be better off, then positive term premia might be associated with an upward-sloping yield curve, if an upward slope reflects expectations of higher output and consumption growth. Since 1994, the correlation between changes in survey-based term premia and changes in yield curve steepness (both at the twelve-month horizon) has been high at 0.81, although this may have reflected in part the fact that term premia are included in the measure of yield curve steepness (see Chart 9).

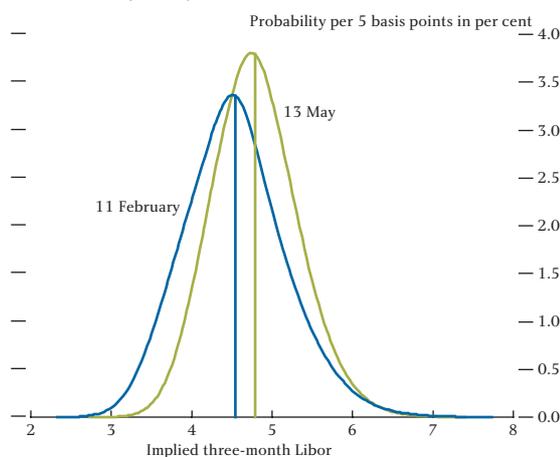
At various times, changes in the demand for, or supply of, fixed-rate funding may also have contributed to term premia. For example, during some periods in the past, market contacts suggested that an increase in mortgage lenders' demand to hedge fixed-rate mortgage loans to match their predominantly floating-rate liabilities may have contributed to a difference between forward interest rates and market participants' rate expectations around two to five years ahead. Mortgage lenders can hedge their fixed-rate loans for example by selling short sterling contracts or by paying fixed and receiving floating in interest rate swap contracts. In either case, the effect is to put upward pressure on the forward rates implied by these derivative instruments. This could contribute to a positive term premium at these maturities, if arbitrage does not close the gap immediately.

If term premia are at least partly caused by investors or borrowers requiring insurance against the risk of adverse future movements in interest rates, then they may also be affected by the shape of the distribution of investors' and borrowers' interest rate expectations. The shape of the distribution can be characterised partly by its standard deviation, which measures the width of the distribution; its skewness, which measures the asymmetry of the distribution around its mean; and its kurtosis, which measures the extent to which the tails of the distribution are 'fatter' than in a normal distribution. For example, positive term premia might in some situations be associated with a distribution that has a relatively high standard deviation, positive skew and high kurtosis, to compensate investors for a relatively

high perceived risk of a sharper-than-expected rise in interest rates.

An estimate of the shape of the probability distribution of market expectations of future interest rates can be inferred from the prices of options on interest rate futures (see Chart 10).⁽²⁾ However, options prices, and the implied probability distributions derived from them, are also affected by demand and supply factors in the options market (assuming that options prices are not

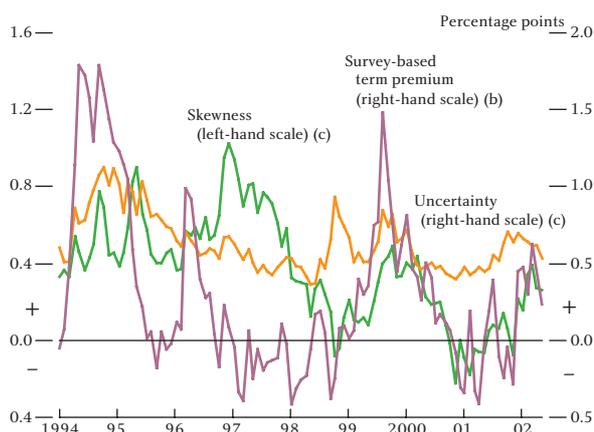
Chart 10
Short sterling implied probability density functions (PDFs)^(a)



Sources: LIFFE and Bank of England.

(a) Implied probability density functions six months ahead for three-month interest rates.

Chart 11
UK survey-based term premia and interest rate uncertainty and skewness^(a)



Sources: Consensus Economics, LIFFE and Bank of England.

(a) Observations are on *Consensus* survey dates.
(b) Three-month interbank rate twelve months forward minus comparable *Consensus* forecast rate.
(c) Standard deviations and skewness implied by six-month constant horizon options on interest rate futures contracts; five-day moving averages.

(1) See Soderland, P and Svensson, L (1997), 'New techniques to extract market expectations from financial instruments', *Journal of Monetary Economics*, Vol. 40, pages 383–429.
(2) For details on extracting information from options prices, see Clews, R, Panigirtzoglou, N and Proudman, J (2000), 'Recent developments in extracting information from options markets', *Bank of England Quarterly Bulletin*, February, pages 50–60.

Comparison of the steepness of sterling money market yield curves in cash and derivative markets

The current steepness of money market yield curves derived from both cash and derivative instruments is likely to reflect a combination of market participants' interest rate expectations and 'term' or risk premia.⁽¹⁾ Risk premia might differ between the various instruments, and between cash and derivative markets in particular: for example, due to differences in the way the instruments are used, varying degrees of exposure to counterparty credit risk and different levels of liquidity in the various markets. In principle, these might generate differences in the steepness of yield curves between the types of instrument, although in practice arbitrage opportunities are likely to keep them in line. Market participants have suggested that derivatives rather than cash instruments have increasingly been used by banks to express interest rate views in recent years. This box describes the different uses of some cash and derivative instruments, and shows that on the whole, there is little difference between the steepness of the money market yield curves implied by cash instruments on the one hand and by derivative instruments on the other.

An interbank deposit is a cash deposit with a bank where a lender deposits an agreed amount of money either at call or for a given period of time, at an agreed interest rate.⁽²⁾ Interbank deposits are primarily used to transfer funds from 'cash-surplus' to 'cash-deficit' financial institutions, primarily at short maturities.⁽³⁾ Interbank deposits can also be used by banks to take interest rate views. However, deposits are now used less widely than money market derivatives (eg short sterling futures and SONIA swaps) for this purpose, in part because on-balance-sheet instruments incur a higher regulatory capital requirement for the lending bank.

Certificates of deposits (CDs) are debt securities evidencing that a deposit has been made with a bank (or building society) for a fixed period of time, at the end of which it will be repaid with interest. Like interbank deposits, CDs are used by banks for funding, often at longer maturities, as their marketability makes them a more liquid investment for a lender. CDs held (excluding a bank's own CDs) are allowable, with certain constraints, in the Financial Services Authority's retail bank stock liquidity regime. A further use of CDs is as collateral. End-investors (eg pension funds) often lend gilts or other securities into the market on a collateralised basis, taking CDs as security.

Commonly used money market derivatives are short sterling futures, forward rate agreements (FRAs) and SONIA swaps.⁽⁵⁾ A short sterling future is an interest rate futures contract that settles on the three-month BBA Libor rate prevailing on the contract's delivery date. Contracts are standardised and traded between members of the London International Financial Futures and Options Exchange (LIFFE). An FRA is an over-the-counter interest rate contract, in which two counterparties agree to exchange the difference between an agreed rate of interest and an as yet unknown Libor rate of specified maturity that will prevail at an agreed date in the future. Payments are calculated against a pre-arranged notional principal. A SONIA swap is a contract that exchanges at maturity a fixed interest rate against a geometric average of the floating overnight rates that have prevailed over the life of the contract.⁽⁴⁾ Short sterling futures are predominantly used to speculate on, and to hedge against, future interest rate movements. The amount outstanding in this market—known as 'open interest'—increased slightly in the year to end-March, by 3% to £419 billion. Unlike futures, which are exchange traded, FRAs and

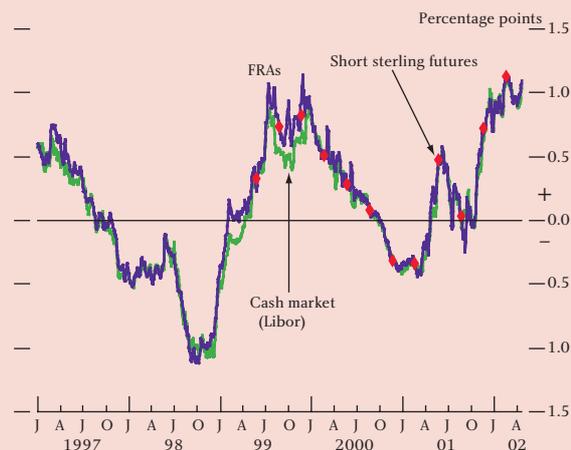
(1) See page 128.

(2) The British Bankers' Association (BBA) publishes London interbank offer rate (Libor) fixings daily, which are calculated as the average of the middle eight offer rates collected at 11 am from a number of financial institutions operating in the London interbank market.

(3) See the box on sterling money market instruments in Brooke, M, Cooper, N and Scholtes, C (2000), 'Inferring market interest rate expectations from money market rates', *Bank of England Quarterly Bulletin*, November, pages 392–402.

(4) The sterling overnight index average: a weighted average of rates on all unsecured sterling overnight cash transactions brokered in London between midnight and 4.15 pm each day.

Chart A
Steepness of sterling money market curve^(a)



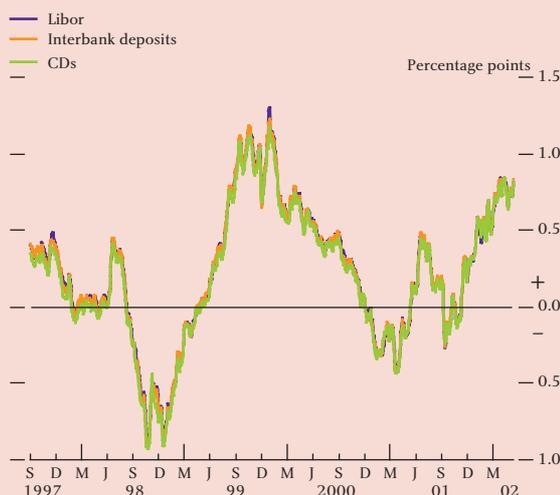
Sources: Bloomberg and Bank of England.

(a) Three-month rates nine months minus one month forward; five-day moving averages.

SONIA swaps are traded over the counter. The greater flexibility of FRAs allows institutions to match the cash flows of outright positions, so that they are good instruments to use for hedging.

Chart A assesses whether differences in usage and liquidity between instruments might have led to a difference in steepness by comparing cash and derivative market yield curves. It shows the steepness of the cash market yield curve, as measured by the difference between three-month Libor rates nine months and one month forward, and the steepness derived from derivatives markets, using short sterling futures and forward rate agreements (FRAs).⁽⁵⁾ The steepness of the sterling money market yield curve is similar for a variety of cash and derivative instruments. The steepness of cash market and derivatives market yield curves have generally moved closely together, as might be expected given the arbitrage opportunities between the two sets of instruments. Since November 2001, when the money market curve steepened strongly, the cash market curve has on average been slightly less steep (by just over 2 basis points) than the FRA curve. (And on average since February 1997, it has been 4.5 basis points less steep.) The differences may partly reflect the fact that derivatives might be used to a greater

Chart B
Steepness of sterling cash market yield curves^(a)



Sources: Bloomberg and Bank of England.

(a) Twelve-month minus one-month spot rates for Libor fixings, interbank and CD offered rates (both at 4.30 pm); five-day moving averages.

extent than cash instruments for hedging purposes when interest rates are expected to rise, thereby possibly increasing the risk premium for derivative instruments.

Chart B compares the yield curves for different cash market instruments, to assess whether Libor fixings are representative of other cash market rates. The chart shows the steepness of the spot cash money market yield curves, as measured by the difference between the twelve and one-month spot rates, for CDs and unsecured interbank deposits as well as Libor fixings.⁽⁶⁾ On average since September 1997, the money market curve derived from interbank deposit rates has been equally steep as that derived from Libor fixings, and the curve derived from CD rates has only been around 3 basis points less steep.

In conclusion, the steepness of money market yield curves derived from the cash and derivative instruments considered here has been similar recently, despite a reduction in liquidity in longer-dated cash instruments reported by some market participants (see the section on the sterling money market), indicating that arbitrage between the two sets of instruments has remained effective.

(5) Note that the furthest horizon for which it is possible to calculate a three-month forward rate for a cash instrument is nine months ahead, using Libor fixings. With regard to short sterling, it is only possible to calculate yield curve steepness at this horizon from June 1999 (when one-month contracts were introduced), and then at three-month intervals to fit with the contract settlement dates.

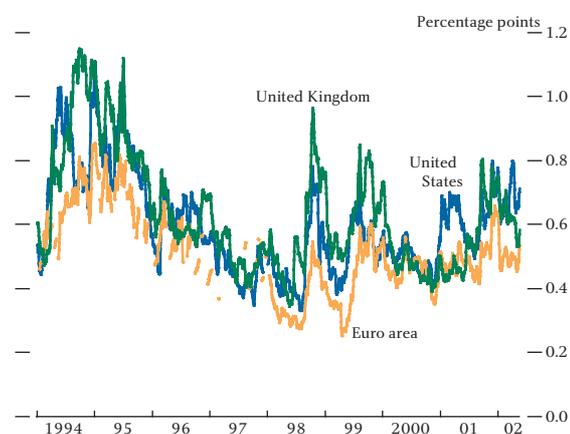
(6) We use the spot rates for CDs and interbank deposits because we cannot derive a back-run of three-month rates nine months forward for these instruments.

perfectly arbitrated) and may themselves contain risk premia. As a result, options prices do not just reflect interest rate expectations. Far 'out of the money' options, used to infer the tails of the probability distribution, tend to be particularly illiquid. Since 1994, the correlation between changes in interest rate uncertainty (as measured by implied standard deviations) and implied skewness, both at a six-month horizon, on the one hand, and changes in survey-based term premia at the twelve-month horizon, on the other, were 0.31 and 0.25 respectively. Chart 11 shows survey-based term premia alongside measures of uncertainty and skewness derived from options prices since 1994.

Interest rate uncertainty from options prices

Interest rate uncertainty in the United Kingdom at the six-month horizon, as inferred from options prices, fell from a relatively high level by historical standards, with much of the fall occurring in the second half of April (see Chart 12). Interest rate uncertainty also fell in the United States in April (although it remained higher than in the United Kingdom). According to market contacts, these decreases may have reflected expectations that official interest rates would remain unchanged for longer than thought previously. In the euro area, uncertainty fell slightly and is currently not high in historical perspective. The skewness of rate expectations at the six-month horizon remained positive in all three regions, indicating that market participants continued to think that there was a greater upside than downside risk to interest rate movements.

Chart 12
Interest rate uncertainty^(a)



Sources: LIFFE, Chicago Mercantile Exchange and Bank of England.

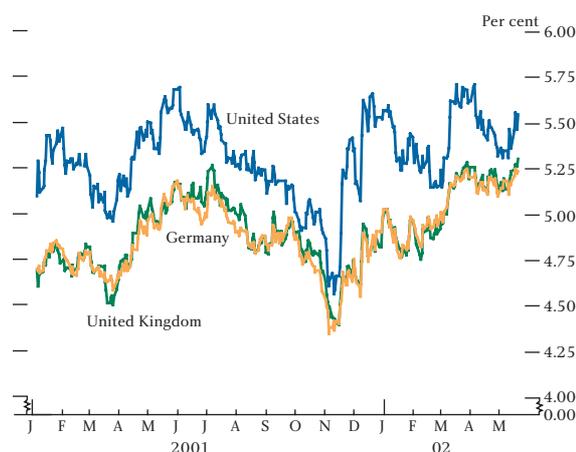
(a) Standard deviations implied by six-month constant horizon options on interest rate futures contracts; five-day moving averages.

Longer-term interest rates

Nominal government bond yields

Between 15 February and 17 May, ten-year government bond yields in the United States, Germany and the United Kingdom rose by 40, 32 and 43 basis points respectively (see Chart 13), following a somewhat similar pattern to that of money market interest rates during the period. Over the period, forward government bond yields rose across the curve (see Charts 14 to 16).

Chart 13
International ten-year government bond yields^(a)

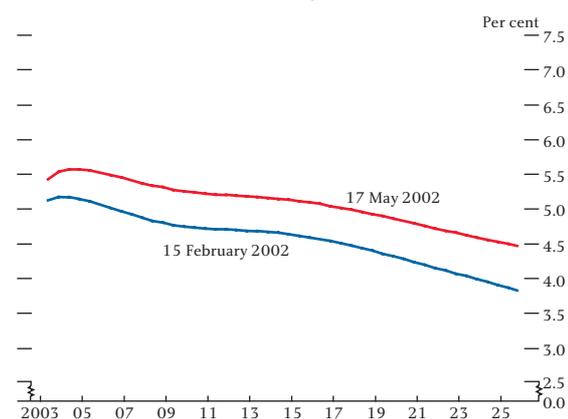


(a) Derived using the Bank's VRP curve-fitting technique. For further details see Anderson, N and Sleath, J (1999), 'New estimates of the UK real and nominal yield curves', *Bank of England Quarterly Bulletin*, November, pages 384-92.

Factors other than macroeconomic news also influenced government bond yields. Revisions to expected government budget balances and associated expectations of increased government bond issuance may have contributed to the rise in US and UK ten-year government bond yields. According to *Consensus* surveys, economists became more pessimistic about budget positions in the United States and the United Kingdom between 11 February and 13 May (see Table C). The UK Budget on 17 April had only a limited immediate impact on gilt yields, since the announcements for tax net of expenditure were largely as the market had expected. However, some market participants commented that if economic growth should turn out to be lower than the upwardly-revised estimate assumed in the Budget, this might lead to higher gilt issuance. Correlations between daily changes in ten-year government bond yields and equity indices rose in the United States, Germany and the United Kingdom (see Chart 17).

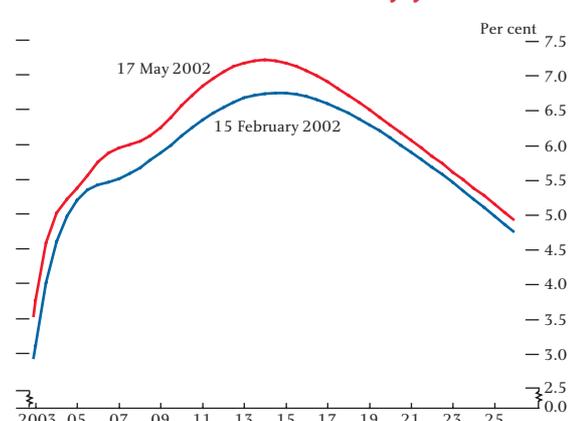
The yields of ten-year Japanese government bonds (JGBs) fell by around 15 basis points. Yields fell in the

Chart 14
Three-month forward gilt yields^(a)



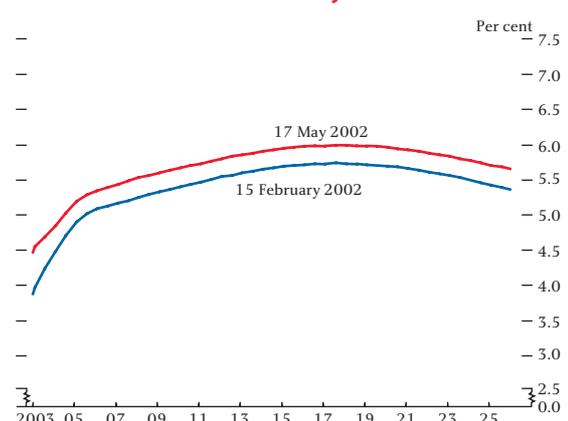
(a) Derived using the Bank's VRP curve-fitting technique.

Chart 15
Three-month forward US Treasury yields^(a)



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

Chart 16
Three-month forward Bund yields^(a)



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

early part of the period, as concerns about possible further financial sector distress at the end of the financial year (end-March) decreased. In part, that

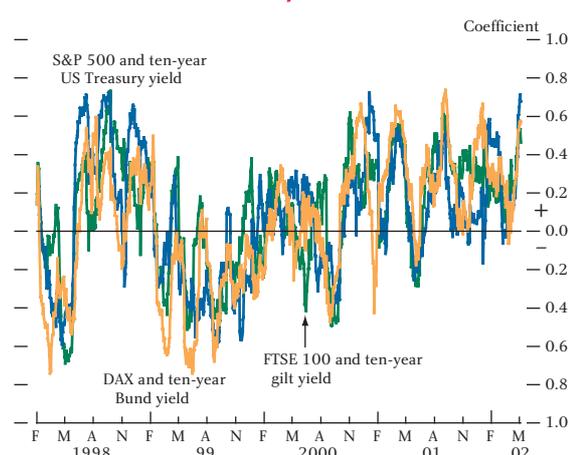
Table C
Forecasts for government budget positions^(a)

	United States (\$ billions) 2001/02 (b)	Germany (€ billions) 2002	United Kingdom (£ billions) 2002/03 (b)
14 January	-18.0	-52.3	-7.5
11 February	-38.0	-54.9	-9.1
11 March	-31.0	-54.8	-10.0
8 April	-41.0	-55.8	-10.6
13 May	-78.0	-55.0	-11.3

Source: Consensus Economics.

(a) Survey means.
(b) US fiscal year is to September, UK fiscal year is to March.

Chart 17
Correlations between equities and bonds^(a)



Sources: Bloomberg and Bank of England.

(a) Thirty-day rolling correlations of daily percentage changes in the relevant equity index and daily yield changes in the relevant government bond.

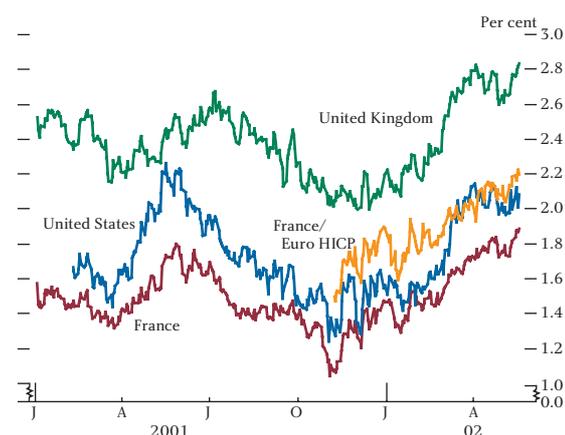
followed measures announced by both the BoJ on 28 February and the government in its anti-deflation package on 27 February. Some of the fall in yields was subsequently reversed as market participants focused on the fall in popularity of Prime Minister Koizumi and its impact on upcoming by-elections, together with expectations of a rating agency downgrade of Japan's sovereign debt.

Breakeven inflation rates

Nominal government bond yields can be decomposed into real yields and implied breakeven inflation rates, using the yields on conventional and index-linked government bonds. Ten-year breakeven inflation rates in the United States, the euro area and the United Kingdom rose by 49, 42 and 53 basis points respectively between 15 February and 17 May (see Chart 18).⁽¹⁾ In the United Kingdom, where a yield curve from index-linked gilts (IGs) can be estimated over a wide range of maturities, forward breakeven inflation rates rose across the curve (see Chart 19), including at long

(1) Based on the difference between yields on conventional government bonds and the yields on Treasury inflation indexed securities, French government bonds linked to the euro area's harmonised index of consumer prices (HICP), and index-linked gilts, respectively.

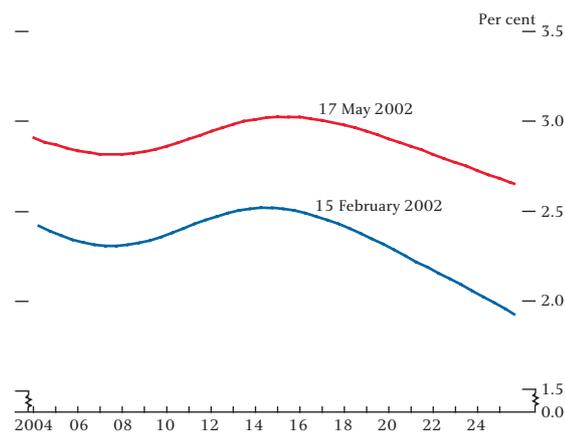
Chart 18
International ten-year breakeven inflation rates^(a)



Source: Bloomberg.

(a) Breakeven inflation rates are calculated as the difference between the yield of a conventional bond and the yield of an index-linked government bond with a maturity of approximately ten years. Indexation is based on the following: RPI for the United Kingdom, CPI excluding tobacco for France, HICP excluding tobacco for French index-linked bonds indexed to euro-area inflation, and the CPI Urban index for the United States.

Chart 19
Twelve-month forward UK inflation expectations^(a)



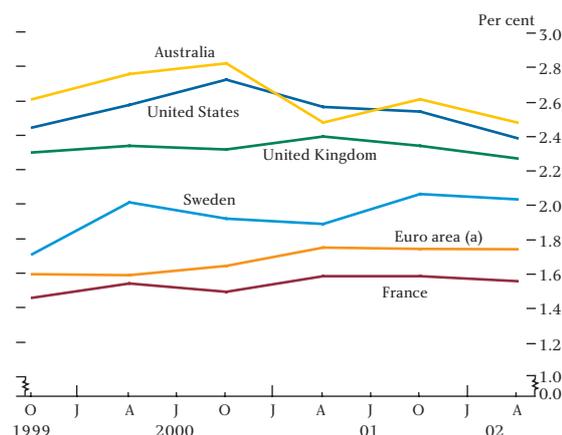
(a) Derived using the Bank's VRP curve-fitting technique.

maturities. However, this change was not particularly large by historical standards.

Breakeven inflation rates inferred in this way may differ from market participants' mean inflation expectations if investors require inflation risk premia or if institutional or regulatory features of the market affect the demand for or supply of government bonds and arbitrage does not keep their prices at levels corresponding to market participants' interest rate expectations, particularly in illiquid markets.⁽¹⁾

According to the two most recent half-yearly *Consensus* surveys, expectations of average inflation over the next

Chart 20
Consensus inflation expectations (average over next ten years)



Source: Consensus Economics.

(a) The euro area is proxied by a simple GDP-weighted average of Germany, France and Italy.

ten years in some major economies changed little or fell between 8 October 2001 and 8 April 2002 (see Chart 20). Over the same period, ten-year breakeven inflation rates rose by 68, 48 and 67 basis points in the United States, France and the United Kingdom, respectively.⁽²⁾

Market participants have suggested that the rise in ten-year breakeven inflation rates in the United States, the euro area and the United Kingdom might have been partly due to a rise in the inflation risk premium. This is said to have reflected a greater dispersion in inflation expectations among market participants, partly due to rising oil prices and accommodative monetary policy. In the euro area, wage negotiations and rising service sector prices were thought to have contributed to a rise in the inflation risk premium.

Market participants suggested that the rise in US, euro-area and UK breakeven inflation rates was also partly due to bond-market demand factors. They reported that there had been increased demand for French index-linked government bonds, associated with greater purchases of inflation-linked interest rate products among retail customers in the euro area, particularly in Italy. Much of this demand was thought to have been the counterpart of a shift away from equities, which have also been considered to offer protection against inflation. There was also thought to have been increased demand for index-linked gilts as an alternative to equities in the United Kingdom. A shift in

(1) See Scholtes, C (2002), 'On market-based measures of inflation expectations', *Bank of England Quarterly Bulletin*, Spring, pages 67–77, and page 7 of the Bank of England's May 2002 *Inflation Report*.

(2) French government bonds linked to euro-area HICP had not yet been issued on 8 October 2001.

Table D
Sterling bond issuance in 2002 Q1

DMO gilt auctions (a) (£ millions)

Conventional	<u>Date</u>	<u>Amount issued</u>	<u>Stock</u>			
	27.03.02	2,250	5% Treasury Stock 2012			
Index-linked	<u>Date</u>	<u>Amount issued</u>	<u>Stock</u>			
	24.01.02	500	4 $\frac{1}{8}$ % Index-linked Stock 2030			
Corporate issuance		<u>Amount (£ billions)</u>	<u>By credit rating:</u>			
	<u>Number of issues</u>	<u>Total (b)</u>	<u>AAA</u>	<u>AA</u>	<u>A</u>	<u>BBB and lower</u>
<i>Fixed-rate issues</i>						
UK corporates	26	5.2	1.0	0.8	1.5	1.9
UK financials	9	2.7	0.2	0.2	2.2	0.2
Supranationals	3	0.5	0.5	0.0	0.0	0.0
Overseas borrowers	15	3.5	1.4	0.0	1.7	0.5
Total (b)	53	11.9	3.0	0.9	5.4	2.6
<i>FRNs</i>						
UK corporates	2	0.1	0.0	0.0	0.1	0.0
UK financials	15	2.5	1.2	0.4	0.7	0.2
Supranationals	3	1.4	1.0	0.4	0.0	0.0
Overseas borrowers	8	1.0	0.8	0.1	0.2	0.0
Total (b)	28	5.1	3.0	0.8	1.0	0.3

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

(a) On 1 March 2002 HM Treasury issued to the DMO additional nominal amounts of each gilt-edged stock in order to ensure that all gilt-edged securities, irrespective of when they were originally issued, fall within the terms of Article 15 of the draft EU Savings Directive (see www.europa.eu.int/eur-lex/en/com/pdf/2001/com2001_0400en01.pdf). The additional nominal amounts of each gilt-edged stock will be used as collateral in the DMO's cash management operations. The overall nominal total issued was £691.0 million with the increase in the nominal amount outstanding of each gilt ranging from £0.25 million to £30 million for conventional gilts and from £5 million to £15 million for index-linked gilts.

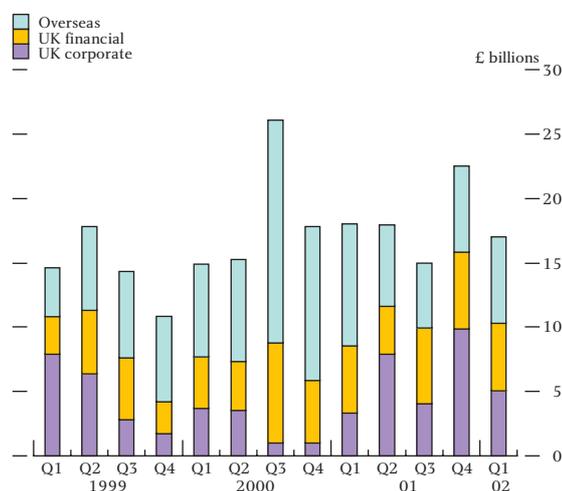
(b) Totals may not sum exactly due to rounding.

issuance by the Agence France Trésor away from government bonds linked to French CPI towards bonds linked to euro-area HICP was thought to have increased the investor base, since the latter were likely to be more attractive in other euro-area member states.

Bond issues and credit spreads

The outstanding stock of gilts increased by about £3.5 billion in nominal value in 2002 Q1, to almost £279 billion, having decreased by £8 billion in 2001 Q4. The Debt Management Office (DMO) held two outright auctions during the quarter, and there were no redemptions (see Table D).

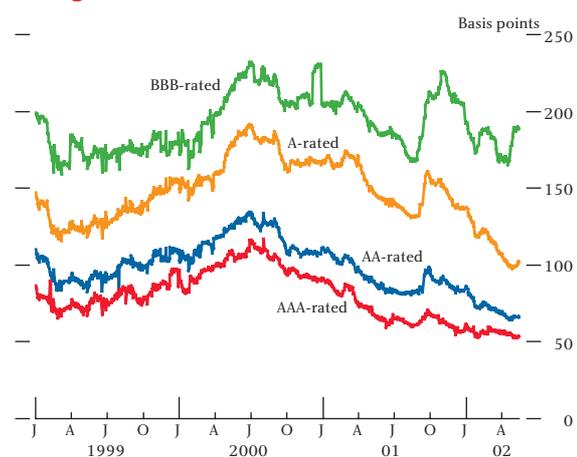
Chart 21
Sterling-denominated non-government bond issuance by issuer type



Issuance in the sterling-denominated non-government bond market was about £17 billion in 2002 Q1 (see Chart 21 and Table D) compared with over £22 billion in 2001 Q4. Issues were more or less evenly split between UK non-financial companies, UK financial companies and overseas and supranational institutions, with the largest proportions in the AAA and A-rated categories. Elsewhere, issuance of US dollar-denominated non-government bonds by all issuers increased in 2002 Q1 in comparison with both 2001 Q4 and 2001 Q1, but euro-denominated non-government bond issuance fell. Increased US dollar-denominated issuance was due, in part, to a switch by a number of US corporates from funding in the commercial paper market to the issuance of long-term debt, partly as a result of concerns about corporate liquidity following the Enron bankruptcy.

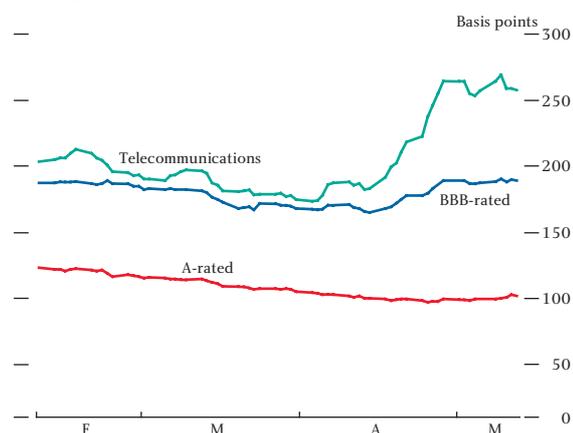
Sterling issuance by UK corporates fell in 2002 Q1, particularly in January and February after a rise in 2001 Q4. This may partly have been since some issues were brought forward to 2001 Q4, as demand for non-government bonds was high during that quarter. Except for bonds rated BBB or lower, spreads over gilt yields on Merrill Lynch non-government bond indices narrowed over the period, despite credit concerns following the Enron bankruptcy (see Chart 22). However, spreads over gilts on government bond yields of bonds issued by some telecommunications companies, many of which have an A or BBB rating, increased significantly (see Chart 23). This might help

Chart 22
Spreads of sterling non-government bond yields over gilts



Source: Merrill Lynch.

Chart 23
Spreads of sterling non-government bond yields over gilts

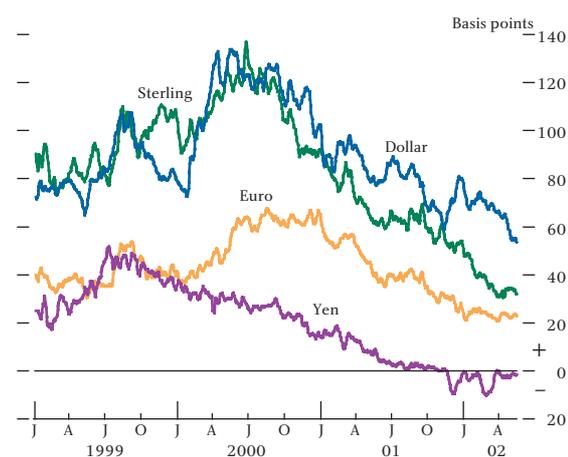


Source: Merrill Lynch.

to explain why telecommunications companies issued fewer bonds in 2002 Q1 than in any quarter in 2001. The rise in credit spreads for bonds issued by telecommunications companies was global, also occurring in the US dollar and euro-denominated markets.

Ten-year US dollar swap spreads (the difference between swap rates and government bond yields) fell by 18 basis points, while ten-year sterling and euro-denominated swap spreads declined by 8 and 3 basis points respectively (see Chart 24). In Japan, swap spreads rose slightly but remained negative. US dollar swap spreads may have decreased as a result of an announced increase in the supply of US Treasury notes and the US government's decision not to conduct any buy-backs in 2002 Q2. In the United Kingdom too, swap spreads

Chart 24
Ten-year swap spreads^(a)



Source: Bloomberg.

(a) Five-day moving averages of yield differences between ten-year swap rates and ten-year government bond yields.

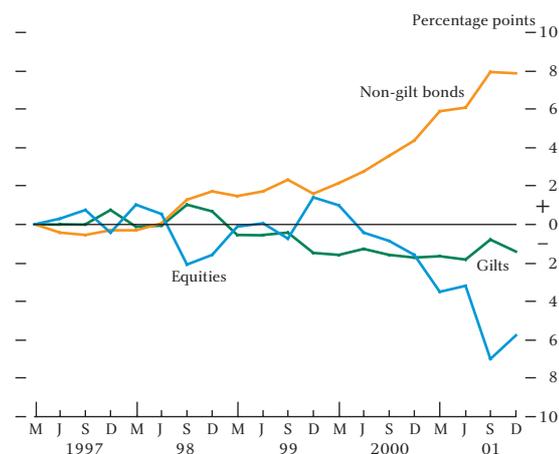
narrowed, perhaps partly due to market speculation about an increase in gilt supply following the Budget. Relatively high levels of corporate issuance will also have contributed to the narrowing of swap spreads, as some issuers switched their fixed-rate liabilities into floating by agreeing to pay the floating-rate leg of interest rate swaps. In the euro area, the narrowing partly reflected ongoing demand from the Agence France Trésor to receive fixed in longer-maturity interest rate swaps, so as to shorten the average duration of the French government's debt portfolio.

On the demand side, recent switching from equities into bonds by pension funds (the largest class of institutional investor in the sterling bond market) seems to have decreased in 2001 Q4, although market contacts continue to report such flows. As shown in Chart 25, non-gilt bond holdings of insurance companies and pension funds were little changed, while the gradual decrease in equity holdings appears to have reversed a little. According to the Investment Management Association (IMA), there were net inflows into UK equity income⁽¹⁾ unit trusts and investment funds for all types of investors in 2002 Q1, following a net outflow between March and December 2001.

Demand from pension funds for non-government bonds may have fallen slightly, perhaps partly as a result of a shift from defined benefit pension schemes to defined contribution pension schemes by a number of companies. Unlike defined contribution schemes, defined benefit schemes have been influenced by

(1) UK equity income funds refer to IMA sectors quoted in their monthly statistics, available at www.investmentfunds.org.uk/industry_data/ukbusiness/default.htm

Chart 25
Insurance corporation and pension fund financial asset allocations^(a)



Source: Office for National Statistics.

(a) Figures given are cumulative percentage point changes in the proportion of funds allocated to each asset.

anticipation of the abolition of the Minimum Funding Requirement (MFR) and the introduction of Financial Reporting Standard 17,⁽¹⁾ both of which are thought to have encouraged the purchase of non-government bonds rather than equities or gilts. In most defined benefit pension schemes, the fund pays retired employees pensions linked to a percentage of their final salary. This means that the pension fund (and ultimately the employer) bears most of the risks of the investments made in order to be able to make this payment. In a defined contribution scheme, pensioners receive a capital sum based on the returns on the money invested in the scheme, and consequently it is the employee who bears the investment risk. A small number of UK companies have closed their defined benefit schemes to all employees, while several other companies have closed their defined benefit schemes to new employees only.

Equity markets

Most major international equity indices rose slightly over the period (see Table E and Chart 26). The notable exception was the Japanese Topix index, which rose strongly from a two-year low in February. The anti-deflation package, announced by the Japanese government on 27 February, may have had an immediate effect. But equity prices continued to rise, with signs of recovery in the United States benefiting Japanese exporters. Despite an increase in *Consensus* survey expectations for US GDP growth in 2002 (see Chart 1), the main US equity indices were little changed, with technology and telecoms subindices falling. Most European indices were slightly higher.

Table E
International equity market performance

Percentage changes between start and end of period in local currencies

	2001 Year	2001/2002 26 Oct. to 15 Feb.	2002 15 Feb. to 17 May
United States			
S&P 500	-13.0	0.0	0.2
Wilshire 5000	-12.1	1.5	1.5
Europe			
Euro Stoxx	-19.7	0.6	1.0
CAC 40	-22.0	-2.3	1.5
DAX 30	-19.8	0.9	3.6
FTSE All-Share	-15.4	0.8	1.4
FTSE 100	-16.2	-0.1	0.7
Japan			
Topix	-19.6	-10.8	12.8
Technology			
Nasdaq Composite	-21.1	2.0	-3.5
FTSE techMARK 100	-42.6	-10.1	-18.2
Neuer Markt	-60.2	-7.2	-11.5

Source: Bloomberg.

Chart 26
International equity indices^(a)



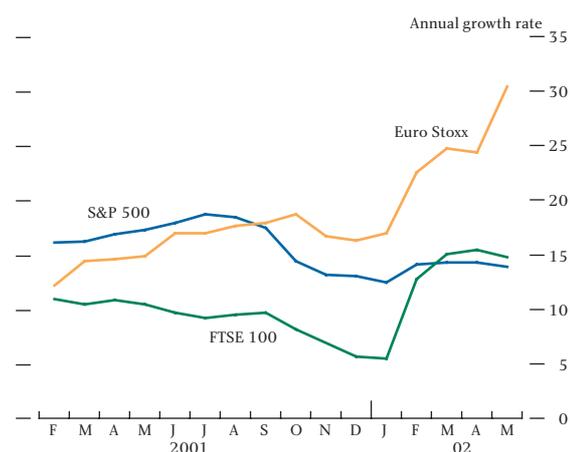
Source: Bloomberg.

(a) In local currencies.

Over the period, analysts' short-term earnings per share (EPS) growth forecasts for 2002 for the FTSE 100 and Euro Stoxx indices, as reported by IBES (Institutional Brokers Estimate System) rose (see Chart 27). But equity prices are more likely to be affected by sentiment about earnings over a longer horizon. Long-term (3–5 year horizon) IBES forecasts for EPS growth for the FTSE 100 and S&P 500 indices fell over the period, continuing the decline since January 2001 (see Chart 28), while the forecast for the Euro Stoxx was little changed. Concerns about the quality of earnings reports may have increased, especially in the United States. The Securities and Exchange Commission (SEC) cautioned investors that pro forma earnings (excluding items that firms choose to describe as extraordinary) may create a 'confusing or misleading impression'. In addition, confidence in views of equity analysts may have been undermined by

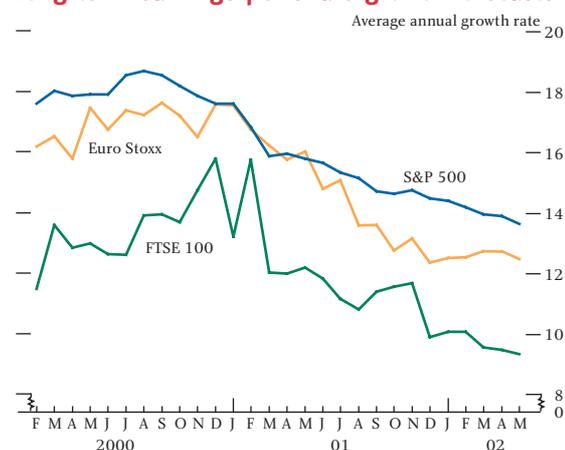
(1) See the *Bank of England Quarterly Bulletin*, Spring 2002, page 14 for a description of FRS17.

Chart 27
2002 earnings-per-share growth forecasts



Source: Institutional Brokers Estimate System.

Chart 28
Long-term earnings-per-share growth forecasts

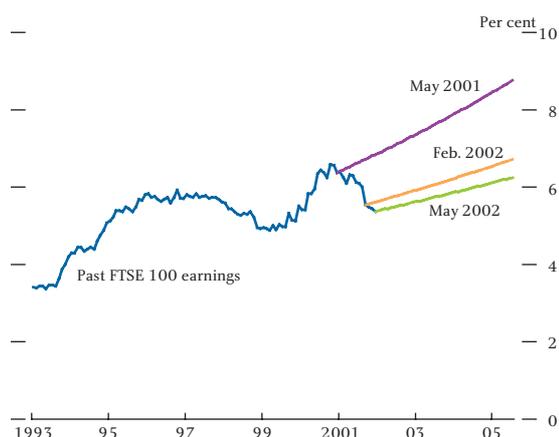


Source: Institutional Brokers Estimate System.

investigations into equity research at major investment banks, which showed that analysts' private views had sometimes been much less positive than their recommendations to clients.

Using current earnings outturns and long-term IBES growth rates as a proxy for the market's expectations of future profitability, the Bank's three-stage dividend discount model (DDM)⁽¹⁾ gives a decomposition of changes in the FTSE 100 and S&P 500 indices. With projected profitability down (see Chart 29), and long-term real interest rates relatively little changed, the model decompositions include large positive residuals (see Table F), which might suggest that these proxies do not fully capture investors' views about future profitability, or perhaps that risk premia which investors require for taking equity risk have fallen a little between the IBES 14 February and 17 May surveys.

Chart 29
FTSE 100 earnings as a percentage of GDP and long-term IBES forecasts^(a)



Sources: IBES, Thomson Financial Datastream and Bank of England.

(a) Earnings calculated using market value and P/E ratios from Thomson Financial Datastream.

Table F
Decomposition of changes in equity indices:
14 February to 17 May 2002

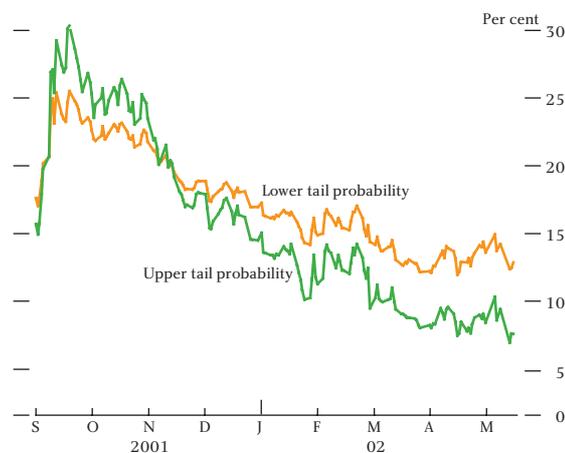
Percentage point contributions	FTSE 100	S&P 500
Real interest rate	2.2	-3.9
Earnings	-9.5	-11.6
Residual (equity risk premium)	7.5	14.6
Total percentage change	0.2	-0.9

Information from options markets also suggests that perceived equity risks may have fallen since February. Options prices can be used to derive implied probabilities that the FTSE 100 index will experience a rise or fall of more than 10%. The probability of a fall of 10% or more was higher over the period than the probability of a rise of 10% or more, perhaps indicating a greater perceived downside risk to equity prices (see Chart 30). However, both the upper and lower tail probabilities decreased, suggesting a reduced probability of extreme movements in stock prices. This may, in part, have reflected the decline in historical volatility of equity indices this year.

The number of profit warnings by UK-listed firms peaked in 2001 Q4, after the terrorist attacks in the United States and a reminder from the Financial Services Authority (FSA) of its power to fine companies for breaching its rules on disclosing information. In 2002 Q1, 98 firms issued statements warning that their profits would not meet expectations, which was lower than in any quarter in 2001 (see Chart 31). The number of warnings fell further in April and early May, though only to around the historical average since

(1) See Panigirtzoglou, N and Scammell, R (2002), 'Analysts' earnings forecasts and equity valuations', *Bank of England Quarterly Bulletin*, Spring, pages 59–66.

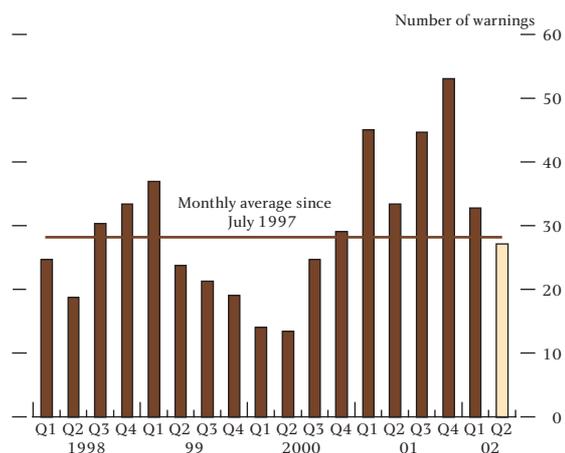
Chart 30
Time series of the upper and lower tail probabilities (10% or more above or below spot) for FTSE 100 implied probability density functions^(a)



Sources: LIFFE and Bank of England.

(a) Derived from options on FTSE 100 futures, for a constant three-month horizon.

Chart 31
Profit warnings by UK firms^{(a)(b)}



Sources: Reuters Business Briefing and Bank of England.

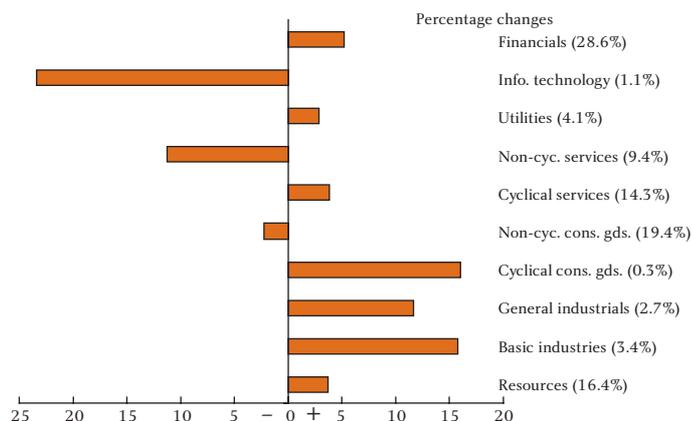
(a) Monthly average number of UK firms listed on the London Stock Exchange issuing a profit warning.
(b) 2002 Q2 refers to 1 April to 17 May and is adjusted pro rata.

July 1997. The falls may reflect lower earnings expectations—low earnings growth may no longer be a surprise.

Within the FTSE All-Share index, subindices for the basic industries and cyclical consumer goods sectors increased most (see Chart 32), as monthly manufacturing output rose from its lowest level since April 1996. Once again, subindices for the IT and non-cyclical services sectors fell. Slow subscriber and revenue growth affected telecoms stocks (a large part of non-cyclical services).

(1) May-June 2000, November-December 2000, July-August 2001.

Chart 32
Changes in the FTSE sectoral equity indices between 15 February and 17 May 2002^(a)



Source: Thomson Financial Datastream.

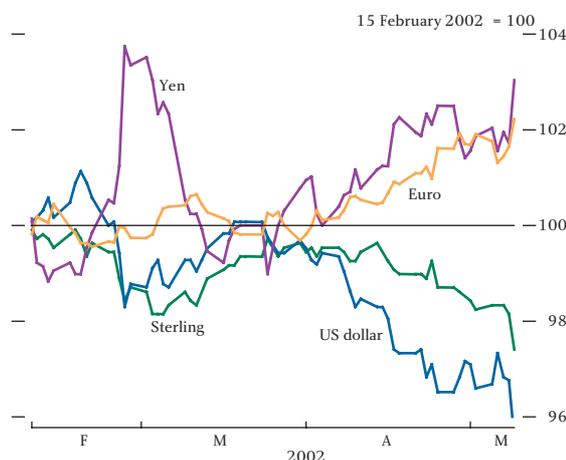
(a) Weights as of 17 May in parentheses.

Foreign exchange markets

The dollar and sterling both depreciated on an effective basis over the period, most notably towards the end, while the yen, and to a lesser extent the euro, appreciated (see Chart 33). The depreciation of the dollar between 15 February and 17 May was broad based. The dollar fell by 5.2% against both the euro and the yen, and by 1.9% against sterling. However, in recent historical perspective, the magnitude and speed of this fall in the dollar were not unusual—three similar episodes may be identified between the beginning of 2000 and the end of 2001,⁽¹⁾ during which time the US dollar ERI increased overall from 104.1 to 122.2.

Movements in short-term interest rates were broadly consistent with movements in the euro-dollar exchange

Chart 33
Effective exchange rate indices



rate—euro-area short-term interest rates rose by more than those in the United States (see the section on short-term interest rates).

Changes in relative growth prospects do not appear consistent with the US dollar's weakness against the euro. Over the period the Consensus Economics survey of growth expectations for 2002 was revised up considerably for the United States (by 1.2 percentage points), but by much less for the euro area (see Chart 1).

During the period there was considerable market discussion of the 'sustainability' of the US current account deficit, and of the cross-border capital flows required to finance it. This was prompted in part by official comment, notably Federal Reserve Chairman Greenspan's observation in a speech on 13 March, in the context of a long-term survey of US saving and investment, that 'eventually the current account deficit will have to be restrained'. US Treasury data on cross-border portfolio flows released during the period showed a fall in foreign purchases of US equities and corporate bonds: the net inflow in February into corporate bonds was the lowest since January 1999. Market participants also noted the relatively weak performance of US equity markets during the period, and perceptions that US equities continue to look expensive on fundamental valuation measures compared with some other major markets. The extent to which particular categories of capital flow determine exchange rate movements is uncertain,⁽¹⁾ but it is likely that concerns over this issue contributed to the weakness of the dollar.

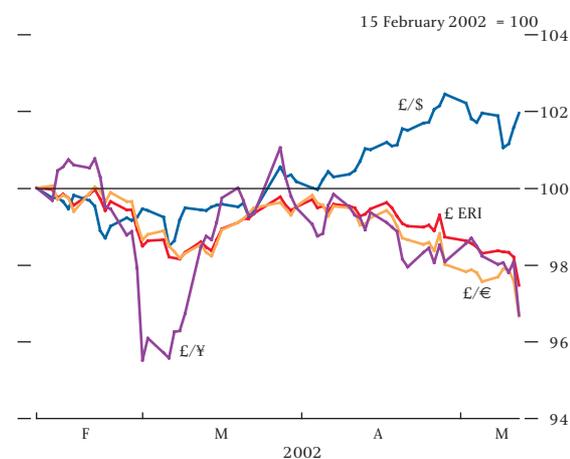
There was also further market discussion of the US Administration's policy towards the dollar. The announcement that tariffs were to be imposed on certain foreign steel products was interpreted by some market participants as indicating sensitivity towards the impact of the strong dollar on the US manufacturing industry.

The Japanese yen appreciated on an effective basis over the period as a whole, moving sharply at times; for example, the dollar-yen exchange rate fell from a close of ¥132.28 on 5 March to an intraday low of ¥126.36 on 7 March. Market participants suggested that this move was driven by repatriation flows ahead of the financial

year-end, and by foreign capital inflows associated with the sharp rise in Japanese equity markets at this time. Ministry of Finance portfolio flow data confirm that such flows occurred. Positioning may have also been a factor: IMM data⁽²⁾ suggest that speculative players switched from a net short position in the yen to a net long position. Implied volatility ahead of the movement was low, suggesting that the market had not attached much probability to the actual size of the appreciation. This rise in the yen was reversed by the end of March after comments from Japanese officials were interpreted as signalling that their view was that the appreciation had been too rapid. Towards the end of the period, the dollar-yen exchange rate fell again, moving below ¥126. Market participants suggested that this appreciation of the yen was associated with the passing of the financial year-end without further financial sector distress, the recovery in Japanese equity prices and tentative signs of a cyclical recovery in activity in Japan.

Between 15 February and 17 May sterling depreciated by 3.3% against the euro and appreciated by 2.0% against the dollar (see Chart 34). The sterling ERI ended the period 2.6% lower. Sterling's depreciation against the euro was consistent with movements in relative short-term interest rates, but this was less so for its appreciation against the dollar. And while sterling's depreciation against the euro was broadly consistent with the decline in relative growth prospects for 2002, according to *Consensus* surveys, its change against the dollar was not. It would be difficult to associate movements in sterling with data announcements over the period: for example, the surprisingly weak first

Chart 34
Sterling bilateral exchange rates



(1) See Bailey, A, Millard, S and Wells, S (2001), 'Capital flows and exchange rates', *Bank of England Quarterly Bulletin*, Autumn, pages 310–18, and chapter 2 of the IMF May 2001 *World Economic Outlook*.

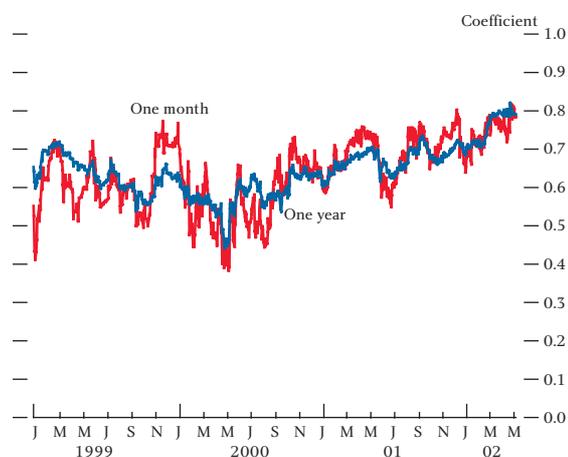
(2) IMM stands for International Money Market. The data measure the net (long minus short) number of Japanese yen futures contracts bought by non-commercial (speculative) traders on the Chicago Mercantile Exchange.

quarter 2002 GDP release in April had no discernible effect on sterling.

The possibility of EMU entry by the United Kingdom continued to be a subject of market commentary. In particular, there was discussion of what an appropriate entry rate might be, with some market participants suggesting that sterling could join at a somewhat stronger rate than previously thought likely. During the first half of the period, the one-year implied volatility of euro-sterling fell sharply to historical lows. This could be consistent with market participants assigning an unchanged (or increased) probability to the United Kingdom joining, and market views that the likely entry rate was closer to current market levels, but it must also be considered against the background of falling exchange rate volatility globally (see the box on pages 142–43).

Sterling's depreciation against the euro was broadly consistent with the historical correlation between the euro-sterling and euro-dollar exchange rates. When the dollar has depreciated against the euro, sterling has tended to depreciate against the euro as well. Looking forward, options prices can give an indication of how closely correlated the euro and sterling exchange rates are expected to be. On this measure, the implied correlation of sterling with the euro (against the dollar) has steadily increased since mid-2000, both for short and longer-term movements, as reflected in the one-month and one-year measures (see Chart 35). Between 15 February and 17 May, the one-year measure

Chart 35
Implied correlation between the euro and sterling
(versus the dollar)



(1) The interpretation of these measures as possible indicators of the market's perceptions of potential UK EMU entry is discussed (along with the methodology for calculating such measures) in Butler, C and Cooper, N (1997), 'Implied exchange rate correlations and market perceptions of European Monetary Union', *Bank of England Quarterly Bulletin*, November, pages 413–23.

(2) For which data are only available to end-February.

was little changed, and the one-month measure increased by 0.07 to 0.79. Both were at historically high levels.⁽¹⁾

A number of countries increased their official interest rates during the period—signalling to some the start of a global tightening cycle. The Bank of Canada was the first central bank in the Group of Seven industrialised nations to raise official rates since 2000, by 25 basis points on 16 April. This was not fully expected by the market and the Canadian dollar appreciated in response. Other countries to increase official interest rates included New Zealand, which raised official rates on three occasions during the period, by a total of 75 basis points, Australia and Sweden, which both increased rates by 25 basis points. The New Zealand and Australian dollars appreciated significantly against the US dollar over the period, by 9.9% and 7.0% respectively. The Swiss National Bank reduced official interest rates by 50 basis points on 2 May due to continued concern over exchange rate developments: the Swiss franc appreciated by 7.4% against the dollar during the period. Some market participants ascribed this to 'safe haven' flows, in response to the crisis in the Middle East.

The sterling money market

Amounts outstanding in the sterling money market rose by £35 billion to £576 billion in 2002 Q1, having fallen by £14 billion in the previous quarter (see Table G). Stock lending saw the largest increase (by £18 billion), with more business also recorded in gilt repo,⁽²⁾ certificates of deposit and interbank deposits.

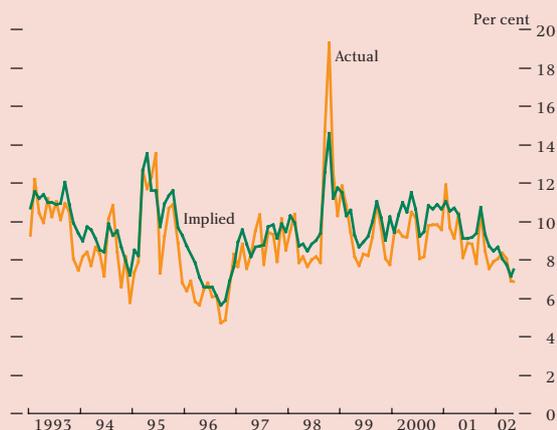
Average daily turnover in short sterling futures contracts rose by £7 billion to £76.4 billion in Q1 (see Table H). After December's fall in turnover, the increase in Q1 represents a return to the rates of growth seen in 2001.

Nominal amounts outstanding in gilt repo at end-February rose by about £4 billion from end-November, after having fallen by £14 billion in the previous quarter. Gilt repos outstanding in the on-call and next-day maturities increased by £17 billion, while repos with maturities between two and eight days decreased by £16 billion. At longer maturities, amounts outstanding in Q1 were larger at maturities between nine days and one month and longer than three months,

Exchange rate volatility

Exchange rate volatility for many major currencies has fallen in recent months. Chart A shows the average one-month implied volatilities (derived from options prices) and actual volatilities for the five most traded currency pairs.⁽¹⁾

Chart A
One-month implied and actual exchange rate volatility^(a)



(a) Each observation in the chart shows the average volatility within each calendar month for the five most traded currency pairs in April 2001 (see text). Implied volatility is measured as the one-month ahead at-the-money volatility. Actual volatility is calculated as the monthly standard deviation of daily logarithmic returns.

Implied volatility is a measure of the degree of uncertainty market participants attach to the forward exchange rate. Actual volatility has been statistically persistent—with periods of low volatility likely to be followed by further periods of low volatility—and so part of the reason implied volatility is currently low may be that many exchange rates have been very stable.

Other asset price volatilities have not been at such low levels recently (see Table 1). It might at first seem odd to observe both an increase in interest rate uncertainty and a fall in exchange rate uncertainty, since higher interest rate uncertainty might suggest that the degree of certainty with which the forward exchange rate is expected to be realised is lower. That said, what matters is not the forward-looking volatility of interest rates, but rather of the interest rate *differential* between currencies. And the implied volatility of interest rate differentials need not have increased.

Table 1
Average implied volatilities for different instruments (per cent)^(a)

	1999–2000	2001 to 17 May 2002
Currencies		
Euro-dollar	11.6	10.8
Dollar-yen	12.8	10.3
Sterling-dollar	8.6	8.1
Dollar-Canadian	6.4	6.2
Dollar-Swiss	11.5	10.5
Equities		
S&P 500	21.5	21.7
FTSE 100	22.6	20.4
DAX	23.9	25.0
Nikkei	22.9	29.1
Interest rates		
Eurodollar	8.5	24.5
Euribor	14.1	15.4
Short sterling	10.4	13.6

Sources: Reuters, Bloomberg and Bank of England.

(a) For currencies, the data are one-month ahead volatilities; for interest rates, volatilities for three-month constant maturity interest rate futures, and for equities, volatilities for the front futures contracts.

Similarly, even if increased equity market uncertainty reflects increasing uncertainty over macroeconomic growth prospects (and if exchange rates are influenced by relative growth prospects), that might not necessarily lead to an increase in uncertainty over *relative* growth prospects, and so to an increase in exchange rate uncertainty.

The implied volatility of exchange rates might be expected to decline if the current spot and the expected future spot rate become closer to one another. The experience of the euro-dollar exchange rate is consistent with this view. When the euro was introduced in January 1999, the mean one-year ahead *Consensus* survey expectation for the euro-dollar exchange rate was \$1.212. As the euro depreciated away from this level, implied volatility rose. Since then the euro has traded at considerably lower levels, and subsequently expectations have been revised down (in May 2002 the mean one-year ahead *Consensus* survey expectation was \$0.941), while implied volatility has declined.

The last time implied volatility was as low as it has recently been was in 1996. At that time market anecdote suggested that supply-side factors in the foreign exchange options market were significant. First, there were reported to be far more option

(1) As reported in the Bank for International Settlements (BIS) *Triennial Central Bank Survey* (April 2001), the five most traded currency pairs by turnover are the US dollar against: euro; yen; sterling; Swiss franc and Canadian dollar.

sellers (notably French corporates and hedge funds) than today, and, second, it is widely believed (in retrospect) that these options were sold too cheaply.⁽²⁾

Currently, market participants suggest demand-side factors may also be important in determining the level of implied volatilities. Interest rate implied volatility increased sharply last year in the United States, partly because of demand generated by an increase in the hedging of mortgage-prepayment risks.

From a longer-term perspective the recent BIS *Triennial Central Bank Survey* showed an 86% increase in turnover of over-the-counter (OTC) interest rate derivative products since 1998. By contrast, turnover for OTC foreign exchange derivatives declined by 12%.⁽³⁾

Another factor in 1996—for European currencies at least—was the imminence of monetary union. Convergence trades may have contributed to falling implied volatilities, and this could also be a factor behind some recent declines in implied volatility.⁽⁴⁾

- (2) There was an increase in the use of relatively newly developed double-barrier binary range options. The buyer of such an option is short volatility. If volatility rises and either barrier is breached the underlying option becomes worthless. The option has limited downside risk to the seller as only a predetermined sum is paid out on expiry. It is thought that pricing techniques were originally unsophisticated and resulted in the option price not fully reflecting the underlying risk. The option price is an increasing function of implied volatility.
- (3) The increase in interest rate derivative turnover between April 1998 and April 2001 was mainly driven by an increase in demand for interest rate swaps. Option turnover for interest rate products declined by 19%, and turnover for foreign exchange products declined by 31%.
- (4) For example euro-Swedish krona one-year implied volatility fell sharply from 7.2% on 9 January to 5.5% on 11 January due to increased speculation about EMU entry.

while less business was conducted at maturities between one and three months.

The size of the unsecured interbank deposit market (in nominal amounts outstanding) increased in 2002 Q1, bringing the increase in the year to end-March to £19 billion (see Table G). Market contacts suggested that the increase might reflect an increased flow of investment funds from equities into money market assets, although data on deposits from 'other financial corporations' show a decline of £4.3 billion to £208.4 billion in the year to March.

The CD market grew by £8 billion in Q1, although this follows a fall of £3 billion in 2001 Q4, with amounts outstanding remaining slightly lower than a year ago (see Table G). Several market participants have reported that in both the CD and interbank deposit markets, there has been a shift in the balance of funds

towards shorter maturities of up to three months or less. Among the factors which might play a part in explaining this are: uncertainty about the future path of official interest rates, which might have discouraged institutions from taking longer-term cash positions; the increasing use of derivatives rather than cash instruments by banks to express interest rate views; and a movement out of interbank lending into corporate paper in search of higher yields by some institutions which are willing to lend over longer periods. The growth in the interbank deposit market may therefore reflect differences between banks in the relative growth rates of their customer loans and deposits, leading to wholesale market funding flows. Another factor that market contacts have cited as a possible reason for the lack of growth of the CD market is that some banks might have issued paper in other currencies and swapped the proceeds back into sterling.⁽¹⁾ Some market contacts have also reported a

Table G
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
Q4	185	131	130	48	11	20	16	541
2002 Q1	190	139	134	66	11	22	14	576

(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.

(c) Including Treasury bills, sell/buy-backs and local authority bills.

(1) The sterling leg of such a swap is included in amounts outstanding of interbank deposits, shown in Table G.

Table H
Turnover of money market instruments

Average daily amount, £ billions

	2000	2001				2002
		Q1	Q2	Q3	Q4	Q1
Short sterling futures (a)	45.0	60.0	66.0	71.5	69.6	76.4
Gilt repo (b)	17.8	15.7	17.9	18.2	20.0	21.3
Interbank (overnight)	10.4	10.3	11.1	9.3	10.8	12.4
CDs, bank bills and Treasury bills	n.a.	11.8	12.4	11.4	11.7	10.5

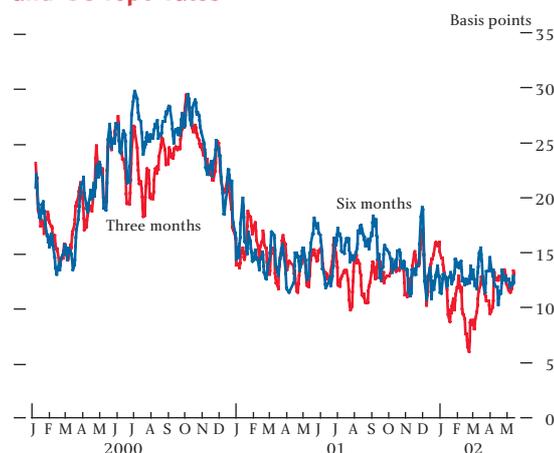
n.a. = not available.

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

(a) Sum of all 20 contracts outstanding, converted to equivalent nominal amount.

(b) Quarters are to end-February (Q1), end-May (Q2), end-August (Q3) and end-November (Q4).

Chart 36
Spreads between three and six-month interbank and GC repo rates^(a)



(a) Interbank is the offer rate, GC repo is the bid rate, five-day lagging moving averages.

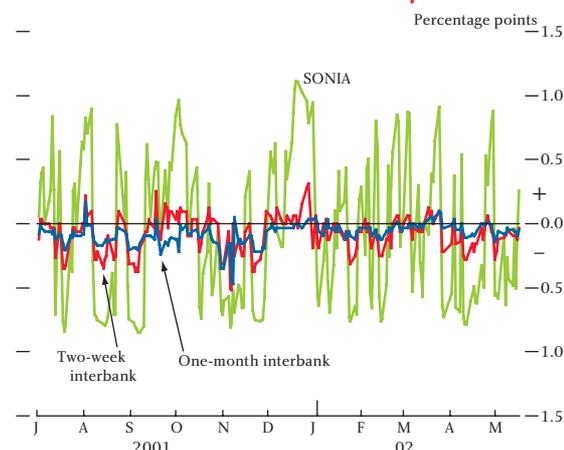
reduction in the demand for CDs for use as collateral for stock loans.

Spreads between three and six-month general collateral repo (GC) and interbank rates averaged 11 and 13 basis points respectively between 15 February and 17 May (see Chart 36). However, during the period there has been some volatility in spreads, with spreads at the three-month maturity narrowing to around 5 basis points in late February and early March when overnight cash rates were on average close to the Bank's repo rate, but widening again in April when overnight rates were lower. Spreads between three-month GC repo and CDs averaged around 12 basis points. Although spreads between six-month CDs and GC repo widened slightly to 14 basis points, this was lower than seen in 2001.

Spreads between the Bank's repo rate and one-month GC, CD and interbank cash rates averaged 14, 4 and 1 basis points respectively, compared with 26, 12 and 10 basis points during 2001. Overnight cash rates remained within the range determined by the Bank's collateralised overnight lending and deposit facilities.

During February and March the average spread of SONIA over the Bank's repo rate was close to zero, although in April this widened to minus 31 basis points (see Chart 37).

Chart 37
Spread of SONIA, two-week and one-month interbank rates over the Bank's repo rate



Intraday volatility in the overnight interbank interest rate (determined from the daily open, high, low and closing rates) declined in late March and early April from the levels seen since the beginning of December 2001. Volatility, as measured by the standard deviations of the daily changes in two-week interbank interest rates over a one-month window, has been broadly constant throughout 2002, at around 11 basis points. By contrast, during 2001 volatility on a monthly basis was higher, averaging 18 basis points, and varied more from month to month.

Market participants report that the introduction of electronic trading platforms has led to increased liquidity in repo markets. They have reported that dealing times have fallen, the cost of settlement has reduced and collateral management improved. It is expected that the London Clearing House's RepoClear service will soon be directly linked to electronic trading platforms via straight-through processing. The introduction of balance-sheet netting through RepoClear is expected to increase the amount of outstanding gilt repo further. The experience of the Government Securities Clearing Corporation (GSCC) in the US government bond repo market suggests that a central counterparty can provide a stimulus to growth in market volumes. Following the introduction of netting for repos by the GSCC in 1995, the proportion of securities used in US government bond repo rose from around 25% to over 40% in 1998.⁽¹⁾ Market participants

(1) See 'The financial stability conjuncture and outlook' (1999), *Bank of England Financial Stability Review*, June, pages 4–39.

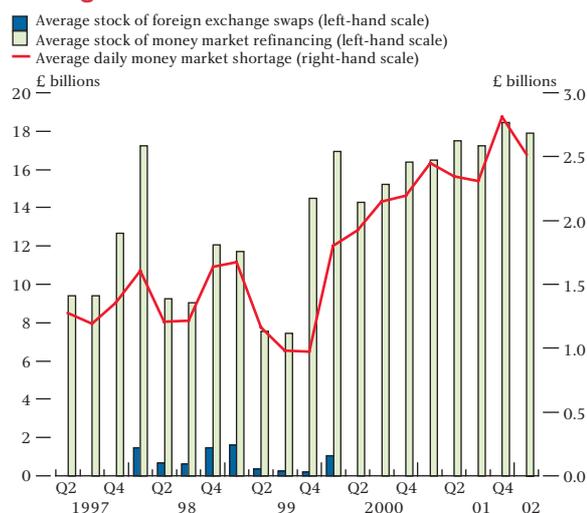
also report that the introduction of RepoClear from 1999 for some euro-denominated European government securities increased liquidity in the euro government bond repo market.

The market in gilt-repo specials continued to be dominated by those gilts that are deliverable into the long gilt futures contracts, with the 9% Conversion 2011 for March delivery and the 5% Treasury 2012 for September delivery trading at the widest spreads below GC repo. In the weeks prior to the first delivery date for the March contract, the DMO's special standing facility was used to create temporary supplies (at a penal rate) of the 9% Conversion 2011, thus relieving overnight shortages in gilt stock. While other special gilts have traded at a premium to GC repo, volumes continued to be low.

Open market operations

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—OMOs) averaged £18 billion between February and April (see Chart 38). This was some £1 billion lower than over the previous three-month period, reflecting the unwinding of the temporary growth of the bank note circulation (which is the principal sterling liability on the Bank's balance sheet) over the Christmas period.

Chart 38
Stock of money market refinancing and daily shortages



Daily money market shortages averaged £2.5 billion between February and April, compared with £2.7 billion

over the previous three-month period (see Table I). As well as reflecting the fall in the stock of refinancing, the shortages were slightly smaller, on average, because of a small fall in the rate of turnover of the stock.⁽¹⁾ Over February, March and April, counterparties chose to refinance 81% of the daily money market shortages at the 9.45 am and 2.30 pm rounds of operations (which largely have a two-week maturity) and 19% in the late rounds of operations, on an overnight basis (see Chart 39).

Table I
Average daily money market shortages

£ billions		
1998	Year	1.4
1999	Year	1.2
2000	Year	2.0
2001	Year	2.5
2002	Jan.	2.1
	Feb.	2.8
	March	2.6
	April	2.2

Chart 39
Refinancing provided in the Bank's open market operations

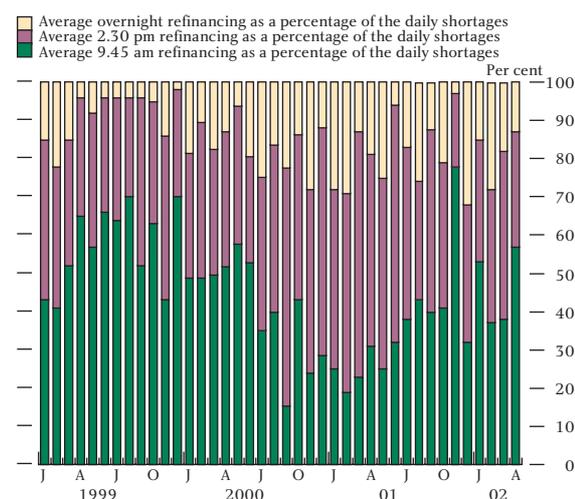


Chart 37 shows the spread between various short-dated money market interest rates and the Bank's repo rate. The one-month interbank rate traded nearer to the Bank's repo rate than had been the case in late 2001, as market expectations of changes in the official repo rate by the MPC in the near term were minimal.

The Bank wrote to its OMO counterparties in November 2001 to inform them that it may, on a more frequent basis, scale down an individual counterparty's bid for OMO liquidity in order to facilitate the Bank's

(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.

operations, and, in particular, to help ensure that access to the liquidity provided by the Bank is available as smoothly as possible to all market participants. Since then, occasional concentrations of the Bank's stock of refinancing in the hands of a very small number of its counterparties have diminished and participation in OMOs has broadened.

Counterparties made use of the Bank's 3.30 pm overnight deposit facility on three days during the review period. In order to leave the market square by close of business, the Bank increased the amount of refinancing available at the 4.20 pm late repo facility by the size of the deposit and, on each occasion, the settlement banks borrowed the full amount of refinancing available. As intended, the deposit facility has continued to provide a 'floor' to the interbank overnight rate, and consequently other short-dated market interest rates.

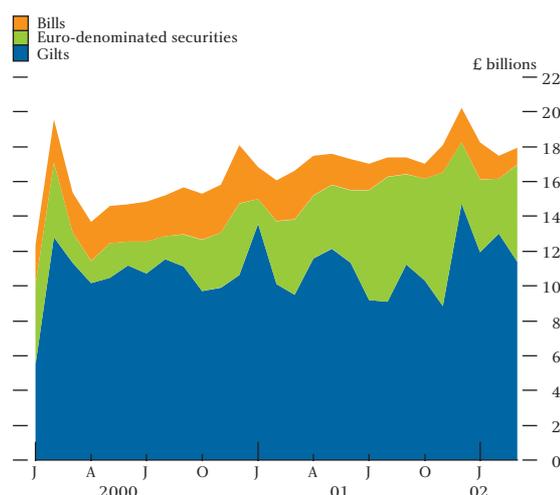
Gilts accounted for around £12 billion (or 65%) of the stock of collateral taken by the Bank in its OMOs during February, March and April (see Chart 40). Euro-denominated eligible securities⁽¹⁾ (issued by European Economic Area governments and supranational bodies) comprised around £4 billion (or 25%) of the collateral, compared with £5 billion in the previous three-month period.

On 16 May, the Bank published a paper 'The Bank of England's operations in the sterling money markets', which provides a full description of the Bank's money market operations. No changes to the operations were announced: the paper updated a previous paper issued in February 1997 to take account of the number of adaptations that have occurred over the past five years.⁽²⁾

HM Treasury and Bank of England euro issues

The Bank of England continued to hold regular monthly auctions during the period. €900 million of Bills were auctioned each month, comprising €600 million of three-month and €300 million of six-month Bank of

Chart 40
Instruments used as OMO collateral



England euro Bills. The stock of euro Bills outstanding increased on 15 March from €3.5 billion to €3.6 billion, remaining at this level for the rest of the period. The auctions continued to be oversubscribed, with the issues being covered an average of 6.81 times the amount on offer; bids were accepted at average yields of between euribor minus 8 and 11 basis points.

On 19 March the Bank re-opened the Bank of England Euro Note maturing in January 2005 with a further and final tranche auctioned on 16 April 2002. The auctions of €500 million each raised the total amount of this Note outstanding with the public to €2.0 billion. The auctions were on average 3.77 times covered and the accepted bids were in the range of 4.499%–4.625%.

UK gold auctions

The programme of gold auctions held by the UK government was completed during the period under review. Twenty tonnes of gold were sold on 5 March 2002. A price of \$296.50 per ounce was achieved and the auction was covered 3.7 times. This sale brought to an end the programme to restructure the United Kingdom's official reserves that was announced by HM Treasury on 7 May 1999.

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

(2) The paper is reprinted on pages 153–61 of this *Bulletin*.

Public attitudes to inflation

As part of a regular series, the market research agency NOP has been carrying out quarterly and annual surveys of public attitudes to inflation on behalf of the Bank since November 1999. This article describes the results of the full annual survey which took place in February 2002. It shows that public opinion remains fairly stable on most issues, though expectations of future interest rate movements do of course fluctuate. Those who think rates should stay where they are remain the largest group, but among the rest, the public was evenly divided over whether it would be better for Britain's economy for rates to rise or fall over the next few months. The proportion satisfied with the way the Bank is doing its job of setting interest rates is very little changed from November.

Introduction

The Bank of England believes that the new monetary policy framework established in 1997 will be most effective if it is accompanied by wide public understanding and support, both for the objective of price stability and the methods used to achieve it. So one of the key strategic objectives for the Bank set by Court (the Bank's board of Directors) is 'to build public support for price stability, and public understanding of the Monetary Policy Committee's approach to its remit.'

MPC members use a variety of methods to explain themselves to the public, including the publication of minutes of their monthly meetings, the quarterly *Inflation Report*, speeches and lectures, research papers, appearances before parliamentary committees, interviews with the media, visits to the regions, and an education programme that includes the 'Target 2.5' schools competition.

The Bank decided that one way to quantify the impact of its efforts to build public support for price stability was to carry out quarterly sample surveys of public opinion and awareness. After trials between November 1999 and November 2000, the current version of the survey questions has been in use since February 2001. The results between November 1999 and February 2001 were described in the Summer 2001 edition of the *Quarterly Bulletin*, and this article updates the results to February 2002.

There are 14 questions in all, but the trials showed that the results of five of them varied little over the quarters. So it was decided to ask the other nine questions every

quarter and to do a full survey once a year each February covering all 14 questions. The full survey uses a larger sample, to allow more detailed analysis.

The range of questions, as well as seeking information on public knowledge, understanding and attitudes to the MPC process, also covers expectations of interest rates and inflation. The five annual questions (numbers 9–13) cover perceptions of the relationship between interest rates and inflation, and knowledge of who sets interest rates. The nine quarterly questions, which are also asked in the annual survey, cover expectations of price and interest rate changes, perceptions of the impact of inflation and interest rate changes on both the economy and the individual, and satisfaction/dissatisfaction with the way the Bank of England is doing its job setting interest rates in order to control inflation.

The surveys are carried out by NOP in its regular Omnibus surveys using a random location sample designed to be representative of all adults in Great Britain, and interviewing is carried out in homes, face to face. In the February 2002 survey, NOP interviewed a quota sample of 3,981 people aged 15 and over in 350 randomly selected enumeration districts throughout Great Britain between 14 and 26 February 2002. The raw data were weighted to match the demographic profile of Great Britain as a whole.

The sample size for the quarterly surveys (which take place after the May, August and November *Inflation Reports*) is 2,000, about half the number for the annual February survey. The sample sizes chosen allow only a broad regional breakdown. The May quarterly survey

results are being published as a separate News Release at the same time as this article in the *Bulletin*. The quarterly survey results for February were published in March, while the answers to the five annual questions for February are published here for the first time.

Summary of results to February 2002

On most issues, public opinion remains fairly stable:

- Most people are aware that inflation is low, but only one in three says it is between 1% and 3%—the range covering recent official measures of the rise in retail prices. Few people expect inflation to rise sharply in the year ahead.
- Almost half the public thinks higher inflation would make Britain's economy weaker, while fewer than one in ten believe it would make the economy stronger.
- Six in ten think the Government's 2.5% inflation target is about right. Four in ten agree that a rise in interest rates would make prices in the high street rise more slowly in the medium term. One in six disagree.
- Asked to choose between raising interest rates to keep prices down, or keeping interest rates down and allowing prices to rise faster, almost two in three opt for higher interest rates, while only one in six opts for higher prices.
- Unprompted, around four in ten know that the Bank of England, or its Monetary Policy Committee, set Britain's basic interest rate level; prompted with a show card, the proportion rises to two in three.

In a few areas, views have shifted since this tracking series began in November 1999:

- Perceptions of how interest rates have moved 'over the past 12 months' change in line with the decisions of the MPC. However, in the absence of very recent movements in rates, the proportion that knows that rates have fallen 'over the past 12 months' has declined from 66% in November 2001 to 55% in February 2002.
- Equally, expectations of future interest rates fluctuate. In the latest survey, 49% expect rates to

rise (up 13 percentage points since November 2001), while 8% expect them to fall (down 10 percentage points) over the next 12 months.

- The public is now evenly divided over whether it would be better for Britain's economy for rates to rise or fall 'over the next few months', with 16% holding each view. This is the first time in this series that the two figures have been equal. In all previous surveys more people thought it would be better for rates to fall rather than rise. However, as in nearly all previous surveys, the largest number (40% in February 2002) thinks it would be best for rates to stay where they are.
- The proportion satisfied with the way the Bank is doing its job of setting interest rates (61%) is virtually the same as in November 2001 (62%); both figures are higher than in any previous survey in this series.

Knowledge and predictions

Inflation

(*Question 1*) Respondents were asked to say how much prices had changed in the previous 12 months by selecting from eight banded options on a card. Among the 89% who made a selection, the median figure was 2.0%. (For the purposes of calculating the median, responses are assumed to be evenly distributed within each band.) However, as in previous surveys, this median conceals a wide variation, from 23% who thought prices had fallen or not risen at all, to 26% who thought they had risen by more than 3%. Just 33% of respondents chose either the 1%–2% band (14% of respondents) or the 2%–3% band (19%). Some of the variation in the answers may be because respondents are thinking about inflation as it relates to their own patterns of spending. In no demographic group did the proportion giving an answer in the 1%–3% range rise much above 40%.

Figures for predicted future inflation (*Question 2*) are similar to those for perceived current inflation; the median figure is 2.2%. These figures have fluctuated very little during the past two years; such variations that there have been have fallen well within sampling error. 15% of respondents were notably pessimistic—expecting prices to rise by 4% or more in the next 12 months; but two thirds of this group thought that prices had climbed by 4% or more in the past 12 months. In other words,

they believed that inflation was already high, not that it was set to increase. By the same token, three quarters of those expecting prices over the coming year to rise by 1% or less thought inflation was this low already. This pattern has been constant through all ten surveys in this series. Few people thought inflation was set either to accelerate or decline sharply.

Interest rates

(*Question 5*) Most people (55%) recognised that interest rates had fallen in the previous 12 months; just 15% thought they had risen. The rest thought either that rates had remained about the same or had no idea. In November the public divided 66%–10% on this question.

On this issue, unlike knowledge of inflation, there are large differences among demographic groups. As many as 72% of AB respondents (professionals, managers and their adult dependants), and 68% of mortgage-payers said rates had fallen; among DE respondents (semi and unskilled workers and those living on state benefits) the figure was just 37%, and among people living in council housing only 28%.

These figures—and the very different pattern of demographic variation in relation to inflation—suggest that responses are driven by personal experience to a greater extent than by media coverage. Price changes affect everyone: interest rate changes have a more immediate and direct effect on some groups than on others.

Interest rates were expected to rise in the coming 12 months by 49% (*Question 6*), while 8% expected them to fall. This compares with a 36%–18% division in November. Expectations of higher rates were greater among AB respondents (57%) and mortgage-payers (54%) than among DE respondents (42%) and people living in council housing (43%). These differences are substantially less than they are for knowledge of past movements in rates.

The Bank of England

Asked unprompted (*Question 11*), who sets Britain's 'basic interest rate level', 39% said either the Bank of England (35%) or the Monetary Policy Committee (4%). Other answers were given by 7%, while 54% said 'don't know'. The figures have fluctuated little during the course of this series. (This question was originally asked each quarter, and is now asked annually.)

Respondents were then given a show card containing five options, and asked again which group sets interest rates (*Question 12*). This time, the proportion saying the Bank of England climbed to 67%, while 13% plumped for 'government ministers', 4% for 'the European Central Bank' and 3% for 'high street banks'. Again, these figures have remained fairly steady throughout the series.

The Monetary Policy Committee was an independent body, partly appointed by the Government, according to 39% (*Question 13*). A further 23% thought it was completely independent. Just 11% regarded the MPC as 'part of the Government'.

Attitudes

Inflation

As in previous surveys, the largest number (48%)—but not a majority—of respondents believed that Britain's economy would end up weaker if prices started to rise faster than they do now (*Question 3*). Just 8% thought it would end up stronger, while 27% thought it would make little difference, and 17% had no idea. Over the ten polls, the proportions have remained steady, with 6%–9% saying stronger, 44%–50% saying weaker, and 22%–28% saying little difference. It seems that fluctuations in interest rates make little or no difference to responses to this question.

Told that the Government has set an inflation target of 2.5% (*Question 4*), 61% thought this was 'about right', while 18% thought it too high and 7% too low; 13% had no idea.

Interest rates

(*Question 7*) On this question the largest number, 40%, thought it would be best for the British economy if interest rates remained where they were. A further 27% said 'it makes no difference' or did not know. For the first time, the minority who took sides divided equally between the 16% who thought rates should rise, and 16% who thought they should fall. In every previous survey, more people thought rates should fall than rise. Before rates started to fall in 2001, the proportion thinking rates should fall was in the range 24%–29%; the February 2002 survey is the first in which the number wanting rates to fall was below 20%.

(*Question 8*) There has, however, been less movement in responses to the question, 'which would be best for you

personally?' As in all previous surveys, more people took sides on this question than when asked what would be best for the British economy. 22% wanted rates to rise, while 30% wanted them to fall further. These figures are not significantly different from those in the previous three surveys, so do not appear to have been affected by the post 11 September interest rate cuts.

Demand for *lower* interest rates was greatest among mortgage payers (45%) and 25–34 year olds (45%). Desire for *higher* rates was strongest among people who own their homes outright (49%) and those aged 65 and over (47%). Among these last two—overlapping—groups, many more people favoured higher rather than lower interest rates for themselves; however, asked about the economy as a whole, the preference for higher over lower rates was very much narrower. As in previous surveys, many people acknowledged a clear difference between what was best for themselves and what would be best for the wider economy.

Inflation versus interest rates

(*Question 9*) Public understanding of the main purpose of interest rate changes—to ensure low and stable inflation over the medium term—continues to be limited. NOP repeated a pair of questions last asked in February 2001, designed to find out what people think the impact would be of a rise in interest rates: (a) in the short term ('say a month or two'); and (b) in the medium term ('say a year or two').

In the short term, 35% agreed that 'a rise in interest rates would make prices in the high street rise more slowly', while 21% disagreed. As many as 45% responded 'neither agree nor disagree' (19%) or 'don't know' (25%). The figures for the medium term are only slightly different: 39% agree, 16% disagree, 18% neither, 26% 'don't know'.

The answers to these two questions were very similar to those found in February 2001. They suggest that almost two in three members of the public do not share the belief that higher interest rates would moderate inflation in the medium term. Nor, in general, do the public draw a distinction between short and medium-term expectations.

However, offered a trade-off (*Question 10*), most people would accept higher interest rates rather than higher inflation. The margin is almost four to one: 63%–16%. Responses are very similar in almost every demographic group. There is one partial exception. Among mortgage-payers, the proportion preferring higher inflation rises to 24% (though 58% would still prefer higher interest rates).

Overall, the conclusion remains the same as last year: most people share the Bank's (and the Government's) priorities, but have limited knowledge of the link between interest rates and prices that underpins its decisions.

The Bank of England

(*Question 14*) Respondents were asked to assess the way the Bank of England was 'doing its job to set interest rates in order to control inflation'. 61% were 'very' (11%) or 'fairly' (50%) satisfied, while just 8% were 'fairly' (6%) or 'very' (2%) dissatisfied. This gives a satisfaction index (satisfied minus dissatisfied) of +53. This is virtually the same as recorded three months earlier (+54), but higher than found in previous surveys.

Responses to this question seem to reflect interest rate decisions. The lowest net satisfaction score, +24, was recorded in February 2000, at a time when rates were rising, while the latest survey followed cuts in rates.

The satisfaction index in February 2002 was higher among men (+62) than women (+45) and higher among AB respondents (+69) than DE respondents (+39). As in previous surveys, net satisfaction was lower in Scotland (+39) than any region in England and Wales (between +52 and +58). However, the Bank's net satisfaction rating is positive, and by a large margin, in every part of Britain and among every demographic group. Of course responses to this question are likely to be strongly affected by interest rate decisions, which means they will be most valuable when studied over more than one cycle. Short-term variations in the answers to *Question 14* need to be interpreted with care.

Public attitudes to inflation

Per cent

	1999		2000			2001				2002
	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.
Question 1										
Which of these options best describes how prices have changed over the last 12 months?										
Gone down	11	7	5	8	6	7	7	5	8	7
Not changed	18	12	10	12	14	15	15	16	18	16
Up by 1% or less	7	5	4	7	5	6	6	6	7	7
Up by 1% but less than 2%	12	11	12	12	13	12	13	13	14	14
Up by 2% but less than 3%	16	17	18	20	18	20	19	18	17	19
Up by 3% but less than 4%	7	11	13	13	13	11	11	11	9	10
Up by 4% but less than 5%	4	8	7	5	6	6	6	6	5	7
Up by 5% or more	9	12	13	10	11	12	10	9	7	9
No idea	17	17	17	12	13	13	12	15	15	11
Median	1.5	2.4	2.6	2.2	2.3	2.2	2.1	2.1	1.7	2.0

Question 2

How much would you expect prices in the shops generally to change over the next 12 months?

Go down	10	7	4	6	4	5	5	4	5	3
Not change	14	8	9	9	9	11	11	9	15	9
Up by 1% or less	10	7	7	10	8	9	9	10	10	10
Up by 1% but less than 2%	16	15	14	15	16	16	17	16	18	17
Up by 2% but less than 3%	17	21	21	19	21	20	20	21	20	22
Up by 3% but less than 4%	6	12	10	12	12	11	9	11	9	11
Up by 4% but less than 5%	3	7	7	6	6	5	7	6	5	6
Up by 5% or more	8	10	11	9	11	10	9	9	7	9
No idea	16	15	16	15	12	13	13	13	13	12
Median	1.5	2.2	2.4	2.2	2.3	2.1	2.1	2.2	1.9	2.2

Question 3

If prices started to rise faster than they do now, do you think Britain's economy would...

End up stronger	8	8	8	6	8	7	8	9	8	8
Or make little difference	28	23	22	23	25	26	27	23	28	27
Or weaker	44	48	47	50	49	47	47	48	48	48
Don't know	20	21	23	21	18	20	18	20	15	17

Question 4

The Government has set an inflation target of 2.5%. Do you think this target...

Is too high	19	27	23	22	23	22	20	21	21	18
Or too low	6	7	7	8	6	6	6	7	7	7
Or about right	51	50	52	54	58	58	61	55	60	61
No idea	24	16	18	16	13	14	13	16	12	13

Question 5

How would you say interest rates on things such as mortgages, bank loans and savings have changed over the last 12 months?

Risen a lot	7	18	19	13	10	6	4	5	2	4
Risen a little	35	37	37	36	29	16	10	10	8	11
Stayed about the same	18	12	13	20	26	20	12	12	7	13
Fallen a little	17	8	7	10	12	33	39	37	29	32
Fallen a lot	4	3	2	2	3	3	16	17	37	23
No idea	19	21	22	19	21	21	19	20	17	16
All saying 'risen'	42	55	56	49	39	22	14	15	10	15
All saying 'fallen'	21	11	9	12	15	36	55	54	66	55
Net risen	21	44	47	37	24	-14	-41	-39	-56	-40

Question 6

How would you expect interest rates to change over the next 12 months?

Rise a lot	7	16	10	8	6	4	4	6	5	6
Rise a little	52	50	46	47	39	24	24	30	31	43
Stay about the same	19	12	19	23	27	26	30	28	30	27
Fall a little	4	4	5	6	10	25	21	16	16	7
Fall a lot	1	1	1	0	0	1	1	1	2	1
No idea	18	17	20	16	17	20	20	19	17	16
All saying 'rise'	59	66	56	55	45	28	28	36	36	49
All saying 'fall'	5	5	6	6	10	26	22	17	18	8
Net rise	54	61	50	49	35	2	6	19	18	41

Question 7

What do you think would be best for the British economy—for interest rates to go up over the next few months, or to go down, or to stay where they are now, or would it make no difference either way?

Go up	12	12	11	11	9	8	10	13	14	16
Go down	21	27	29	27	24	28	24	24	21	16
Stay where they are	40	33	28	35	42	34	40	37	40	40
Make no difference	7	10	10	9	11	10	10	10	10	10
No idea	20	18	23	17	15	19	16	17	14	17

Question 8

And which would be best for you personally, for interest rates to...

Go up	17	19	16	17	17	18	22	20	24	22
Go down	30	35	33	36	36	33	33	33	32	30
Stay where they are	22	15	16	18	19	17	18	16	18	20
Make no difference	17	22	22	19	20	22	20	22	21	20
No idea	14	10	13	10	8	10	7	8	6	8

Public attitudes to inflation (continued)

Per cent

	1999		2000			2001				2002
	Nov.	Feb.	May	Aug.	Nov.	Feb.	May	Aug.	Nov.	Feb.
Question 9										
How strongly do you agree with the following statements?										
(a) A rise in interest rates would make prices in the high street rise more slowly in the short term—say a month or two										
Agree strongly					2	2				1
Agree					35	32				34
Neither					16	19				19
Disagree					25	20				20
Disagree strongly					2	2				1
Don't know					21	25				25
All agree					37	34				35
All disagree					27	22				21
Net agree					10	12				14
(b) A rise in interest rates would make prices in the high street rise more slowly in the medium term—say a year or two										
Agree strongly					2	2				1
Agree					39	35				38
Neither					16	19				18
Disagree					21	16				15
Disagree strongly					1	1				1
Don't know					22	27				26
All agree					41	37				39
All disagree					22	17				16
Net agree					19	20				23
Question 10										
If a choice had to be made, either to raise interest rates to try to keep inflation down; or keep interest rates down and allow prices in the shops to rise faster, which would you prefer:										
Interest rates to rise	51	58	52	57	63	62				63
Prices to rise faster	17	19	16	15	19	16				16
No idea	31	24	31	28	18	22				21
Question 11										
Each month, a group of people meets to set Britain's basic interest rate level. Do you know what this group is?										
Monetary Policy Committee	7	4	5	6	5	5				4
Bank of England	39	29	33	38	29	32				35
The Government	4	2	3	2	3	3				4
The Treasury	1	1	1	1	1	1				1
Parliament	1	*	*	*	1	*				*
Other	1	2	1	2	1	2				2
Don't know	47	62	57	51	60	57				54
Question 12										
Which of these groups do you think sets the interest rates?										
Government ministers	14	15	12	13	16	15				13
Civil servants	*	*	*	*	*	1				1
Bank of England	67	63	63	69	65	66				67
High street banks	3	4	3	2	4	3				3
European Central Bank	2	3	3	3	3	3				4
No idea	15	14	18	12	12	15				15
Question 13										
In fact, the decisions are taken by the Monetary Policy Committee of the Bank of England. Which of these do you think best describes the Monetary Policy Committee?										
Part of the Government	11	11	9	10	12	11				11
A quango, wholly appointed by the Government	8	8	8	8	9	8				7
An independent body, partly appointed by the Government	38	39	37	42	37	38				39
A completely independent body	23	20	22	20	24	24				23
No idea	20	21	24	20	17	19				19
Question 14										
Overall, how satisfied or dissatisfied are you with the way the Bank of England is doing its job to set interest rates in order to control inflation?										
Very satisfied	7	4	5	6	7	8	9	10	11	11
Fairly satisfied	41	37	38	45	48	47	49	45	51	50
Neither satisfied nor dissatisfied	26	28	27	25	26	25	23	23	19	20
Fairly dissatisfied	7	12	9	9	8	7	6	6	6	6
Very dissatisfied	4	5	4	4	3	3	2	2	2	2
No idea	16	14	17	12	9	11	12	14	11	11
Total satisfied	48	41	43	51	55	55	58	55	62	61
Total dissatisfied	11	17	13	13	11	10	8	8	8	8
Net satisfied	37	24	30	38	44	45	50	47	54	53

Note: * indicates less than 0.5%.

The Bank of England's operations in the sterling money markets

This article provides a full description of the Bank of England's arrangements for its money market operations. No changes to the operations are being announced at this time: the article updates the description provided in the May 1997 Quarterly Bulletin⁽¹⁾ to take account of adaptations that have occurred over the past five years. This article has also been published as a separate paper, which can be found on the Bank of England's web site at www.bankofengland.co.uk/markets/money/stermm3.htm

Full and definitive technical details of the Bank of England's operations in the sterling money markets, and of related settlement procedures, are contained in the Operational Notice, available at www.bankofengland.co.uk/markets/money/mmopnot.htm

I Introduction

The primary aim of the Bank of England's operations in the sterling money markets is to implement the Monetary Policy Committee's interest rate decisions, while meeting the liquidity needs, and so contributing to the stability of the banking system as a whole. Subject to meeting this aim, the Bank of England also seeks to promote sound practices, to encourage the development of private sector markets in which banks and other market participants can manage their liquidity and to foster efficiency and competition in these markets, given their importance in the wider financial system. These objectives reflect the Bank of England's three core purposes: maintaining the integrity and value of the currency, maintaining the stability of the financial system, both domestic and international, and seeking to ensure the effectiveness of the United Kingdom's financial services.

The Bank of England derives its influence over interest rates in the wholesale money markets from its monopoly of the supply of central bank money—that is, money which is a direct liability of the central bank

(Bank of England bank notes and deposits at the Bank of England). There is natural demand for central bank money, also known as 'base money', as the only form of final settlement for sterling payments. The Bank of England meets this demand and is able to set the price (interest rate) at which it provides refinancing, by lending to its counterparties in the wholesale money markets. The interest (or repo) rate charged on this lending is often referred to as the Bank of England's 'official rate'⁽²⁾ and is set by the Monetary Policy Committee (MPC), under powers set by the Bank of England Act 1998. The official repo rate changes only when the MPC decides that it should.⁽³⁾ In its money market operations, the Bank of England satisfies the marginal liquidity demand of the banking system as a whole, through open market operations conducted transparently in high credit quality market instruments. The operating procedures of the Bank of England are similar to those of many other central banks, though details differ slightly from country to country. In the United Kingdom, the Bank of England lends predominantly through transactions conducted under sale and repurchase (repo) agreements at a two-week maturity.⁽⁴⁾

(1) 'The Bank of England's operations in the sterling money markets', *Bank of England Quarterly Bulletin*, May 1997, pages 204–07.

(2) In the past, the Bank of England's official operational interest rate has also been termed the Bank Rate, the Minimum Lending Rate and the Minimum Band 1 Dealing Rate (see www.bankofengland.co.uk/mfsd/rates/baserates.xls for an historical series).

(3) In exceptional circumstances, Section 19 of the Bank of England Act 1998 gives the Treasury reserve powers, after consultation with the Governor, to give 'the Bank directions with respect to monetary policy if they are satisfied that the directions are required in the public interest and by extreme economic circumstances'.

(4) This article uses expressions such as 'lend', 'borrow' and 'collateral' for the sake of familiarity, but is not a reflection of the legal nature of the repo transactions undertaken by the Bank of England, which is determined by the Master Agreement. Full title to securities sold under sale and repurchase transactions and to securities transferred by way of margin passes to the recipient; the right of the party making the transfer is a right to receive equivalent securities in accordance with the Master Agreement and the Operational Notice.

Changes in the official repo rate influence other short-term sterling wholesale lending and deposit rates as well as commercial banks' base rates, and hence the structure of rates across the economy as a whole, including rates in the retail market such as those for variable-rate mortgages and savings deposits. However, these market interest rates may not always change by exactly the same amount as the official rate; other factors, including the extent to which the MPC's interest rate decision has been anticipated, and competitive pressures in the mortgage and retail deposit markets, also influence changes in and levels of such rates.⁽¹⁾

II The liquidity requirements of the sterling money markets

The fulcrum of the system is the underlying demand for Bank of England money as the final settlement asset for sterling payments, principally in the form of Bank of England bank notes and banks' settlement accounts held with the Bank of England. Settlement banks are obliged to maintain a minimum balance of zero on their Bank of England settlement accounts at the end of each day⁽²⁾ (ie there is, in effect, a one-day maintenance requirement in the United Kingdom, and, unlike in some other countries' systems, there are no positive reserve requirements and no reserve averaging over a maintenance period). Although the Bank of England holds accounts for some other commercial banks, the vast majority of banks in the United Kingdom hold accounts with the settlement banks. Settlement of sterling obligations between settlement banks occurs in the United Kingdom's Real Time Gross Settlement (RTGS) system, operated by the Bank of England. Whether payments are between customers of different banks, between settlement and/or non-settlement banks, through whichever payment system (CHAPS Sterling, CREST, BACS, Cheque or Credit clearings),⁽³⁾ or whether

between the Bank of England and the rest of the system, settlement ultimately occurs over the accounts that settlement banks hold at the Bank of England. In its money market operations, the Bank of England, by providing the liquidity needed by the banking system for same-day settlement, enables the settlement banks to achieve positive end-of-day balances on these accounts. In this way it acts as the marginal supplier of money to the banking system, enabling effective system-wide liquidity management in normal market conditions.

The Bank of England manages its balance sheet in such a way that participants in the wholesale money markets normally seek refinancing (ie borrow money) from it on a daily basis: this can be illustrated by the structure of its balance sheet, shown in Figure 1.⁽⁴⁾ Its principal liabilities are the bank notes in circulation and the deposits made by commercial banks and other customers (eg other central banks).⁽⁵⁾ These liabilities are largely matched by two assets: the stock of money market refinancing⁽⁶⁾ (which consists of the short-term assets acquired by the Bank of England in its open market operations) and the Ways and Means advance (which represents the stock of borrowing by the government from the Bank of England).

Figure 1
Simplified version of the Bank of England's balance sheet as at 28 February 2001

£ billions

Liabilities		Assets	
Bank note issue	27	Stock of refinancing	16
Sterling-denominated deposits from banks and other customers and the Bank of England's capital and reserves	5	Ways and Means advance	13
Foreign currency denominated liabilities	7	Other sterling-denominated assets	3
		Foreign currency denominated assets	7
Total	39	Total	39

(1) For further details about the way in which changes in the Bank of England's repo rate affect other interest rates and their collective impact on economic activity, see 'The transmission mechanism of monetary policy', *Bank of England Quarterly Bulletin*, May 1999, pages 161–70. See also 'Asset prices and inflation' by Roger Clews on pages 178–85 of this *Bulletin*.

(2) In practice, the settlement banks prefer their end-of-day balances to be slightly greater than the bare minimum of zero, in order to cover themselves against uncertainties in their daily cash flows. Consequently, the Bank of England targets a small positive level of bankers' operational balances within its overall forecast of the system's liquidity position each day.

(3) For further details on sterling payment systems see *Oversight of Payment Systems*, available at www.bankofengland.co.uk/fsr/payment.htm

(4) The Bank of England is required by the Bank Charter Act 1844 to separate the note issue function from its other activities. Accordingly, for accounting purposes, the balance sheet is divided into two accounting entities: the Issue Department and the Banking Department. The Issue Department comprises solely of the note issue and the assets backing it. The Banking Department comprises all the other activities of the Bank of England. For illustrative purposes only, Figure 1 shows a consolidated version of the Bank of England's balance sheet at a high level of aggregation, without the accounting split between the Issue and Banking Departments. Details of the Issue and Banking Department balance sheets can be found in the Bank of England's *Annual Report*, the weekly *Bank Return* and Table B1.1 of the Bank of England's *Monetary and Financial Statistics* (all are available on the Bank's web site).

(5) These deposits include balances on settlement accounts (used to settle payments between banks) as well as the non-interest bearing Cash Ratio Deposits that deposit-taking institutions in the United Kingdom are required to place with the Bank of England. The latter deposits are used by the Bank of England to finance its unrecovered costs associated with its monetary policy and financial stability activities.

(6) The stock of money market refinancing can be an asset of both the Issue and Banking Departments.

When commercial banks and the public increase their holdings of bank notes, they purchase them from the Bank of England, creating a liquidity shortage in the banking system, as the Bank of England debits the banks' settlement accounts with the cost. As Figure 1 illustrates, commercial banks and money market participants need to seek refinancing from the Bank of England when the demand for bank notes rises or if the level of sterling-denominated deposits held at the Bank of England by banks or other customers increases. Such a financing requirement can be offset either by a reduction in the size of the settlement banks' operational deposits at the Bank of England or by an increase in the stock of refinancing (which would be achieved through the Bank of England's open market operations) or a combination of the two. In practice, however, changes in settlement banks' operational deposits held at the Bank of England are generally small. This is because the settlement banks usually seek to keep their operational deposits as close to zero as possible, as they are non interest bearing. In normal circumstances, the Bank of England does not permit these operational accounts to have a balance below zero at the end of the day; any such unauthorised negative balance (which would need to be collateralised by eligible securities) would normally be charged a penal rate of interest.⁽¹⁾ In rare circumstances, if normal market mechanisms were impaired (eg because of infrastructure or confidence problems), the Bank of England's operational deposit-taking and open market operations could be used to intermediate between firms with liquidity shortages and surpluses.

Until April 2000, the UK government's short-term financing needs were met by varying the size of the Ways and Means advance from the Bank of England. The government's cash position was thus managed as a component of the Bank of England's overall management of system liquidity through its open market operations. From 3 April 2000, when the UK Debt Management Office (DMO) assumed responsibility for managing the Exchequer's cash position, the government ceased to use the Ways and Means advance in this way;⁽²⁾ the level of the advance has been frozen since then. Consequently, the principal counterpart to

the growth in the stock of bank notes is an increase in the stock of refinancing provided in the Bank of England's open market operations. In recent years, the stock of bank notes has been growing by around £2 billion a year, matched by a similar rise in the stock of refinancing. In essence, the Bank of England's sterling liabilities structurally drain liquidity from the banking system, while the purchase of assets provides liquidity. Some assets (eg the Ways and Means advance or the Bank of England's holdings of gilts) provide liquidity on a long-term or semi-permanent basis. Other assets (the stock of refinancing) provide liquidity on a short-term basis, given their short maturity.

The Bank of England chooses to provide the refinancing required by money market participants by lending to its counterparties for a short maturity in the form of repos or by purchasing bills. When these repos or bills mature, or when commercial banks acquire additional bank notes, a payment is made to the Bank of England. This creates a liquidity shortage in the banking system and, as a result, market participants have to seek refinancing from the Bank of England to enable the settlement banks to achieve positive end-of-day balances on their operational accounts. The short-term nature of the refinancing provided by the Bank of England ensures that the banking system almost always has a net shortage of funds each day. This refinancing is largely, although not entirely, conducted via repo transactions, which usually have a maturity of two weeks (ten working days), by which the Bank of England provides liquidity to market participants in exchange for eligible collateral. On average, around one-eighth of the lending that makes up the stock of refinancing matures each day⁽³⁾ (about £2–£2.5 billion) and is usually the largest influence on the day's shortage. In this way the Bank of England turns over the short-term assets acquired in its money market operations and has an opportunity each day to influence the levels of wholesale and retail market interest rates. Chart 38 in the 'Markets and operations' article on page 145 shows the size of the stock of refinancing and the daily net liquidity needs of the banking system (or shortages) from April 1997 to March 2002.

(1) During the business day, the settlement banks' operational accounts in the RTGS system often run a collateralised negative balance so that payments can be made between banks in real time (no charge is made for intra-day liquidity).

(2) For further details see the DMO's publication *Exchequer cash management: a DMO handbook*, February 2002, available at www.dmo.gov.uk/cash/public/cmbook200202.pdf

(3) The average maturity is less than ten working days because the Bank of England's counterparties can also choose to obtain refinancing by selling bills on an outright basis with less than a two-week residual maturity, or can obtain overnight repo refinancing at a penal interest rate.

III Open market operations

The Bank of England's ability to influence market interest rates depends principally on it supplying the marginal liquidity required by the banking system (ie the liquidity shortage), rather than on the way in which liquidity is supplied. The Bank of England uses open market operations to supply liquidity because it wishes to foster the development of private sector markets in high credit quality securities, thereby giving banks and other market participants an incentive to use these markets to manage their liquidity. As noted in Section II, the short-term maturity of the Bank of England's lending operations ensures that its counterparties regularly need to come back to refinance the lending. As a result, on most days the banking system is short of liquidity, which the Bank of England provides via open market operations. It seeks to provide the system's daily liquidity requirement at its principal rounds of operations at 9.45 am and 2.30 pm, which are conducted at the official repo rate, set by the MPC. Sometimes, however, liquidity may need to be provided later in the day: further rounds of operations, conducted at 3.30 pm and 4.20 pm, are designed to square off any remaining imbalances in the banking system in as orderly a manner as possible, usually at a penal rate of interest.

Eligible collateral

In its repo operations to supply funds to market participants, the Bank of England purchases eligible securities from its counterparties and agrees to sell back equivalent securities at a predetermined future date, around two weeks later. The interest rate charged on these two-week repos is the official repo rate.⁽¹⁾ Alongside this technique, the Bank of England also offers its counterparties the option to sell it bills on an outright basis. In this case, the amount the Bank of England pays for the bills is less than their nominal value: the discount factor used in such operations is set at a level equivalent to the official repo rate. The securities purchased are required to be of high credit quality; actively traded in a continuous, liquid market; held widely across the financial system; and available in adequate supply. The choice of obtaining liquidity by repo or outright sale of securities, and the particular eligible instrument provided as collateral, are normally

at the counterparty's discretion, subject to settlement constraints.

In its repo operations to supply funds to market participants, the Bank of England is willing to purchase (and then resell) the following types of securities:⁽²⁾

- gilts (including gilt strips);
- HM Government non-sterling marketable debt;
- sterling Treasury bills;
- Bank of England euro bills and euro notes;
- eligible bank bills;⁽³⁾
- eligible local authority bills;
- sterling-denominated securities issued by European Economic Area (EEA) central governments and central banks and major international institutions; and
- euro-denominated securities issued by EEA central governments and central banks and major international institutions that are eligible for use in the European System of Central Banks' monetary policy operations.

The total stock of securities eligible for open market operations is around £2^{1/2} trillion and, typically, some £15–£20 billion of these will be held by the Bank of England as collateral for open market operations at any one time. Chart 40 in the 'Markets and operations' article on page 146 shows the broad categories of instruments that have been held as collateral for open market operations from January 2000 to April 2002.

The market prices of these eligible securities can change during the life of a repo transaction. Any fall in the price of a security would pose a credit risk to the Bank of England if one of its counterparties were to fail to complete the second leg of a repo transaction. To help protect itself against loss in such a situation, it requires its counterparties to provide securities with a greater market value than the amount of liquidity provided. The size of the initial mark-up margin required currently varies between 0.5% and 9%, depending on the type of security, its currency of denomination and its residual maturity.⁽⁴⁾ Each day the Bank of England compares the market values, after adjusting for the appropriate margin, of the securities it is holding in repo operations with their current repurchase prices; if the market value falls

(1) The Bank of England could choose to operate on a variable-rate basis through a tender process. If it were to conduct a variable-rate tender, the form of the tender would be announced at the time or in advance.

(2) The full list of securities eligible to be used in the Bank's open market operations is available on the Bank's web site at www.bankofengland.co.uk/markets/money/eligiblesecurities.htm

(3) For further details see www.bankofengland.co.uk/markets/money/eligiblebanks.htm

(4) Details of these margins are contained in the Operational Notice.

below the repurchase price by a certain trigger amount the Bank of England requires its counterparties to provide additional securities sufficient to eliminate the margin deficit.

The range of securities that the Bank of England is willing to purchase on an outright basis in its open market operations is narrower:

- sterling Treasury bills;
- eligible bank bills; and
- eligible local authority bills.

The maximum residual maturity of the bills that the Bank of England is willing to purchase outright is no longer than the maturity of the longest-dated repo for which bids have been invited that day (usually around two weeks). The minimum residual maturity for outright bill purchases is one day.

The 9.45 am and 2.30 pm rounds of operations

As noted in Section II, any change in the stock of bank notes in circulation (or other sterling movements across the Bank of England's balance sheet) will generate an equal and offsetting financing requirement for the banking sector. The Bank of England closely monitors these flows across its balance sheet in order to know how much liquidity to supply to market participants each day. Similarly, the Bank of England's counterparties find this information useful in informing their view of market conditions. To facilitate this process, the Bank of England publishes a forecast of the daily system liquidity shortage (the expected amount of refinancing likely to be required) on its wire service pages each day.⁽¹⁾

The Bank of England's main daily open market operations are normally conducted at 9.45 am and 2.30 pm.⁽²⁾ At 9.45 am, the Bank of England releases a forecast of the market's liquidity position for the day on its wire services pages together with some accompanying information about the principal factors contributing to the forecast, including changes in the note issue, the amount of maturing refinancing to be repaid that day, and the deviation from target (on the previous day) of the settlement banks' balances on their accounts at the Bank of England. The box (on page 158) provides an example of the daily information released about open

market operations. If, as is normally the case, the market is forecast to be short of liquidity, and if the forecast shortage exceeds a minimum threshold, the Bank of England invites its counterparties to submit offers for repos and/or outright sales of bills. The Bank of England also states the interest rate at which it is prepared to operate (the repo rate) and the maturity date or dates for the repos. Repos are normally invited to one or two dates;⁽³⁾ the Bank of England selects these dates from the two-week forward date and the working days either side of that forward date. If the Bank of England offers repos to two or more maturity dates, the total amount of funds allotted to each participant is normally split approximately equally between these dates, or at the Bank's discretion.

Counterparties wishing to participate in the round have five minutes in which to bid for the funds that they wish to obtain through repo and/or outright sales of bills. No single counterparty is permitted to bid for more than the total amount of the forecast shortage. The Bank of England normally announces the results within 15 minutes of the start of the round, publishing the total amounts allotted via repos and through outright purchases.

At the 9.45 am round, the Bank of England normally does not relieve all of the forecast shortage (even if this amount is fully bid for) since it may need to revise slightly its forecast during the course of the day in the light of updated information. If the aggregate bids for funds exceed the amount the Bank of England wishes to allot, it allocates the bids pro rata. The amount by which the Bank of England seeks to leave the market short of funds after the 9.45 am round is determined principally by the likely scale of revisions to the forecast shortage, but may also be adjusted in the light of the behaviour of short-dated interest rates relative to the official repo rate.

A similar process is repeated at the next round of operations, at 2.30 pm. The Bank of England publishes an update of the day's forecast shortage as well as the residual shortage after allowing for liquidity supplied at the 9.45 am round. If there is still a residual shortage, a further round of bids is invited from the Bank of England's counterparties and the results are once again announced within 15 minutes. The 2.30 pm round is

(1) Available on Reuters BOE/MONEYOPS1-6; Moneyline Telerate 3868-3873; Knight-Ridder 3286-3292; Thomson Financial Topic3 44731-44736; Bloomberg BOE.

(2) On the days of MPC decisions the first round is delayed until 12.15 pm.

(3) Very occasionally, the Bank of England may invite repos to three or four maturity dates in order to smooth the pattern of future daily shortages.

The Bank of England's wire services announcements on 27 March 2002

9.45 am Initial liquidity forecast Stg 1750 million shortage

A round of fixed-rate operations is invited. The Bank's repo rate is 4.0%.

The operations will comprise repos to 11 April and outright offers of bills maturing on or before 11 April.

Principal factors in the forecast:

Maturing outright purchases -109

Maturing bill/gilt repo -1402

Bank/Customer transactions +120

Rise in note circulation -315

Maturing settlement bank late repo facility -75

Bankers' balances above target +10

9.51 am Total amount allotted—Stg 1550 million

of which—outright Stg 0 million, repo Stg 1550 million

2.30 pm No revision to liquidity forecast. Residual shortage—Stg 200 million

A round of fixed-rate operations is invited. The Bank's repo rate is 4.0%.

The operations will comprise repos to 11 April and outright offers of bills maturing on or before 11 April.

2.36 pm Total amount allotted—Stg 200 million

of which—outright Stg 0 million, repo Stg 200 million

3.30 pm No residual shortage.

Deposit Facility: bids are invited for the purchase from the Bank of overnight DBV at a rate of 3.0%.

3.36 pm No use has been made of the Deposit Facility.

4.20 pm Final liquidity forecast revision—Stg 1800 million

Residual shortage—Stg 50 million

The settlement bank late repo facility is available.

4.31 pm Stg 50 million has been provided in the settlement bank late repo facility.

timed so as to enable the Bank of England to make use of a later and more accurate forecast of the market's liquidity needs. By the completion of the 2.30 pm round, the Bank of England aims to have supplied the market with enough liquidity to enable all of the settlement banks to maintain positive balances on their operational accounts at the end of the day. In practice, however, further operations later in the day at 3.30 pm and 4.20 pm (described below) are sometimes required to achieve this, because market participants do not always bid for enough funds at 2.30 pm to relieve the residual shortage, or there may be a late revision to the liquidity forecast.

The Bank of England also reserves the right to scale down its allotment of funds to individual counterparties. Such action may be taken to reduce what the Bank

of England considers to be an undue concentration of its operations in the hands of a few of its counterparties and so help ensure that access to the liquidity provided by the Bank of England is available as smoothly as possible to a wide range of market participants.

The techniques described above are employed when the banking system is forecast to be short of liquidity, but, very occasionally, a surplus of liquidity is forecast. On these days the Bank of England absorbs the market surplus by inviting its counterparties to place money with it in a short-maturity repo transaction. These repo transactions are conducted on a competitive rate tender basis. If the forecast surplus exceeds a minimum threshold, tenders are held at both 9.45 am and 2.30 pm; otherwise a single tender is held at 2.30 pm.

Counterparties provide their offers to the Bank of England within five minutes of the invitation and the Bank then ranks them in interest rate order and accepts the offers with the lowest interest rates, up to the amount of the forecast liquidity surplus. At a 9.45 am tender, the Bank of England would normally not absorb the entire forecast surplus (even if this amount is fully offered) since it may need to revise its forecast during the course of the day in the light of updated information. If the aggregate offers for funds exceed the amount the Bank of England wishes to absorb, it allocates the bids pro rata. Such repos are invited with one or more specified maturity dates; the dates chosen will normally be days on which a significant liquidity shortage is forecast. Alternatively, the Bank of England can pre-empt a forecast liquidity surplus by asking the DMO to issue extra Treasury bills at its weekly tender and deposit the proceeds with the Bank; this would drain structurally any surplus liquidity from the money market for a period.

The Bank of England can also use foreign exchange swaps to supply liquidity to the sterling money market. Such swap transactions have occasionally been used to help smooth the forecast pattern of future daily liquidity shortages and are then reported in the 'Markets and operations' article of the *Bank of England Quarterly Bulletin*.

3.30 pm overnight repo facilities

The Bank of England aims to supply the net amount of liquidity needed by the banking system (ie the forecast daily shortage) by the end of its 2.30 pm round of open market operations and expects its counterparties to manage their individual liquidity needs sufficiently closely to enable it to meet this aim. Nonetheless, unforeseen variations in market participants' positions may mean that the banking system as a whole may still be short of liquidity, or some individual participants may have long positions. For these reasons, the Bank of England makes an overnight lending facility available at 3.30 pm, if there is still a residual market shortage, and an overnight deposit facility.

In the event of a residual liquidity shortage remaining after the 2.30 pm round of operations, the Bank of England publishes a forecast of the shortage remaining at 3.30 pm and invites bids for overnight repos. The

rate applied to these overnight repos is set normally at 100 basis points above the official repo rate. This margin is intended to encourage the market to participate fully in the principal rounds of two-week operations at 9.45 am and 2.30 pm. The amount of liquidity the Bank of England provides at this round does not normally exceed the residual forecast shortage.⁽¹⁾

Also at 3.30 pm, the Bank of England makes available a daily overnight deposit facility. This provides counterparties with a standing invitation to make (collateralised) overnight deposits with the Bank of England and so helps to moderate undue softness in overnight market interest rates at the end of the day, as counterparties have an option to lend surplus liquidity. To ensure that this facility does not discourage active trading between market participants, the interest rate paid on overnight deposits is set normally at 100 basis points below the official repo rate. The deposits made by counterparties are collateralised against gilts.

The 100 basis point upper and lower 'band' is designed to allow active trading in the sterling money markets but to moderate undue volatility in market interest rates, which might complicate banks' liquidity management and deter the use of money markets by non-financial companies. Chart 37 in the 'Markets and operations' article on page 144 shows the spread between SONIA,⁽²⁾ the two-week and one-month interbank rates and the official repo rate from January 2001 to April 2002.

4.20 pm settlement bank late repo facility

If, after the conclusion of the above open market operations, a residual liquidity shortage remains, the Bank of England makes available an overnight repo facility to the settlement banks at the end of the day, after market trading has finished, to prevent one or more of them ending the day with a negative balance on their operational accounts. These institutions are invited to apply for funds between 4.20 pm and 4.30 pm. No settlement bank is permitted to apply for more than the amount of the residual shortage. When the 3.30 pm deposit facility has been used, the amount of refinancing available at 4.20 pm is increased by the size of the deposit(s), thereby ensuring that this liquidity is recycled to settlement banks. The Bank of England

(1) However, the Bank of England reserves the right to supply funds in excess of the forecast remaining shortage.

(2) The sterling overnight index average: a weighted average of rates on all unsecured sterling overnight cash transactions brokered in London between midnight and 4.15 pm each day.

allots bids for funds from the settlement banks pro rata if, in total, they exceed the amount of the residual shortage.

On days when the residual forecast shortage reflects only a late revision to the day's forecast shortage by the Bank of England (including the recycling of 3.30 pm deposits), funds are normally provided to the settlement banks at the official repo rate. The forecast liquidity need may also be revised at 4.20 pm, should the DMO find that it has an Exchequer cash surplus at that late point in the day (the DMO is not able to settle transactions with its counterparties this late in the day). The Bank of England therefore provides the settlement banks with any additional refinancing necessary to balance their positions, at the official repo rate. However, on days when there is a remaining shortage but there has been no late change to the forecast (and, therefore, the settlement banks should reasonably have been able to take the necessary funds from the Bank of England earlier in the day) funds are provided at a higher rate, normally 150 basis points above the official repo rate. On days when a residual shortage at 4.20 pm reflects both a late forecast revision against the market and some remaining shortage from earlier rounds, a single composite rate is charged—normally a weighted average of the official repo rate (weighted by the share of the forecast revision in the residual shortage) and the official repo rate plus 150 basis points (weighted by the rest of the shortage).

Chart 39 in the 'Markets and operations' article on page 145 shows the refinancing provided at the 9.45 am, 2.30 pm and overnight rounds from January 1999 to April 2002.

IV Counterparties

The Bank of England stands ready to deal in its daily operations with a wide range of financial institutions, provided they satisfy a number of functional criteria, designed to ensure both that its operations function efficiently and that the liquidity supplied is then made available as smoothly as possible to other participants in the sterling money markets. The Bank of England is prepared to accept as counterparties banks, building societies and securities firms that are subject to appropriate prudential supervision and that meet the following criteria:

- Counterparties must have the technical capability to respond quickly and efficiently to the Bank of England's daily rounds of operations.
- Counterparties must maintain an active presence in the markets for at least one of the instruments eligible in the Bank of England's operations. Counterparties are expected to have an active trading presence in the core sterling money markets on a reasonably continuous basis and with a range of unrelated counterparties, on a scale that would enable them to contribute in a material way to distributing the liquidity provided by the Bank of England around the system.
- Counterparties are expected to participate regularly in the Bank of England's daily rounds of open market operations. This does not mean that counterparties are obliged to take part in the operations every day or in every round on any one day. But the Bank of England does expect them to participate on most occasions and, on average over time, on a reasonable scale.
- The Bank of England will look to its counterparties to provide useful information on a regular basis on market conditions and developments in the sterling money markets.

The Bank of England expects the functional requirements to be met on a continuous basis, and monitors compliance with them by its counterparties. It takes steps to ensure that the legal agreements it signs with counterparties are, and remain, at all times, fully valid and robust and wishes to be satisfied that counterparties continue to meet the prudential and other requirements of their relevant supervisory body. Applications to become a counterparty are invited from any institution that fulfils the functional criteria at any time.⁽¹⁾ The Bank of England reserves the right to cease dealing, temporarily or for longer periods, with any counterparty at its own discretion.

The Bank of England provides a regular report on its operations in the 'Markets and operations' article published in each issue of the *Bank of England Quarterly Bulletin*. It continues to monitor the workings of its open market operations and keeps under review the possible need for further adaptation. Developments

(1) In May 2002, there were 17 counterparties participating in open market operations. The Bank of England does not publish a list of these institutions. Institutions interested in becoming counterparties may apply to the Head of Gilt-Edged & Money Markets Division at the Bank of England.

are discussed with market participants at the quarterly meetings of the Sterling Money Market Liaison Group.⁽¹⁾ Any operational adaptations are announced in published Market Notices. In addition, the Bank of England

publishes details of its operations in the sterling money markets in Tables D2.1 and D2.2 of the monthly Bank of England *Monetary and Financial Statistics* publication.⁽²⁾

(1) For more information see 'The Bank's contacts with the money, repo and stock lending markets,' *Bank of England Quarterly Bulletin*, Winter 2001, pages 431–33. See also www.bankofengland.co.uk/markets/smmlg.htm

(2) See www.bankofengland.co.uk/mfsd/index.htm

No money, no inflation—the role of money in the economy

*In this article,⁽¹⁾ Mervyn King, **Deputy Governor**, examines the apparent contradiction that the acceptance of the idea inflation is a monetary phenomenon has been accompanied by the lack of references to money in the conduct of monetary policy during its most successful period. The disappearance of money from the models used by economists is, however, more apparent than real, with official interest rates playing the leading role as the instrument of policy, with money in the wings off-stage. Nevertheless, there are real dangers in relegating money to this behind-the-scenes role.*

Introduction

Most people think economics is the study of money. But there is a paradox in the role of money in economic policy. It is this: that as price stability has become recognised as the central objective of central banks, the attention actually paid by central banks to money has declined.

It is no accident that during the ‘Great Inflation’ of the post-war period money, as a causal factor for inflation, was ignored by much of the economic establishment. In the late 1970s, the counter-revolution in economics—the idea that in the long run money affected the price level and not the level of output—returned money to centre stage in economic policy. As Milton Friedman put it, ‘inflation is always and everywhere a monetary phenomenon’. If inflation was a monetary phenomenon, then controlling the supply of money was the route to low inflation. Monetary aggregates became central to the conduct of monetary policy. But the passage to low inflation proved painful. Nor did the monetary aggregates respond kindly to the attempts by central banks to control them. As the governor of the Bank of Canada at the time, Gerald Bouey, remarked, ‘we didn’t abandon the monetary aggregates, they abandoned us’.

So, as central banks became more and more focused on achieving price stability, less and less attention was paid to movements in money. Indeed, the decline of interest in money appeared to go hand in hand with success in

maintaining low and stable inflation. How do we explain the apparent contradiction that the acceptance of the idea that inflation is a monetary phenomenon has been accompanied by the lack of any reference to money in the conduct of monetary policy during its most successful period? That paradox is the subject of my talk.

Of course, some central banks, especially the Bundesbank and the Swiss National Bank, always paid a good deal of attention to monetary aggregates. But when the European Central Bank acquired responsibility for monetary policy it adopted a reference value for money growth as only one of its two pillars of monetary policy, with an assessment of the outlook for inflation as the other. And the Swiss National Bank recently replaced its target for the monetary aggregates with one for inflation. In the United States, the Federal Reserve, at its own request, has been relieved of the statutory requirement, imposed in 1978, to report twice a year on its target ranges for the growth of money and credit. As Larry Meyer, a Governor of the Federal Reserve Board explained earlier this year, ‘money plays no explicit role in today’s consensus macro model, and it plays virtually no role in the conduct of monetary policy.’

The decline and fall of money in policy formation is confirmed by a fall in the number of references to money in the speeches of central bank governors. So much so that over the past two years, Governor Eddie George has made one reference to money in 29 speeches, Chairman Greenspan one in 17,

(1) Presented to the Festschrift in honour of Professor Charles Goodhart held at the Bank of England on 15 November 2001. An earlier version of this paper was given at the Maxwell Fry Global Finance Lecture, University of Birmingham, 24 October 2001. I would especially like to thank Andrew Hauser, James Proudman and Jan Vlieghe for their expert help in preparing this paper. I have also benefited from useful comments from Peter Andrews, Kosuke Aoki, Zvi Eckstein and John Power. Richard Geare, Alex Gollodge and Amit Sohal provided help with the data.

Governor Hayami one in 11, and Wim Duisenberg three in 30.

Money and inflation: the evidence

Let me begin by looking at some of the historical evidence. Chart 1, which extends the results of McCandless and Weber (1995), shows the correlation between the growth of the monetary base and inflation over different time horizons for a large sample of 116 countries. Countries with faster growth rates of money experience higher inflation. It is clear from Chart 1 that the correlation between money growth and inflation is greater the longer is the time horizon over which both are measured. In the short run, the correlation between monetary growth and inflation is much less apparent. Understanding why this is so is at the heart of monetary economics and still poses problems for economists trying to understand the impact of money on the economy. I shall return to this later.

Few empirical regularities in economics are so well documented as the co-movement of money and inflation. Chart 2 shows that this relationship is true for broad money as well as the monetary base. The other side of the coin to this close relationship between money and prices is the absence of a long-run relationship between money and output growth, shown in Chart 3. Over the 30-year horizon 1968–98, the correlation coefficient between the growth rates of both narrow and broad money, on the one hand, and inflation, on the other, was 0.99. Correspondingly, the correlation between the growth of narrow money and real output growth was -0.09 and between broad money growth and output was -0.08.

Correlation, of course, is not causation. The essence of monetary theory is trying to understand the structural relationship between money growth, demand, output and price movements. Stable structural relationships can give rise to unstable short-run correlations between any of these variables. It is, therefore, somewhat surprising that some economists have argued that the instability of observed short-run correlations casts doubt on the long-run importance of money growth in the inflationary process. Chart 4 shows the behaviour of the price level in the United Kingdom and its relationship with the ratio of money to real income over the period from 1885 to 1998. Short-run movements in the velocity of money are apparent, as well as the long-run link between money and inflation.

The view that money does not matter has been encouraged by those who point to regressions of inflation and output growth on monetary growth, and find that the influence of money is either insignificant or unstable. But these results tell us little about the significance of money in the transmission mechanism of monetary policy. They are based on what economists call reduced-form equations, the coefficients of which will be complex functions of the true structural parameters of the economy, as well as expectations of future policy responses by the monetary authorities. There is no reason to expect a simple relationship between inflation and output and money growth in reduced-form estimates.

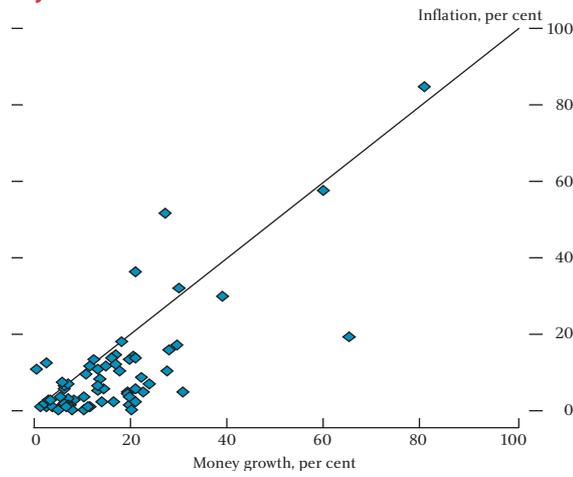
This last point was clearly grasped by Friedman and Schwartz in their classic 1963 study of money in the United States. They took great care to identify periods in which there was an exogenous shock to the money supply, such as moves on to and off the gold standard, and changes in reserve requirements imposed on banks. More recent studies, such as Estrella and Mishkin (1997), Hendry (2001), Gerlach and Svensson (2000) and Stock and Watson (1999) produce conflicting and unstable regression results for the influence of money growth on inflation.

To understand the true role of money, a clear theoretical model is required and that model must allow for the central role of expectations. The key role of expectations is best illustrated by considering extreme cases of high inflation, known as hyperinflations. In hyperinflations the effect of expectations on money and inflation is amplified relative to other influences, such as the business cycle.

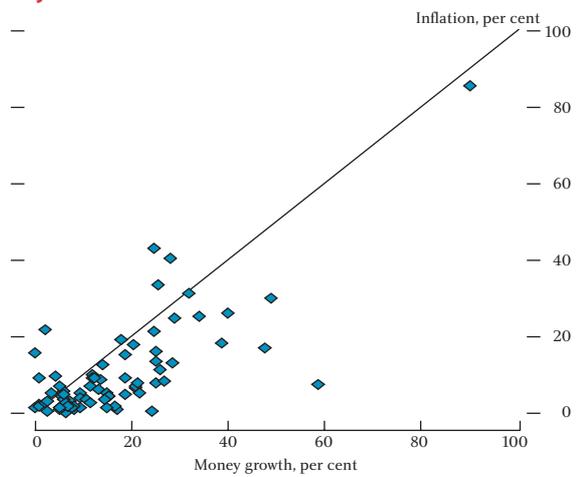
Chart 5 shows the link between money and prices in four hyperinflations. Two of these are drawn from the inter-war period, namely the hyperinflations in Austria and Hungary, and two are post-war hyperinflations, in Argentina and Israel. At their peak, these hyperinflations involved annual inflation rates of 9,244%, 4,300%, 20,266%, and 486% respectively. All four hyperinflations illustrate the importance of expectations. In the case of the two inter-war hyperinflations, large government deficits were monetised, leading to rapid money growth and inflation. The public tried to economise on money holdings, and so real money demand fell. Announcements of credible fiscal stabilisations changed inflation expectations and led extremely quickly to a rapid fall in inflation. Lower

Chart 1
Annual inflation and growth of narrow money at different horizons across countries

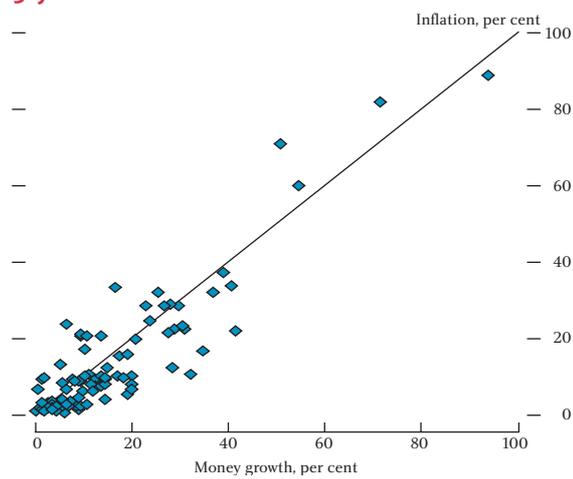
1 year



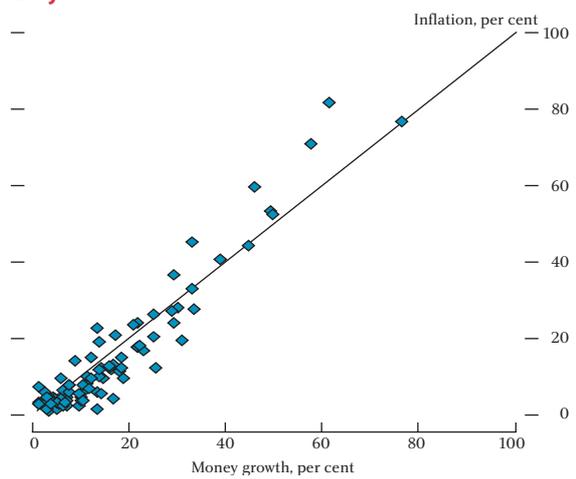
2 years



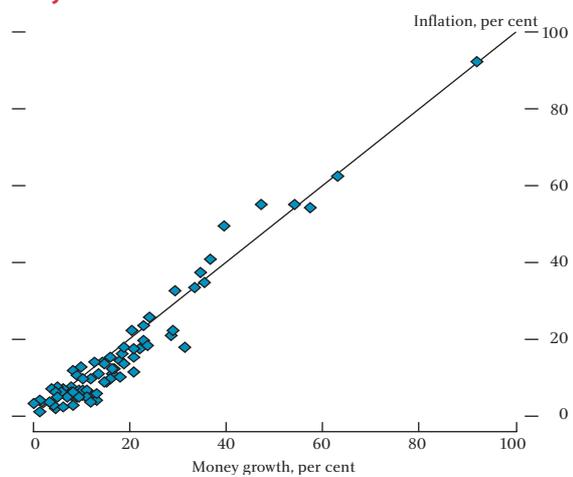
5 years



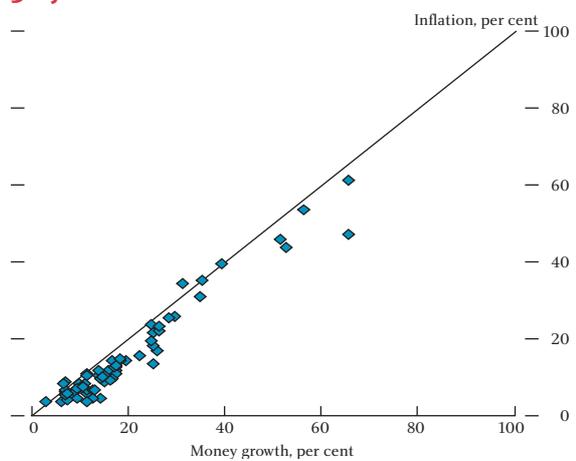
10 years



20 years



30 years

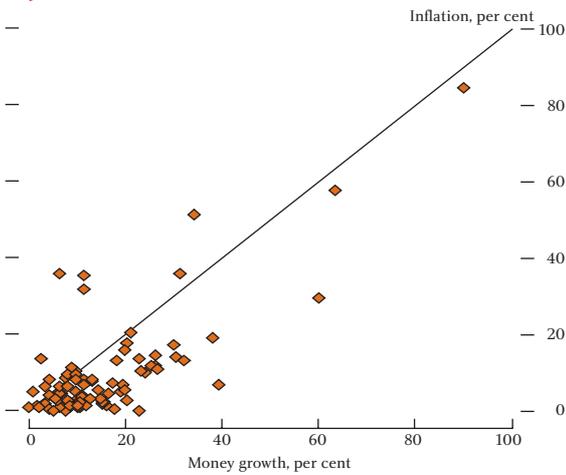


Note: Narrow money is reserve money, which includes currency in circulation (data item 14 in each IFS country table). Inflation is the percentage increase in the consumer price index (item 64). For presentation purposes, countries with average annual money growth or inflation exceeding 100% have not been included in the charts.

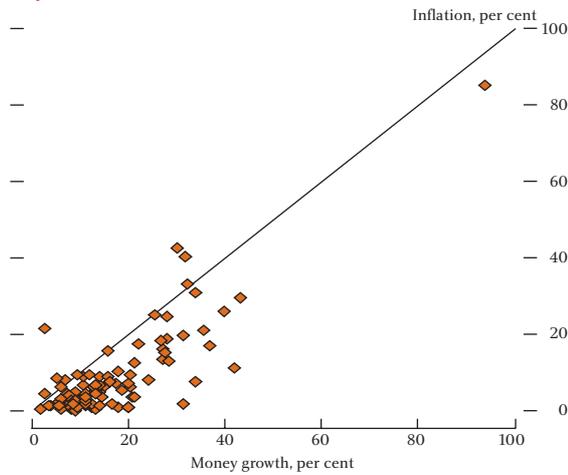
Source: *International Financial Statistics*, International Monetary Fund.

Chart 2
Annual inflation and growth of broad money at different horizons across countries

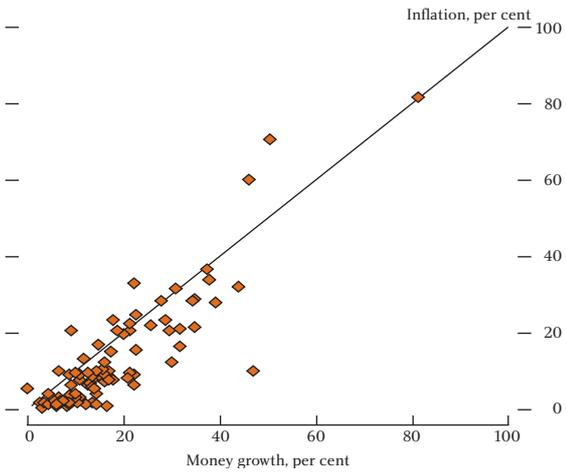
1 year



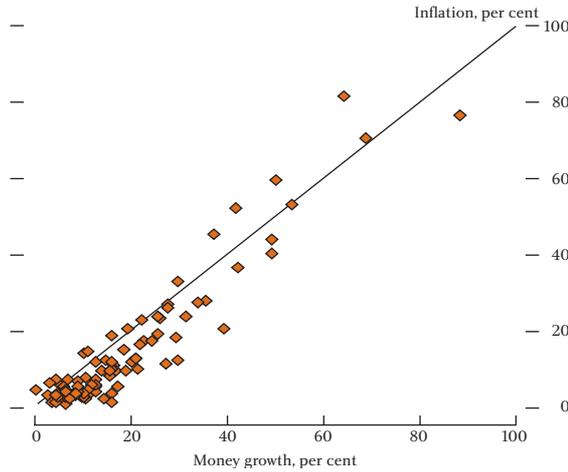
2 years



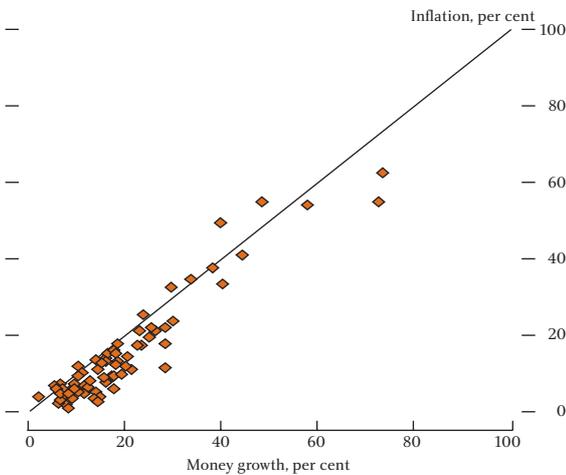
5 years



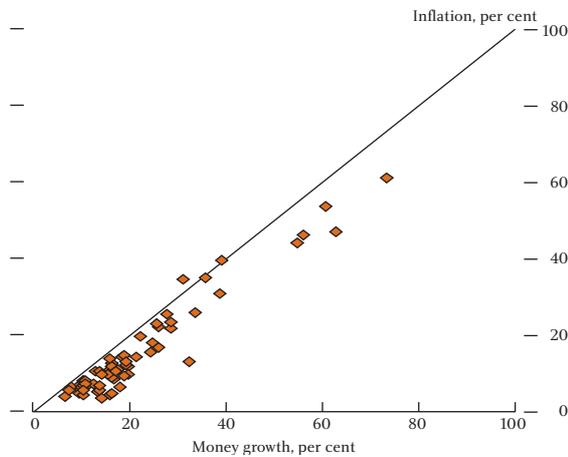
10 years



20 years



30 years

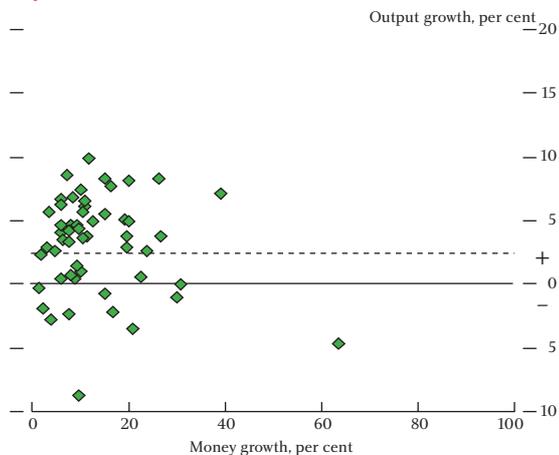


Note: Broad money includes demand deposits and time deposits (data items 34 and 35 in each IFS country table). Inflation is the percentage increase in the consumer price index (item 64). For presentation purposes, countries with average annual money growth or inflation exceeding 100% have not been included in the charts.

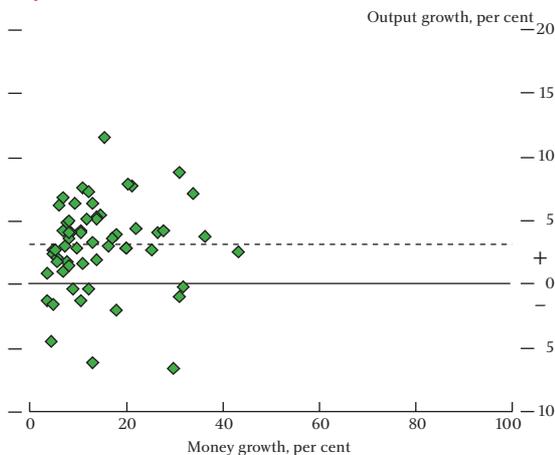
Source: *International Financial Statistics*, International Monetary Fund.

Chart 3
Annual growth of broad money and output at different horizons across countries

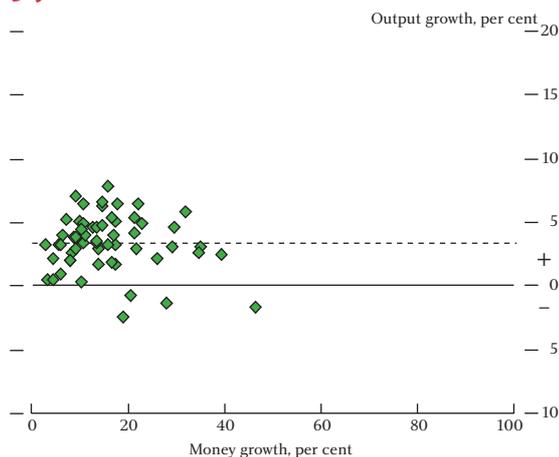
1 year



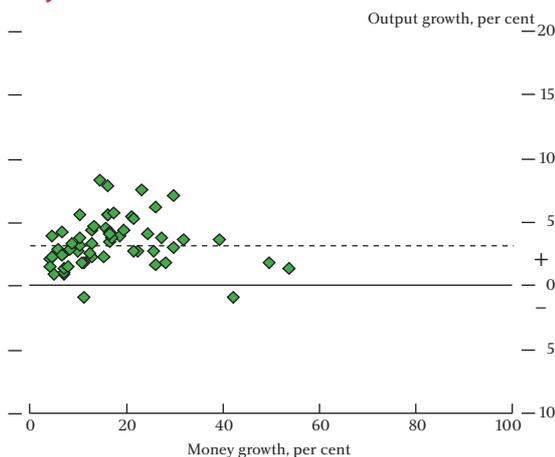
2 years



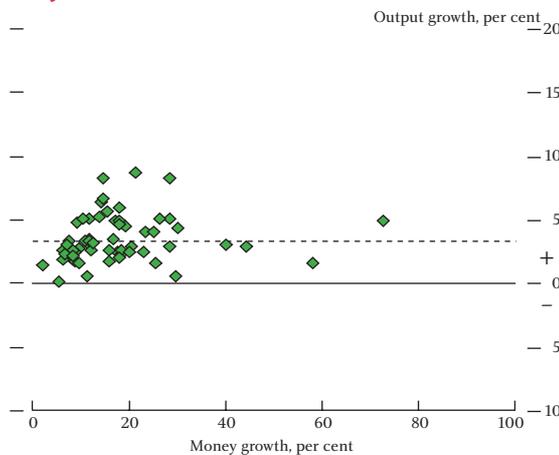
5 years



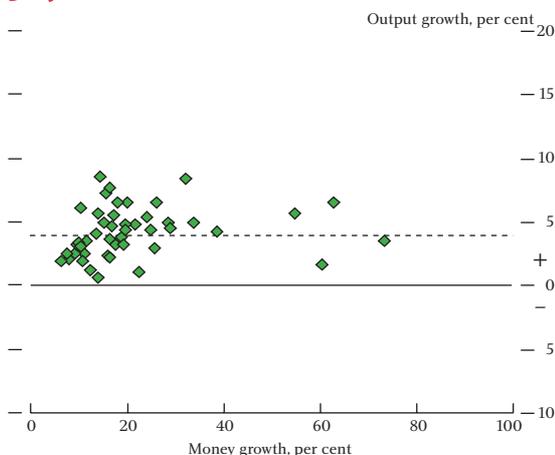
10 years



20 years



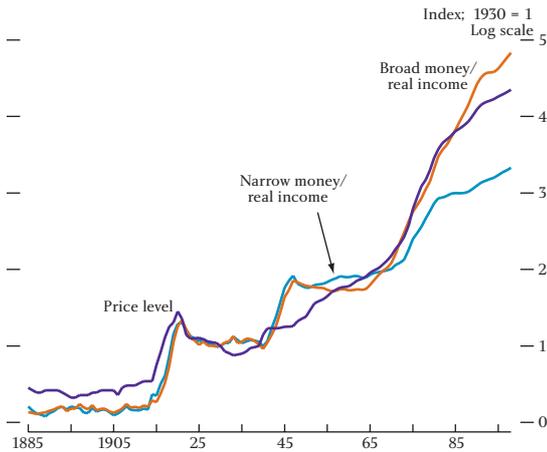
30 years



Note: Real output is nominal GDP (data items 99b in each IFS country table) deflated by the consumer price index (item 64). A GDP deflator was only available for a small sample of countries, and was therefore not used. The dashed horizontal line represents the average annual money growth across countries for each time horizon. For presentation purposes, countries with average annual money growth or inflation exceeding 100% have not been included in the charts. There were eight countries that had negative average real output growth over the 1978–98 period. These countries have not been included in the charts.

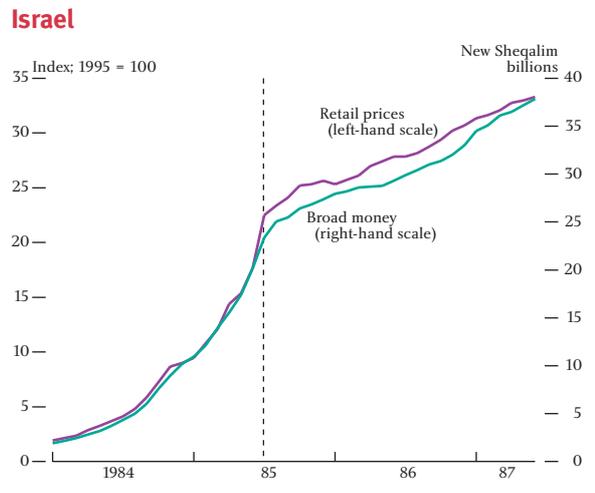
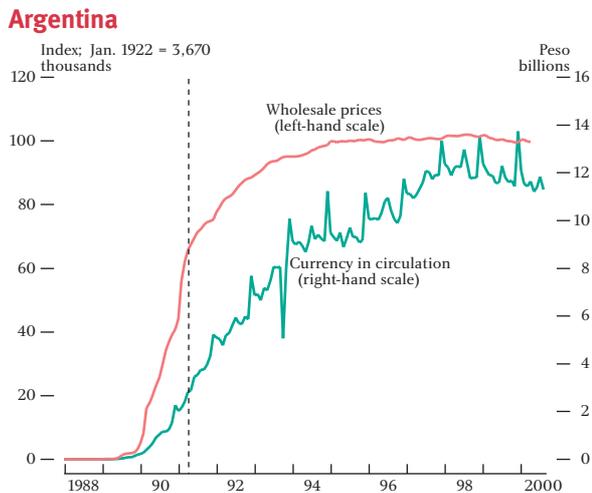
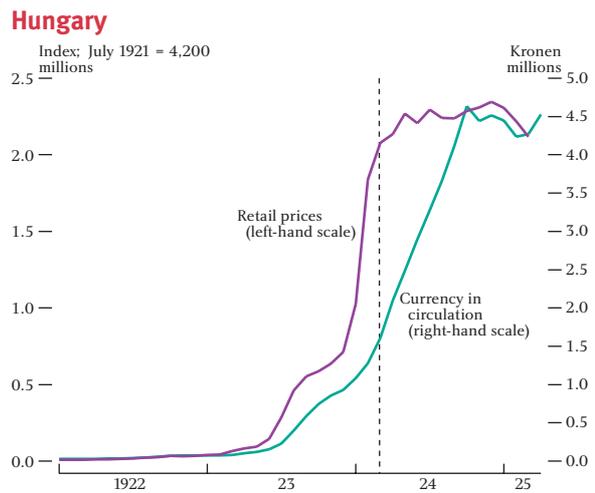
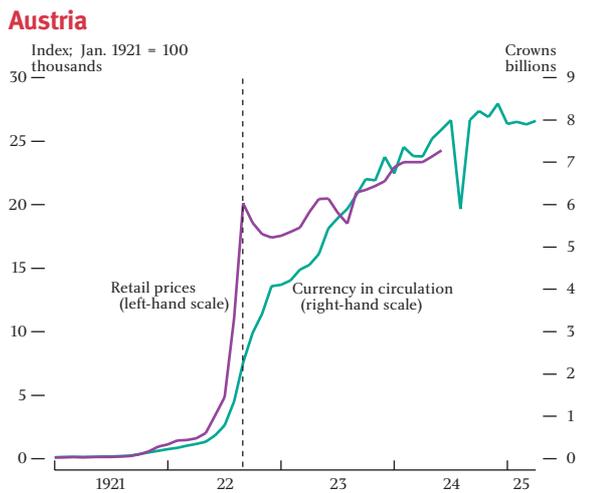
Source: *International Financial Statistics*, International Monetary Fund.

Chart 4
Prices and money relative to real incomes in the United Kingdom: 1885–1998



inflation encouraged real money demand to rise again, and so nominal money growth continued to rise for some time after inflation had fallen. Inflation was,

Chart 5
Money and prices during four hyperinflations



Note: Dashed vertical lines indicate the date at which a stabilisation plan involving fiscal and monetary reforms was announced.

Sources: Austria and Hungary: Sargent, T (1995), *Rational expectations and inflation*, Harper Collins College Publishers, New York, pages 80–92. Argentina and Israel: *International Financial Statistics*, International Monetary Fund.

therefore, stabilised ahead of the slowdown in money growth, although the causation ran from the credible announcement of monetary contraction to lower inflation. The dashed vertical lines in the charts indicate the announcement dates of stabilisation packages. In Argentina, inflation expectations were stabilised by the convertibility plan of 1991 which established a currency board to back the local currency in terms of the US dollar. Inflation expectations fell, and, as in the earlier cases, the fall in inflation preceded the slowdown in money growth. The case of Israel is somewhat different in that the absence of any delay between the announcement and the implementation of the stabilisation programme in 1985 meant that the gap between the fall in inflation and the contraction of monetary growth was shorter than in the other cases shown in Chart 5. Although hyperinflations are extreme examples, they do illustrate the fact that, even when monetary contraction is evidently the cause of a fall in

inflation, the rapid response of expectations means that inflation may fall before signs of a slowing of monetary growth itself.

To make progress, a more complete account is required of the role of money in the transmission mechanism, and it is to this that I now turn.

Understanding the role of money

There is an old joke to the effect that economists spend their time trying to work out how something that works in practice can work in theory. The role of money in the economy offers an excellent example. In modelling the monetary transmission mechanism, economists have tended to rely on two types of ‘rigidities’ which introduce time lags into the process by which changes in money lead to changes in prices. These are lags in the adjustment of prices and wages to changes in demand—so-called ‘nominal rigidities’—and lags in the adjustment of expectations to changes in the monetary policy regime—so-called ‘expectational rigidities’. These rigidities mean that money affects real variables in the short run and prices in the long run.

But we have no good theories to explain either type of rigidity, nor a clear idea of when the short run turns into the long run. Hence Milton Friedman’s dictum that there are ‘long and variable’ time lags between changes in monetary policy and their impact on inflation. To understand these theoretical shortcomings, it is helpful to consider an abbreviated history of the models used by economists to analyse the impact of money. The standard or consensus model comprises four basic equations (see Table A). First, there is an equation for aggregate demand which relates total demand to either money or interest rates and to expected inflation. The aggregate demand function is sometimes known as the ‘IS’ curve. Second, there is an equation describing the supply side of the economy in which total output is related to differences between expected and actual inflation; this is the ‘Phillips-Lucas supply curve’. Third, there is an equation for the demand for money relating broad money holdings to total expenditures and the interest rate; the ‘LM’ curve. Fourth, there is an equation describing monetary policy in which the supply of broad money is determined by the actions of the central bank in controlling base money (bank reserves plus notes and coin in circulation) which in turn influences broad money provided by the banking system through the ‘money multiplier’. This equation represents the monetary policy reaction function of the central

bank. The model determines the values of output, inflation, the interest rate, and money growth. Most models used to analyse monetary policy are based on a variant of this four-equation system, with increasing importance over time given to the role of expectations in the Phillips curve.

Table A
Standard monetary model

$$\begin{aligned} Y_D &= f_1(M, i, E(\pi)) & (1) \\ Y_S &= f_2(\pi - E(\pi)) & (2) \\ M_D &= f_3(Y_D, i) & (3) \\ M_S &= f_4(Y_D, i, \pi) & (4) \end{aligned}$$

Given (i) a model for $E(\pi)$
(ii) equilibrium, ie $Y_D = Y_S = Y$; $M_D = M_S = M$
then the four equations determine $\{Y, M, i, \pi\}$.

In this framework, the standard theoretical view of the transmission mechanism of monetary policy works as follows. An unexpected increase in the money supply reduces the nominal interest rate in order to persuade households to hold larger money balances. If inflation expectations are slow to adjust to the increase in the money supply—because of expectational rigidities—then the fall in the nominal interest rate also implies a fall in the real rate of interest. This raises expenditures on items such as investment and consumer durables which are sensitive to interest rates. If prices and wages are slow to adjust to higher demand—because of nominal rigidities—then in the short run firms are induced to supply more output. As the pressure on capacity in the economy rises, employees demand higher wages to reflect increased demand and both wages and prices rise. In the long run output is determined solely by real factors, and the increase in money supply is reflected in a rise in the price level.

More recently, the equation for money supply has been replaced by an explicit feedback rule for interest rates. The money demand equation plays no explicit role in determining output, inflation and interest rates. Money, it would appear, has been eased out of the picture. In these new models, a loosening of monetary policy—characterised by an unexpected reduction in the nominal interest rate—raises demand, output and, ultimately, inflation. In the long run the inflation rate is determined by monetary policy, in the sense that the monetary policy reaction function determining interest rates contains an explicit inflation target. Money growth is higher, the higher is the inflation rate, but, if the model were an accurate description of the economy, the interest rate would be a sufficient statistic of monetary policy. Models of this type in which interest rates are

the policy instrument are widely used both in theoretical analysis and in the design of empirical policy rules, such as the well-known Taylor rule. Given this prominent role for interest rates rather than money in the theoretical analysis of policy, it is, perhaps, not surprising that econometric forecasting models in most major central banks include interest rates, but not the quantity of money.

Despite appearances, however, these new models give no less weight to money than the older versions. Irrespective of whether the central bank uses base money or interest rates as the policy instrument, the quantity theory of money still applies. In the new models, monetary quantities play no independent role in the transmission mechanism over and above that summarised in interest rates. But, equally, in the old models too, monetary policy impacted on the economy through its effects on interest rates. The key question is not whether the central bank uses the monetary base or interest rates as its policy instrument. It is whether the equations which are embedded in both the old and new models of monetary policy exclude important channels through which monetary policy works.

Before attempting to answer this question, the consensus model can be used to illustrate a key point made earlier, namely that there is no reason to expect a stable relationship between money and inflation in the short run. Using a linearised model of the type described in Table A, the exact details of which are given in the technical appendix, simulated data can be generated for long time periods corresponding to realisations of the various shocks to the economy. In particular, a quarterly model was constructed using calibrated parameters and processes for the stochastic shocks in each equation. Several variants of the model were then created, keeping the main model parameters constant, but altering the variance and persistence of the stochastic shocks. By simulating the shock processes 10,000 times for each variant, several datasets spanning 2,500 years were created. Reduced-form regressions were then run on the variants of the model to estimate the dependence of inflation on lagged values of output, money growth and inflation itself. Note that, by construction, money has a stable causal effect on inflation. The regression results obtained from different sample periods produce a wide variation of estimated coefficients on money in determining inflation (see Table B). In fact, these coefficients can be either positive, negative or insignificantly different from zero,

depending on the constellation of shocks hitting the economy. Moreover, the reduced-form relationships change with the length of the horizon (see Table C). Money appears to contain little information about very short-term inflationary pressures, but it becomes much more significant in the long run. In contrast, the impact of output growth on inflation falls as the horizon lengthens. The conclusion is straightforward. Simple reduced-form econometrics are no substitute for a clear theoretical structural model of how monetary policy works (a point also made by Nelson (2001)). Thinking needs to be liberated from the ‘tyranny of regressions’.

Table B
What can we learn from this model about simple econometrics?

Consider two reduced-form regressions, specified as:

$$\pi_t = \sum_{s=1}^i \gamma_s \pi_{t-s} + \sum_{s=0}^j \delta_s (y_{t-s} - \bar{y}_{t-s}) + \sum_{s=0}^k \mu_{t-s} (\Delta m_{t-s}) \quad (1)$$

$$\pi_t = \sum_{s=1}^i \gamma_s \pi_{t-s} + \sum_{s=0}^j \delta_s (\Delta y_{t-s}) + \sum_{s=0}^k \mu_{t-s} (\Delta m_{t-s}) \quad (2)$$

Long-run coefficient on money growth		Changes to the sources or magnitudes of shocks from the baseline
(1)	(2)	
-0.14	0.05	Case 1: None.
-0.50	-0.08	Case 2: Increase in the autocorrelation of demand shocks to 0.5.
-2.51	-1.4	Case 3: Increase in the standard deviation of mark up shocks to 0.01.
0.65	0.78	Case 4: Increase in the standard deviation of mark up shocks to 0.01, the autocorrelation of cost push shocks to 0.8 and the standard deviation of policy shocks to 0.04.

Notes and sources: Precise details are provided in the technical appendix. Under the baseline, demand (€1 from the technical appendix), mark-up (€2), monetary policy (€3) and supply (€4) shocks are generated with standard deviations of 0.01, 0, 0.0082 and 0.0072, respectively, and with first-order autocorrelation of 0.33, 0, 0.3 and 0.95 respectively. These values are consistent with Nelson (2000) and Neiss and Nelson (2001). Each regression uses 10,000 observations.

Table C
What can we learn about money from simple econometrics?

The correlations between the simulated data depend on their frequency, as they do in the historical data.

	corr ($y - \bar{y}, \Delta p$)	corr ($\Delta m, \Delta p$)
Short run	0.79	0.23
Long run	0.05	0.68

Note: Short run means a contemporaneous correlation between the variables and long run means a correlation between the output gap today and average inflation over the following 25 years, or average money growth and inflation both over a 25-year period.

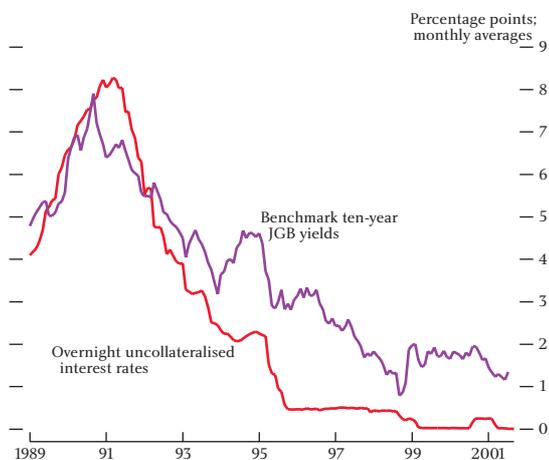
Both old and new models of the monetary transmission mechanism have important limitations. Crucially, there is only a single financial asset. But in the traditional monetarist account (Friedman and Schwartz (1963)) money is an imperfect substitute for a wide range of financial and real assets, including bonds, equity, physical capital and durable goods. A monetary policy

change induces a rebalancing of portfolios in general, affecting nominal demand both directly (through wealth and substitution effects on real assets), and indirectly (through adjustments in a wide range of financial yields relevant to expenditure decisions). Hence both old and new models may ignore an important part of the transmission mechanism of monetary policy.

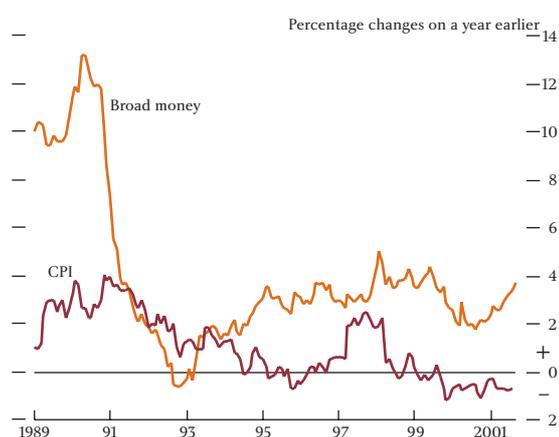
The practical relevance of this consideration is extremely topical. The conventional model suggests that monetary policy is ineffective if interest rates have reached their natural floor of zero and a further reduction of real interest rates is required to stimulate demand. Japan appears to be in exactly that situation at present. Chart 6 shows the recent experience of monetary policy in Japan. Inflation has been very low; indeed, it has been negative in recent years. The Bank of Japan has lowered interest rates to the point where they have now hit their lower bound of zero. Interest rates have been extremely low for five years, and have been almost

Chart 6
Interest rates, money and inflation in Japan
(1989–2001)

A. Interest rates



B. Broad money growth and CPI



exactly zero since February 1999. The question of whether monetary policy is impotent when interest rates are zero has remained open since the possibility of a 'liquidity trap' was suggested by Keynes in the General Theory and revived recently by Paul Krugman.

Broadly speaking, there are two answers to this question. The first is that monetary policy is indeed impotent when interest rates are zero. At this point, households and firms have an infinitely elastic demand for money balances, and so any increase in money supply is absorbed passively in higher balances. An increase in money supply has no implications for spending or output. In such circumstances, the only way to affect the economy is by an expansionary fiscal policy. The second answer is that, at some point, households and firms become satiated with money balances at the current level of income, and any attempt to increase the money supply leads them to adjust portfolios in order to limit their holding of money balances. These changes in household portfolios lead to changes in relative yields on different financial and real assets, and hence on asset prices and, in turn, real spending. Despite interest rates remaining at zero, monetary policy, in this world, can influence nominal spending and incomes.

Which view is the more attractive theoretically and empirically? It is clear that, in part, the answer depends on the response of the demand for money as interest rates tend to zero. If the demand for money tended to infinity, as the interest rate tended to zero, then an expansion in the money supply would have no real effect on demand and output because any additional money created would simply be absorbed passively in money holdings. But if the demand for money is satiated at a finite level as interest rates tend to zero, then the creation of money beyond that point would be translated into a demand for other assets and higher incomes. Since observations on interest rates close to zero are rare in practice, there is little evidence to enable us to distinguish between these two hypotheses.

A recent study by economists in the Bank of England (Bakhshi, Martin and Yates (2002)) finds some evidence of a satiation point in the demand for narrow money in the United Kingdom, although Bental and Eckstein (1997) and Lucas (2000) find evidence for an asymptote. The empirical evidence is not, therefore, decisive. There are very considerable uncertainties surrounding these estimates. But they are at least consistent with the

possibility that monetary policy may have potency even at zero interest rates.

What, therefore, has economic theory to say about how changes in money might affect nominal demand, over and above any influence via interest rates? This is a question that is relevant to all economies, not just those, such as Japan, facing zero interest rates. One view, associated with Pigou (1943) and Patinkin (1965) is that a monetary expansion will, in the presence of sticky prices ('nominal rigidities') lead to a rise in the real value of the money stock which will, in turn, raise household net wealth and lead to higher expenditures. There are two objections to this view. The first is that the only part of the money supply which constitutes net wealth for the economy as a whole is 'outside' money, namely the monetary base. And this accounts for only a very small fraction of financial wealth—a little over 1% in the United Kingdom. So the quantitative impact of the real balance effect is inevitably small.

Second, even this effect is subject to households failing to take into account the impact on future generations of the use of monetary financing. Nevertheless, models by which money changes real balances have become more fashionable recently. Building on the work of Sidrauski (1967), a number of economists have examined the impact of higher money holdings on the size of transactions costs. An unexpected monetary expansion lowers transactions costs, according to this view, and increases the attractions of consumption. Effects of varying size have been claimed by authors such as Ireland (2001a, 2001b), Koenig (1990), McCallum (2001) and Woodford (2002). Such transmission mechanisms, however, do not appear to be empirically significant nor do they correspond to the main channels of policy as seen by earlier generations of economists.

The main difference between the models described above and earlier writings on money is the absence in those models of financial yields other than the short-term interest rate. In principle, many more asset yields could enter the demand for money. In his own writings, Keynes placed emphasis on the yield on long-term government bonds. In this view, expansionary monetary policy can take the form of open market operations in which the central bank purchases a wide variety of assets, not just short-term government securities. Yields on a wide variety of financial assets respond, and in turn so does demand. One of these

financial prices is the exchange rate. That is why some economists see the salvation for Japan in terms of the exchange rate. They recommend strategies such as expanding the monetary base in order to produce a fall in the market exchange rate which would lead to an upturn driven by net trade. Alternatively, economists such as Svensson (2001) have recommended pegging the yen at a much lower exchange rate against the dollar. This, it is argued, would lead to expectations of higher inflation which, given zero nominal interest rates, would produce a negative real interest rate that would generate an expansionary impact on the economy.

The major question, however, is how an expansion of the money supply operates through indirect effects on the yields of other assets which are excluded from conventional models of the transmission mechanism. If future interest rates are incorporated into optimal consumption behaviour, then the only channel by which monetary policy can operate, other than via interest rates, is through changes in risk premia.

How might we try to integrate monetary theory and portfolio theory? Little help will come from traditional finance theory. The reason is extremely simple. Most finance theory is based on the assumption that equilibrium yields on assets, including risk premia, are independent of the quantities of the supplies of different assets. Hence the search for a better model of the monetary transmission mechanism is, in part, a search for evidence of supply effects on financial asset yields. That is why the view that money matters, over and above interest rates, is intimately bound up with a question of whether the supplies of different assets affect yields, and hence whether the composition of government debt affects both money and real economic behaviour. In the United Kingdom, Tim Congdon has emphasised the importance of 'funding policy' in the determination of the broad money supply, a subject which has been analysed in detail by Goodhart (1999). The broad weight of opinion, to date, is that supply effects are hard to find. Many years ago, for example, the United States tried to change the slope of the yield curve on its government debt by 'Operation Twist' in which the composition of government debt was altered in an attempt to change relative yields. This experiment was widely regarded as a failure. Intriguingly, however, there is renewed interest among finance theorists in the impact of supply effects on yields. More and more puzzles in the theory of finance appear to be related to the existence of supply effects.

There seems to be a gap between modern finance theory and the traditional monetarist account in which a monetary expansion causes a rebalancing of portfolios putting direct upward pressure on a range of asset prices, which in turn stimulates higher nominal demand. To bridge this gap requires a more careful analysis of exactly what is special about money. Much of the traditional monetarist account relies on the imperfect substitutability between various marketable assets, including money. But there is often a weak theoretical rationale for the mechanisms discussed. Thus, while it is clear that financial markets have a much richer structure than is conventionally assumed by the models described earlier, the monetarist argument that this is sufficient to imply a significant role for money remains unproven. What are the promising avenues for future research? The solution, I conjecture, will be based on two observations:

1. Transaction costs are important in determining asset prices—many of the puzzles in the behaviour of asset prices, such as the equity risk premium, can be resolved by taking the effects of transaction costs seriously.
2. Money reduces transaction costs.

Rather than rely on a barter economy, goods (or labour) can be exchanged for money, and money for goods. But there is no reason to suppose that the same argument cannot be used in asset markets.

If the quantity of money can affect the size of transaction costs in financial markets, then it will have an effect on expenditures and inflation, over and above any change via the transmission from changes in risk-free interest rates. Over the past decade, economists have made strides in setting out a more coherent theoretical story of the way in which money reduces trading frictions in markets for goods and services. Traditional models of exchange economies make strong demands on the institutional arrangements that underlie transactions. Money can help reduce these transactions costs. And it is possible that money might have a similar role in alleviating frictions in financial markets, thus expanding the scope of the transmission mechanism of monetary policy. It is striking that nearly a quarter of the money stock in the United Kingdom is held by non-bank financial firms. The frictions which money helps to overcome in financial markets are related to its role in providing liquidity services. Money enables

individuals, both households and firms, to avoid borrowing should they hit a cash-flow constraint. Since the probability of experiencing such a constraint falls as the stock of money rises, changes in money could affect relative asset returns. Introducing financial frictions into models of asset prices, and recognising the role of money in reducing those frictions, provides, in my view, a potentially more significant role for money in the transmission mechanism than has been examined hitherto in a rigorous way. The theoretical support for, and empirical relevance of, such an approach is still unclear. So there is a substantial agenda for future research.

The link between money and the provision of financial services more generally is clear in the historical evolution of ‘inside money’, such as checking accounts and credit cards, which now constitute the bulk of broad money. Credit services can displace the use of ‘outside money’ in transactions, but only where their cost is sufficiently low, and that may depend upon the individual characteristics of the agents undertaking the transactions. As a result, the parameters of the money demand function are dominated by the technology of transaction services, and can be unstable over time (as for example, in the model of Aiyagari, Braun and Eckstein (1998)). This instability derives not from the irrelevance of money, but from changes to technology.

Money and monetary policy

What does this debate about the transmission mechanism of monetary policy mean for the conduct of monetary policy today? The role of money in determining the price level, and its embodiment in the quantity theory of money, evolved over several hundred years. The broad shape of this theory was accepted by most economists. It is certainly evident in the writings of both John Maynard Keynes and Irving Fisher. As the theory of monetary economics developed, so too did the practice of monetary policy. In Britain, the beginning of the theory and practice of monetary policy as we know it today started with the Bank Charter Act of 1844. Keynes wrote that prior to the 1844 Act, ‘the principles and methods of currency management were but ill understood by those responsible for its management, namely, the Governors and Court of the Bank of England.’ (*Treatise on money*, pages 14–15.) He went on to conclude, ‘The efficiency of bank-rate for the management of a managed money was a great discovery and also a most novel one—a few years earlier the Bank

of England had not had the slightest understanding of any connection between bank-rate policy and the maintenance of the standard' (*op cit* page 15). I hope that the Bank of England today has at least some understanding of the relationship between interest rates and inflation!

Thinking of monetary policy in terms of interest rates has become the norm in central banks today. Frequent and volatile shifts in the demand for money led central banks to change their focus from monetary aggregates towards the control of short-term interest rates. Few major central banks now place the monetary aggregates at the centre of their targeting regime. Instabilities in the demand for money are not new. In the early years of the Bank of England, there were unexpected shifts in the demand for money and credit resulting from uncertain arrival times in the port of London of ships laden with commodities from all over the world. The uncertainty derived from changes in the direction and speed of the wind carrying ships up the Thames to the port of London. Hence the Court Room of the Bank of England contained a weather vane which provided an accurate guide to these shifts in money demand—the weather vane is there to this day, and it still works. If only monetary policy could be as scientific today! Financial liberalisation and changes in the technology of payments and settlements have led to large volatilities in money demand. No one has yet worked out how to translate such shifts into a simple reading on the financial equivalent of a weather vane. So central banks have paid decreasing attention to the monetary aggregates as an intermediate indicator of their policy stance.

Although there is no mechanical link from the monetary aggregates to inflation, the underlying relationships, in quantitative form, still hold. Hence it is important for a central bank to understand changes in money. One of the features of Bank of England analysis of monetary developments is the attempt to understand the entire range of monetary quantities and prices facing agents in the economy. Each month the Monetary Analysis and Strategy Division of the Bank of England produces a *Quarterly Monetary Assessment* in order to provide the Monetary Policy Committee with as much information as possible about monetary developments. Part of this includes an analysis of equilibrium interest rates and the stance of monetary policy. Rules, such as the Taylor rule, provide a useful benchmark against which to judge whether interest rates are too high or too low. But the

analysis provided by the Bank of England is not restricted to interest rates. It is crucial to look at developments in quantities in the monetary area and credit conditions, as well as prices. Using historical relationships estimated from the data, developments in money and credit, and their sectoral patterns, can be used as indicator variables for near-term activity and inflation. The short-term outlook for consumption, for example, can be related to movements in Divisia Money, and the outlook for investment is related to the financial position of the corporate sector.

Conclusions

I return to the paradox with which I began. Most people believe that economics is about money. Yet most economists hold conversations in which the word 'money' appears hardly at all. Surprisingly, that appears true even of central bankers. The resolution of this apparent puzzle, is, I believe, the following. There has been no change in the underlying theory of inflation. Evidence of the differences in inflation across countries, and changes in inflation over time, reveal the intimate link between money and prices. Economists and central bankers understand this link, but conduct their conversations in terms of interest rates and not the quantity of money. In large part, this is because unpredictable shifts in the demand for money mean that central banks choose to set interest rates and allow the public to determine the quantity of money which is supplied elastically at the given interest rate.

The disappearance of money from the models used by economists is, as I have argued, more apparent than real. Official short-term interest rates play the leading role as the instrument of policy, with money in the wings off-stage. But the models retain the classical property, that, in the long run, monetary policy, and hence money, affect prices rather than real activity. Nevertheless, there are real dangers in relegating money to this behind-the-scenes role. Three dangers seem to me particularly relevant to present circumstances. First, there is a danger of neglecting parts of the monetary transmission mechanism that operate through the impact of quantities on risk and term premia of various kinds. The current debate about the appropriate monetary policy in Japan illustrates this point. Second, by denying an explicit role for money there is the danger of misleading people into thinking that there is a permanent trade-off between inflation, on the one hand, and output and employment, on the other. Third, by

discussing monetary policy in terms of real rather than monetary variables, there is the danger of giving the impression that monetary policy can be used to fine tune short-run movements in output and employment, and to offset each and every shock to the economy. These dangers all derive from the habit of discussing monetary policy in terms of a conceptual model in which money plays only a hidden role.

Habits of speech not only reflect habits of thinking, they influence them too. So the way in which central banks talk about money is important. There is no inconsistency between the consensus models we use to analyse policy in terms of interest rates and the proposition that monetary growth is the driving force behind higher inflation. But it would be unfortunate if

the change in the way we talk led to the erroneous belief that we could turn Milton Friedman on his head, and think that 'Inflation is always and everywhere a real phenomenon'.

My own belief is that the absence of money in the standard models which economists use will cause problems in future, and that there will be profitable developments from future research into the way in which money affects risk premia and economic behaviour more generally. Money, I conjecture, will regain an important place in the conversation of economists. As Hilaire Belloc wrote,

'I'm tired of Love: I'm still more tired of Rhyme.
But Money gives me pleasure all the time.'

Technical appendix on the generation of the simulation results

The model used here is a linearised version of that shown in Table A, similar to that given in McCallum (2001), where the interest rate reaction function below replaces the money supply equation.

1. Model

$$\begin{aligned}
 y_t &= E_t y_{t+1} - (i_t - E_t \pi_{t+1}) + \varepsilon_1 \\
 \pi_t &= 0.99 E_t \pi_{t+1} + 0.1 (y_t - \bar{y}_t) + \varepsilon_2 \\
 m_t - p_t &= y_t - 7i_t \\
 i_t &= (1.5)(1 - 0.3)(\pi_t - \pi^*) + (0.5)(1 - 0.3)(y_t - \bar{y}_t) + 0.3i_{t-1} + \varepsilon_3 \\
 \bar{y}_t &= \varepsilon_4
 \end{aligned}$$

where y is the natural log of output, i is the nominal interest rate, π is the inflation rate, \bar{y} the natural log of potential output, m the natural log of money, π^* the inflation target. The parameter values are based on Nelson (2000), Neiss and Nelson (2001), and Neiss and Pappa (2002).

2. Calibration of the stochastic shocks

Each of the shocks is independently normally distributed with mean zero, and standard deviations and autocorrelations shown below for the benchmark case.

ε_1 (<i>demand</i>):	standard deviation 0.01, autocorrelation coefficient 0.33
ε_2 (<i>mark up</i>):	standard deviation 0
ε_3 (<i>monetary policy</i>):	standard deviation 0.0082, autocorrelation coefficient 0.3
ε_4 (<i>supply</i>):	standard deviation 0.0072, autocorrelation coefficient 0.95

These values are consistent with Nelson (2000), Neiss and Nelson (2001), Neiss and Pappa (2002). In case 1, the baseline parameters shown above are chosen. In case 2, we use the benchmark parameters, but increase the autocorrelation of demand shocks to 0.5. Case 3 is the benchmark, with the standard deviation of mark up shocks raised to 0.01. Case 4 is the benchmark, with an increase in the standard deviation of mark up shocks to 0.01, the autocorrelation of mark up shocks to 0.8 and the standard deviation of policy shocks to 0.04.

3. The experiment

Simulated data were created by taking 10,000 random draws from a standard normal distribution for each shock, and scaling and transforming as appropriate for each of the shocks to create autocorrelated series where required. Using the realisations for the shocks, we can solve for the model variables using the solution algorithm of King and Watson (1995). This gives a time series of 10,000 simulated observations for each model variable. Correlation coefficients and ordinary least squares regression coefficients were then calculated using standard statistical techniques on the simulated data.

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Asset prices and inflation

By Roger Clews of the Bank's Monetary Instruments and Markets Division.

This article is one in a series on the UK monetary policy process.⁽¹⁾ It discusses some of the interconnections between inflation, monetary policy and asset prices. The Monetary Policy Committee is extensively briefed on asset market developments, along with other developments in the economy, before it makes its policy decisions.

Monetary policy is forward-looking and so are asset markets. Assets are held because they yield benefits in the future and asset prices change as the markets reassess those benefits. Many of the factors determining asset prices are economic, for example prospective real growth or inflation, and so overlap with the Monetary Policy Committee's concerns. But some have to do with the investors themselves, for example their attitude to risk or the rules which investing institutions have to follow. And many asset prices, including the price of foreign exchange, move on news about monetary policy itself, in this country or abroad, because of the impact which monetary policy has on financial and future economic conditions. In assessing the impact which any particular asset price movement may have on inflation prospects, it is important to consider *why* the price has moved.

Asset prices and the transmission mechanism of monetary policy

Monetary policy is set in one financial market (the money market) and is transmitted to the economy in part through other financial markets, and through markets for real assets, such as the housing market. The MPC sets a short-term nominal interest rate—the Bank's official repo rate—which directly influences other short-term rates in sterling markets. Less directly, the MPC also influences long-term interest rates because long rates depend in part on expectations about future short-term interest rates (to be set by the MPC). To take a simple example, investors may be able to choose between making a long-term loan or rolling over a series of short-term loans. If so, the rate they are willing to

accept on the long-term loan will be influenced by what they can expect to earn from short-term interest payments on the series of short-term loans. So if short-term interest rates are expected to rise in the future, then long-term interest rates will reflect that already today. If the long-term loan is traded, in the form of a bond, then changes in long-term rates will in turn affect the price of the bond. Think of an existing bond which pays, say, 5% a year. If long rates rise, so that new bonds pay 6% a year, the old bond will become less attractive and will fall in price. In sum, expectations about rates to be set by the MPC in the future have an impact today on long rates and hence on bond prices.

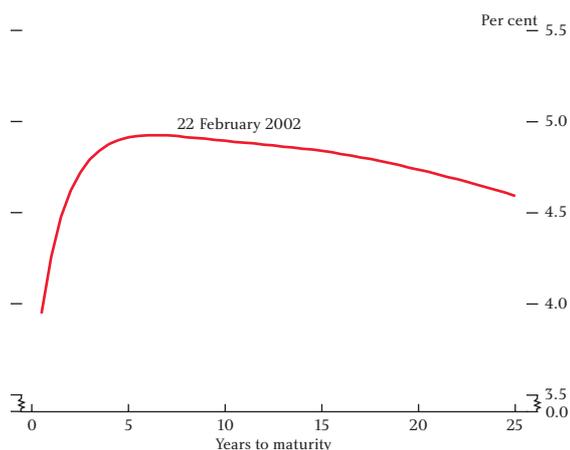
The MPC is provided with information on interest rates and yields, both in this country and abroad. The information is often summarised in yield curves showing yields to different maturities and the path of future short-term rates that would be compatible with those yields.⁽²⁾ Charts 1 and 2 are examples. Chart 1 shows the yield that could be earned by investing from 22 February this year to different points in the future. Chart 2 shows the path of very short-term rates that is implied by the yield curve in Chart 1. Investing for, say, five years at the rate shown at five years in Chart 1 gives the same return as investing in a series of very short-term loans at the rates shown for the period up to five years in Chart 2.

The MPC's influence reaches other markets too. A change in mortgage rates brought about by a change in the Bank's repo rate will affect house prices. Exchange rates are affected by many factors, but one of them will

(1) See also Bean, C and Jenkinson, N (2001), 'The formulation of monetary policy at the Bank of England', *Bank of England Quarterly Bulletin*, Winter, pages 434–41.

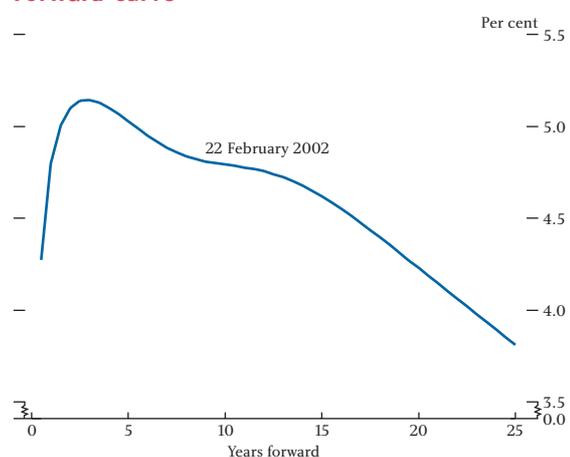
(2) For details see Anderson, N and Sleath, J (1999 and 2001), 'New estimates of the UK real and nominal yield curves', *Bank of England Quarterly Bulletin*, November 1999, pages 384–92, and *Bank of England Working Paper no. 126*.

Chart 1
Yield curve^(a)



(a) Yields in the market for UK government sterling debt.

Chart 2
Forward curve^(a)



(a) Future short-term rates consistent with the yields shown in Chart 1.

be a comparison of the return to be earned on assets denominated in sterling and assets denominated in other currencies. By changing the return on sterling-denominated assets the MPC affects their relative attractiveness, which, other things being equal, will affect the exchange rate. Equities too can form part of this transmission mechanism, either because monetary policy is expected to affect the profitability of companies, or simply because the rate at which the market discounts future profits or dividends changes as longer interest rates change. To put this latter point another way, if, for example, bond prices rise (so that bond yields fall) the return on equities will look more attractive, and equity prices will be bid up too.

By changing interest rates the Monetary Policy Committee changes the 'terms of trade' between resources now and resources in the future. By, say, raising rates it makes it more attractive to save, to spend less now to be able to spend more later. And higher interest rates make it less profitable to borrow now to finance investment that will pay off in the future.⁽¹⁾ This is indeed the most direct way in which the MPC can control inflationary pressures, by influencing the level of demand in the economy, relative to the economy's capacity to supply.

If some movements in asset prices are *reflections* of monetary policy action (actual or expected), what part do they play in the transmission of policy to the economy? The transmission mechanism as a whole was described in a report published in 1999.⁽²⁾ Two of the channels through which policy-induced changes in asset prices may affect the economy are wealth and the cost of capital. If monetary policy is eased and house prices and equities rise as a result, individuals will see their wealth increasing and may feel less need to save.⁽³⁾ If companies see their share price rising and long-term interest rates falling as a result of monetary policy action they may be more inclined to invest. The exchange rate too has a major influence on the economy. It is set in an asset market, the currency market, but affects prices at which goods and services are imported into this country and thus the inflation rate that the MPC targets. Another channel of influence runs from the exchange rate to the competitiveness of UK output at home and abroad, and hence to the level of activity in the UK economy and, again, to UK inflation.

A further way in which asset prices affect demand (and hence inflationary pressure) is by changing the value of collateral that households or companies have available. Lenders often know a lot less than borrowers do about the borrowers' prospects. And lenders may have limited control over borrowers' behaviour once the loan has been made. So lending decisions may be influenced by the amount of collateral that borrowers can put up to secure their loan. 'Mortgage equity withdrawal' is an obvious case in point; the greater the value of the housing stock, the easier it is for borrowers to 'withdraw equity' by borrowing on mortgage for non-housing

(1) In the medium to long run the real interest rate (the price of future resources in terms of resources today) is determined by fundamental factors, such as the productivity of physical investment and the tendency of consumers to value future consumption less highly than consumption today. But in the short run, prices of goods and services are subject to inertia, and by controlling the short-term nominal rate the MPC has a grip on the short-run real rate also.

(2) 'The transmission mechanism of monetary policy', a report prepared by Bank staff under the guidance of the then Monetary Policy Committee in response to suggestions by the Treasury Committee of the House of Commons and the House of Lords Select Committee on the Monetary Policy Committee of the Bank of England, *Bank of England Quarterly Bulletin*, May 1999, pages 161–70.

(3) See Davey, M (2001), 'Saving, wealth and consumption', *Bank of England Quarterly Bulletin*, Spring, pages 91–99.

purposes.⁽¹⁾ But the value of collateral can be important for corporate borrowers too.

The value of collateral can change for many reasons. But one factor will be monetary policy itself. If monetary policy is tightened, one way in which it has its effect on the economy is to lower the value of collateral and to make loans more expensive or difficult to obtain at all. This is sometimes called the ‘credit channel’ of monetary policy.⁽²⁾ But its strength depends on circumstances. If collateral is plentiful, a fall in asset prices that still leaves a comfortable cushion of collateral may have no impact at all. If balance sheets are more stretched, the impact may be considerable.

Asset prices as information for policy-makers

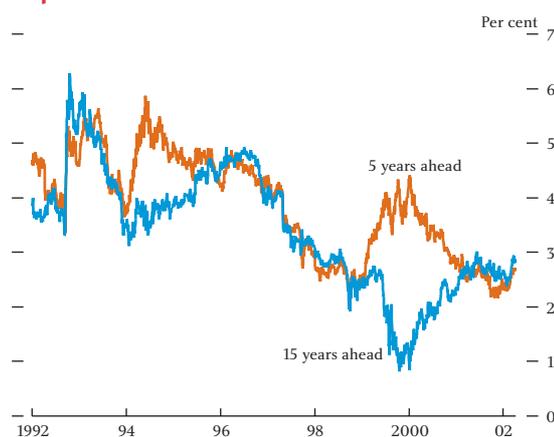
As noted earlier, asset markets are forward-looking. Assets are held because they will earn a return in the future. So the prices at which assets trade reflect in part the views of market participants about the future state of the world. The market’s view of the future, if we can work it out from market prices, can thus be compared and contrasted with the Monetary Policy Committee’s own projections, incorporated in its *Inflation Report* forecast. Indeed the path of short-term interest rates implicit in market prices reflects in part market expectations of the MPC’s own future behaviour in setting interest rates.⁽³⁾

Changes in asset prices are potentially informative also. Policy has to react to what the economic jargon calls ‘shocks’—unexpected developments that were not incorporated in policy-makers’ forecasts. Because asset prices at any one time incorporate the market’s view of the future, changes in asset prices largely reflect ‘news’—developments which the markets had not previously expected. So asset price movements may help policy-makers to identify the shocks that are hitting the economy, and that may affect their view of the outlook and hence of the required stance of policy.⁽⁴⁾

In practice judgment is required in interpreting market information in this way. Take the case of inflation expectations. In principle we have a fairly

straightforward way to set about deriving the market’s expectations. That is because in this country the Government issues two sorts of bonds. There are conventional bonds in which the Government promises fixed amounts of money as interest and capital repayment. And there are indexed bonds in which the interest and capital repayment are indexed to the Retail Prices Index (RPI). The relative yields at which these two forms of debt trade clearly depend, in part, on expectations of future movements in the RPI. On certain assumptions we can back out from relative yields the future inflation rates they imply.⁽⁵⁾ Chart 3 shows implicit twelve-month inflation rates five and 15 years ahead as they appeared over the past decade. Sometimes the interpretation of these implied future inflation rates appears straightforward. For example they jumped up in September 1992, when sterling left the Exchange Rate Mechanism of the European Monetary System. The fall in the exchange rate was seen as adding to inflationary pressures. By contrast on the day the Government announced operational independence in monetary policy for the Bank of England these implied future inflation rates fell by up to about half a percentage point. They then drifted down to around 2½% over the next year. But through 1999 implied inflation rates for a few years ahead increased again to over 4%, even though there was no such increase in direct surveys of inflation expectations. And a bond-implied inflation rates for the more distant future

Chart 3
Implied twelve-month inflation forward rates



(1) See Davey, M (2001), ‘Mortgage equity withdrawal and consumption’, *Bank of England Quarterly Bulletin*, Spring, pages 100–03.

(2) See three articles in the *Bank of England Quarterly Bulletin*, Winter 2001, Hall, S, ‘Credit channel effects in the monetary transmission mechanism’, (pages 442–48), Hall, S, ‘Financial effects on corporate investment in UK business cycles’, (pages 449–59), and Aoki, K, Proudman, J and Vlieghe, G, ‘Why house prices matter’, (pages 460–68).

(3) See Brooke, M, Cooper, N and Scholtes, C (2000), ‘Inferring market interest rate expectations from money market rates’, *Bank of England Quarterly Bulletin*, November, pages 392–402.

(4) See Clare, A and Courtenay, R (2001), ‘Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes’, *Bank of England Working Paper no. 125*.

(5) See Scholtes, C (2002), ‘On market-based measures of inflation expectations’, *Bank of England Quarterly Bulletin*, Spring, pages 67–77.

Briefing the Monetary Policy Committee

Asset market developments are monitored continuously by Bank staff and by outside commentators. Members of the Monetary Policy Committee have access to many reports from inside and outside the Bank.

Before each policy meeting, usually on the Friday morning of the previous week, MPC members attend a half-day meeting ('pre-MPC') at which senior Bank staff give a series of presentations on key economic and financial developments over the past month. Briefing on asset price developments is normally included in presentations on the international environment and on domestic monetary and financial conditions, and house prices are often covered in a presentation on domestic demand and output. In addition, the views of financial market participants, particularly on interest and exchange rate developments and prospects, are covered in a presentation from the Bank's Monetary Operations area.

In the pre-MPC meeting, the focus is on extracting information relevant to the Committee's policy decision. Do changes in market interest rates mean that markets have revised their views on future output or inflation at home or abroad, or on the likely stance of policy? Can exchange rate movements be explained in terms of relative changes in monetary conditions in different countries, or in terms of specific capital flows (eg connected with mergers and acquisitions, or portfolio shifts)? What do changes in

equity prices mean for future profitability or activity in different economies or different sectors of industry? Can different measures of house prices be reconciled, and what do they indicate for households' wealth and spending? Have particular economic data releases or policy announcements had an especially large impact on asset markets? At times particular attention may be paid to individual markets—for example oil futures contracts or options on those contracts—but it is often the pattern of movements across many markets that may be most suggestive of the underlying news in asset prices.

Ahead of the pre-MPC meeting each MPC member receives a standardised briefing pack of charts and tables, including many dealing with asset prices and interest rates. The pack and the pre-MPC presentations are updated for market developments between pre-MPC and the policy meeting, and any questions on asset prices arising at the pre-MPC meeting are answered by the staff.

Four times a year the Committee's forecast and the associated *Inflation Report* are produced. As part of that process the staff provide the Committee with a Quarterly Financial Assessment which considers asset market developments over a somewhat longer time-frame and which quantifies as far as possible the outlook for UK output and inflation implicit in financial market prices, and also uses financial market data to assess the risks around central forecasts.

fell to remarkably low levels (sometimes as low as 1%). Since then future inflation rates implied by relative bond prices have come closer together again at around 2¹/₂%.

What can explain these movements? Institutional investors including pension funds are large holders of British Government bonds. The Minimum Funding Requirement (MFR) for pension funds was coming into effect in the late 1990s and then possible reform to the MFR was increasingly discussed. It seems quite likely that these developments had a significant impact on bond yields so that the apparent economic information from the market was distorted by institutional factors.⁽¹⁾

Other cases where care is required include house and equity prices. House prices can give some insight into households' expectations of their future income, because the ability to service mortgage payments out of future income will influence how much people are willing to spend on acquiring a house today. But the price of housing also reflects a number of other things. Demographic and other social factors also influence the demand for housing, and changes in the degree of competition in the supply of mortgage finance and in tax incentives in favour of owner-occupation have likewise been important in the past. And, for example, changes in planning regulation affect housing supply.

(1) See Cooper, N and Scholtes, C (2001), 'Government bond markets in an era of dwindling supply' in: 'The changing shape of fixed income markets: a collection of papers by central bank economists', *BIS Paper*, No. 5, pages 147–69.

Valuing equities is notoriously difficult. Movements in share prices depend on prospects for the relevant companies. Investors and market analysts scrutinise the outlook for individual companies so that share prices are in principle summarising a mass of detailed information that could well be of interest to the MPC—not only on the economy as a whole but also on particular sectors. Movements in equity prices in recent years, particularly in the United States, appear to have reflected changing perceptions of future productivity growth. For markets, productivity growth matters because it affects future corporate earnings and dividends. To policy-makers it matters because it helps determine the rate at which the economy can grow without putting upward pressure on inflation. However, equity values depend not only on future streams of earnings or dividends, but also on the rate at which they are discounted, including any allowance for the risk involved. If equities come to be seen as less risky that would raise share prices, even if there was no change in the view taken of future earnings or dividends.⁽¹⁾ In practice, the links between equity price movements themselves and subsequent developments in the macroeconomy appear to be not stable enough to form the basis of reliable forecasts of, for example, inflation or output.⁽²⁾ But information from the markets may nevertheless provide some information on the ‘shocks’ hitting the economy.⁽³⁾

Chart 4
FTSE All-Share index



The United Kingdom is integrated into the wider world economy. Inflation and output in this country are clearly influenced by developments abroad and so are movements in UK asset prices. Care may therefore be needed in weighing the significance of UK asset price movements for domestic prospects. Many large UK companies have interests overseas, and movements in UK equity prices may reflect prospects for overseas subsidiaries as well as domestic activity. Moreover, there is evidence that the strength of international influences on domestic financial markets varies over time, being especially high at times of financial market stress.⁽⁴⁾

Exchange rates are the price of one currency in terms of another. So there is a wide range of factors in this country and abroad that in principle bear on sterling's exchange rates against other currencies. But quantifying the effect of each has often proved very hard. The largest recent movement in sterling occurred in the second half of 1996 (ie just before the establishment of the MPC) and was analysed by Bank staff in the *Inflation Report* of February 1997. The factors considered were monetary and fiscal policy at home and abroad, portfolio shifts associated with the prospect of EMU, movements in the oil price, possible shifts in the demand for UK goods in world markets, and possible improvements in productivity in UK industries producing internationally tradable goods and services. The implications for inflation of each of these factors could be quite different, but it was hard to know how important each of them was. Exchange rate movements since the establishment of the MPC have been less extreme, but often equally difficult to interpret, as can be seen, for example, in the discussion in the Minutes of the February 2000 MPC meeting.⁽⁵⁾ One way of tackling this topic is to use theory to consider the pattern of exchange rates, other asset prices and capital flows that might be expected following a particular change in one of the underlying factors, and then to see how far that pattern matches developments in the real world.⁽⁶⁾

The future is inherently uncertain, and so asset prices depend on their holders' attitude to uncertainty or risk. Future dividends from equities are clearly uncertain and

(1) See Panigirtzoglou, N and Scammell, R (2002), 'Analysts' earnings forecasts and equity valuations', *Bank of England Quarterly Bulletin*, Spring, pages 59–66.

(2) See Hayes, S (2001), 'Leading indicator information in UK equity prices: an assessment of economic tracking portfolios', *Bank of England Working Paper no. 137*.

(3) See Clare, A (2001), 'The information in UK company profit warnings', *Bank of England Quarterly Bulletin*, Spring, pages 104–09.

(4) For the case of bond markets see Clare, A and Lekkos, I (2000), 'An analysis of the relationship between international bond markets', *Bank of England Working Paper no. 123*.

(5) Paragraphs 2–6.

(6) For an example of this approach see Bailey, A, Millard, S and Wells, S (2001), 'Capital flows and exchange rates', *Bank of England Quarterly Bulletin*, Autumn, pages 310–18. The underlying factor considered in this article is a change in US productivity.

equity-holders may require a higher return from equities to compensate them for bearing this risk. But bond-holders may be affected too. The holder of a conventional bond may be concerned not only with the expected rate of inflation, which will erode the real value of future cash receipts from the bond, but also with the fact that future inflation is uncertain, so that the real return is uncertain too.

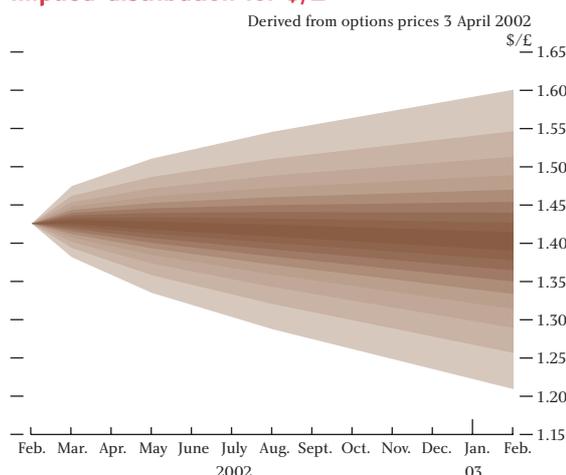
This means that asset prices can change for a number of different reasons.

- Market participants' best assessment of the future may have changed because their view of the economy has changed;
- because their view of the MPC has changed;
- market participants' view of the future may have become more or less diffuse (risky);
- market participants may be more or less comfortable about bearing risk.

The Monetary Policy Committee may be interested in all of these elements, and may wish to take account of them in different ways. But unscrambling the different elements from observed asset prices is rarely easy.

Some financial instruments, options, are particularly related to risk. They are designed to put a value on the risk of future movements in the price of an underlying asset, which is often a financial instrument, such as an equity or foreign exchange, but can also be a physical commodity such as oil.⁽¹⁾ From options prices we can, under certain assumptions, infer 'distributions' of future equity or oil prices, exchange rates etc, rather like the fan charts which express the MPC's own uncertainty about future inflation or about GDP growth.⁽²⁾ Chart 5 shows the implied probability of the sterling/dollar exchange rate falling into different ranges, as given by options prices earlier this year. Market views of risk can help inform the MPC's own judgment of risk, particularly of course when the Committee is concerned with asset markets as a source of risk to the economic outlook.

Chart 5
A foreign exchange 'fan chart'
Implied distribution for \$/£^(a)



(a) The chart shows the probability of the sterling/dollar exchange rate lying in certain ranges at future dates, as implied by foreign exchange options prices. The darkest band of the fan chart contains the modal outcome and covers 10% of the probability. Each successive pair of bands is drawn to cover a further 10% of the probability until 90% is covered.

As noted above, asset prices move for a variety of reasons, which may have different implications for the inflation outlook. So it is not surprising that attempts to forecast inflation on the basis of purely statistical relationships with asset prices have by and large not been successful.⁽³⁾

Asset prices and monetary policy decisions

Asset prices are part of the information on which the MPC bases its view of inflation prospects. In that sense they clearly feed into monetary policy decisions. But economists and policy-makers also debate whether asset prices should feed into policy decisions more directly, and not just through the inflation forecast. The debate is not completed.

The case for taking asset prices directly into account generally rests on the possibility of asset price 'bubbles', that is episodes in which asset prices move away from the level that would be compatible with fundamental economic forces and then, when the 'bubble' bursts, come back into line. The UK house price boom of the late 1980s and the 'irrational exuberance' in world equity markets in the 1990s might be candidate episodes. In

(1) Options give the right, but not the obligation, to buy or sell the underlying asset at a point in the future at a price set now (the strike price). An option to buy only has value if there is a chance that the underlying asset will be worth more than the strike price when the option comes to be exercised. So by examining prices of options at different strike prices we can form a view on the probability that the price of the underlying asset will be in different ranges.

(2) See Clews, R, Panigirtzoglou, N and Proudman, J (2000), 'Recent developments in extracting information from options markets', *Bank of England Quarterly Bulletin*, February, pages 50–60.

(3) See, for example, the treatment of asset prices in Cecchetti, S G, Chu, R S and Steindel, S (2000), 'The unreliability of inflation indicators', *Federal Reserve Bank of New York, Current Issues in Economics and Finance*, April and Stock, J H and Watson, M W (2001), 'Forecasting output and inflation: the role of asset prices', manuscript, *NBER Working Paper No. 8180*.

MPC analysis

In March 2001, equity prices fell sharply in the United Kingdom, the United States and in the euro area. The following extract from the Minutes of the MPC's meeting on 4–5 April shows the range of factors that went into the Committee's analysis of these developments.

'The size of these falls in equity prices could not plausibly reflect changes in risk-free real interest rates, but instead indicated lower expected profits and, perhaps, a higher equity risk premium associated with greater uncertainty about future returns. In the United States, options prices suggested that market participants now attached a higher probability than before to further sharp falls in equity prices. The declines already seen would tend to restrain the growth of private consumption (through the effects on personal sector wealth), of

investment (through the effects on the cost of capital), and of exports, since this was a global phenomenon.

Given the volatility of equity prices, the recent falls need not imply that there had been a major change in longer-term prospects for US productivity growth. They might instead represent a correction to earlier over-optimistic expectations of earnings growth for individual companies, or indeed an overshooting on the downside. In the United States, downside risks to equity prices remained: price to earnings ratios were still above historical averages. UK profit warnings, meanwhile, remained high compared with a year ago and were widely distributed across sectors, with an increasing number of firms citing the US slowdown as the reason for the revision downwards to their expected profits.'

'bubbles', asset markets become an independent source of economic instability. Households that see their wealth rise with house or equity prices may save less, only to have to save more when the 'bubble' bursts. Firms that could sell equity at high prices in the late 1990s invested in projects that would not have seemed worthwhile before or since.

If asset price bubbles destabilise the economy they may also destabilise the inflation rate. Since the target which the Chancellor has set for the MPC is 2¹/₂% 'at all times', there is an obvious case for policy attempting to head off the impact that asset price bubbles might have on inflation. If bubbles tend to grow when left unchecked, that may strengthen the case for giving them special attention in the policy process and for using monetary policy to prick them early on. Some have argued that central banks can recognise asset price bubbles and should react to them. A policy of this kind, it is said, would make misalignments less likely to arise in the first place.⁽¹⁾ Others question whether policies of this kind are feasible at all—whether bubbles can be recognised in time and whether the policy action needed to prick them can be defined with any accuracy.⁽²⁾

Asset prices and the inflation target

The inflation target set for the MPC is expressed in terms of the twelve-month change in the retail prices index excluding mortgage interest payments (RPIX). House prices are the only asset prices that enter directly into the calculation of RPIX. They are used to proxy the cost of depreciation to owner-occupiers (with a weight of just over 4% in the index) and in the calculation of ground rents and estate agents' fees (with smaller weights). But some have argued that asset prices should play a much larger role. The twelve-month change in RPIX can be thought of, more or less, as the current change in the cost of living. But some have argued that what matters to consumers is the value of money in a more general sense, including both the current and *future* cost of living.⁽³⁾ If inflation falls today, but people expect it to be much higher in the future, they may consider that inflationary conditions have worsened overall, so that looking only at *current* inflation would be misleading.

Asset prices come into this discussion because it is obviously very hard to measure 'future inflation' directly.

(1) See Cecchetti, S G, Genberg, H, Lipsky, J and Wadhvani, S (2000), 'Asset prices and central bank policy', *Geneva Reports on the World Economy*, 2 and Cecchetti, S G, Genberg, H and Wadhvani, S (2002), 'Asset prices in a flexible inflation targeting framework', available on the Bank of England web site, www.bankofengland.co.uk/assetprices.pdf

(2) See Bernanke, B S and Gertler, M (2001), 'Should central banks respond to movements in asset prices?', *American Economic Review*, May, pages 255–57.

(3) See, for example, Goodhart, C (1999), 'Time, inflation and asset prices', *LSE Financial Markets Group Special Paper*, No. 117. For a sceptical view see Filardo, A J (2000), 'Monetary policy and asset prices', *Federal Reserve Bank of Kansas City Economic Review*, Third Quarter, pages 11–37.

There are some commodities in which it is possible to fix a price today for, say, a barrel of oil to be delivered in the future. But such futures markets cover only a limited range of commodities and limited periods into the future. Some have argued that asset prices can fill this gap.⁽¹⁾ The idea is that assets represent a claim on the future consumption of goods and services. If the prices of future goods and services rise so too will the current prices of all assets taken together. But this is true only of a very theoretical, all-embracing definition of 'assets'—including 'human capital', the present value of people's future wages and salaries. There is no reason to suppose that it is necessarily true of assets which are actually traded and whose prices we can observe.

In practice, UK official statisticians have not chosen to use asset prices to measure future prices of goods and services. So there is no ready-made index of current and future inflation that could be substituted for RPIX in the MPC's target. (The definition of the target is in any case a matter for the Chancellor of the Exchequer and for Parliament and not for the Bank or the MPC.) However, although the target is defined in terms of a measure of current inflation only, the target applies at all

times, and in this sense future inflation *is* included in the MPC's remit. Indeed it may take up to two years for the MPC's policy actions to have the bulk of their effect, so interest rates are set with future inflation in mind. And the current policy framework as a whole may have an impact much further into the future, if people expect that similar anti-inflationary policies will be followed then.

Summary and conclusions

Asset markets are forward-looking and so is monetary policy. Market participants and MPC members need to form a view on many topics in common. But asset markets are just part of the wider economy. They have an impact on the real economy, but they also react to developments elsewhere, including monetary policy. It makes sense to interpret asset price movements in the light of other information on the economy. But they rarely give simple unequivocal messages for policy on their own—the links between asset prices and inflation depend on the circumstances. For this reason asset prices are unlikely to be suitable as intermediate targets for a policy whose main aim is to control inflation.

(1) Much of the debate stems from Alchian, A A and Klein, B (1973), 'On a correct measure of inflation', *Journal of Money, Credit and Banking*, February, pages 173–91.

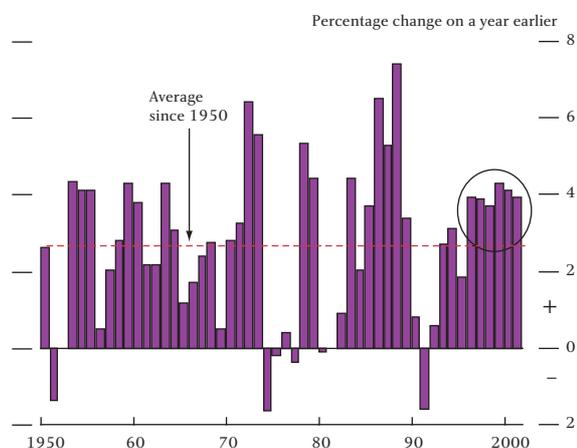
Durables and the recent strength of household spending

By Robert Hamilton of the Bank's Structural Economic Analysis Division and Beverley Morris of the Bank's Inflation Report and Bulletin Division.

Household consumption in the United Kingdom grew by about 4% during 2001. This was largely accounted for by unusually strong spending on durable goods—growth in spending on other goods and services slowed to around a six-year low. This article discusses why spending on durable goods needs to be analysed differently from that on other types of goods, and provides some possible explanations for its recent unusual strength. In addition, an alternative estimate of consumption is presented that replaces the expenditure on durable goods with the flow of services derived from them. Over the past year, this alternative measure has grown less strongly than the standard expenditure series.

Real household consumption in the United Kingdom increased by about 4% during 2001. This was the sixth consecutive year of above-average growth—the longest above-trend period over the past five decades (see Chart 1).

Chart 1
Household consumption



During the second half of the 1990s, consumer spending was boosted by robust growth in households' real disposable incomes, as well as strong gains in household wealth, particularly from increases in house prices.⁽¹⁾

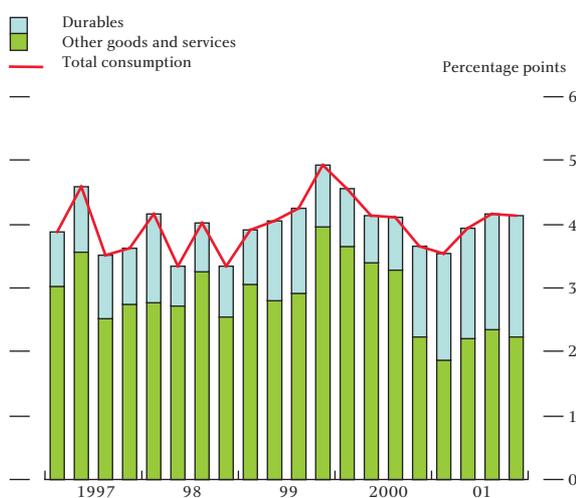
However, the continued strength of consumption growth in 2001 was surprising. For example, the Bank of England's August 2000 *Inflation Report* expressed the

MPC's view that 'consumption growth is likely to moderate from its high levels in recent years'.

Consumption growth and the strength of spending on durable goods

Much of the recent buoyancy of consumer spending has been accounted for by particularly rapid growth in spending on durable goods.⁽²⁾ Despite making up about 15% of total consumer spending, durables accounted for around half the growth in consumption during 2001 (see Chart 2).

Chart 2
Contribution to annual consumption growth



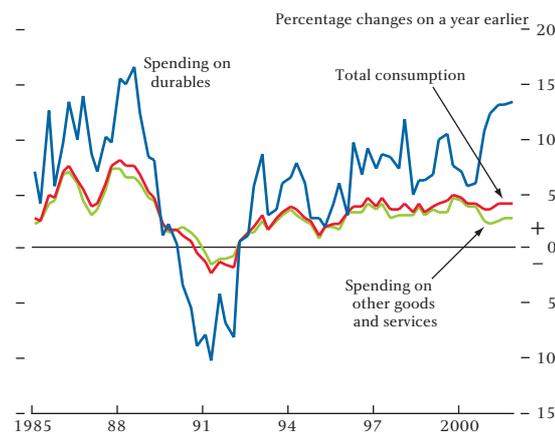
(1) See Aoki *et al* (2001) for more explanation of the transmission mechanism from house prices to consumption.

(2) Note that the Office for National Statistics' (ONS) constant price aggregates for the United Kingdom are produced on a 'fixed-weight' basis (Office for National Statistics (1998)). That is, the components of a series (such as consumption) are aggregated using weights that are only changed at periodic intervals. The ONS is planning to introduce a 'chain-linked' system, which uses annually updated weights, with the publication of the 2003 *Blue Book*. The wedge between the growth rates of consumption and durables expenditure in recent years may be less pronounced in this new system. See Tuke and Reed (2001) and Whelan (2000) for further details.

Annual growth in durables spending was above 12% throughout most of 2001. Such strength is particularly unusual, and was last exceeded in 1988 when GDP growth was higher than at any time during the past 30 years.

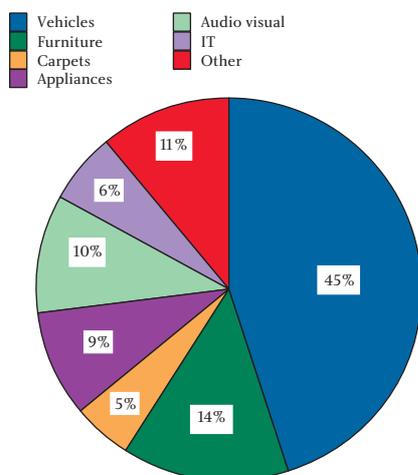
In contrast to the strong spending on durables, households' spending on other goods and services has slowed significantly, with growth in 2001 around its lowest rate for six years (see Chart 3).

Chart 3
Consumer spending (constant prices)



Vehicles accounted for a little under half the value of all durables spending in 2001 (see Chart 4). Furniture, carpets and household appliances together explained about a quarter of expenditure. Audio-visual and IT equipment contributed about 15% to spending, while

Chart 4
Expenditure breakdown of durables consumption in 2001^(a)



(a) Measured in current prices.

other goods, which include jewellery and watches, made up the remainder.

Why are we focusing on durable goods?

Durable goods tend to last for several periods and can be used repeatedly. This makes them rather different from most other consumption goods, which are usually consumed relatively quickly.⁽¹⁾

The long-lasting nature of durable goods means that they have some of the attributes of an asset, as they provide consumers with a flow of services over a number of future periods. But in the National Accounts, consumption of durable goods is measured by the expenditure on new purchases. This ensures consistency with most other parts of the accounts, which are produced on a similar basis.

A 'flow-of-services' measure of consumption

Although measurement of the expenditure on consumer goods and services is clearly important in determining the extent of household demand in the economy, additional insight may be gained by recognising that households' behaviour will also depend on the flow of services they receive from the durable goods that they already own. In other words, the existence of a stock of durable goods that provides services for long periods means that past decisions may affect present consumption behaviour. In this article, we present an alternative 'flow-of-services' estimate of consumption that attempts to measure the goods and services consumed in each period.

The (constant price) flow of services from durable goods is calculated using the average lifetime of the goods and the value of expenditure on them in each period.⁽²⁾ The flow of services from each good is assumed to be equal in each period of its life. Thus a good that originally had a value of ten units and lasts for ten years is assumed to generate a flow of real services of one unit per year. In this exercise, different goods have different

Table A
Service-life assumptions in years^(a)

Audio-visual goods	8
Household appliances	10
Carpets	20
Furniture	25
Information technology	5
Vehicles	10
Other durables	10

(a) From Williams (1998).

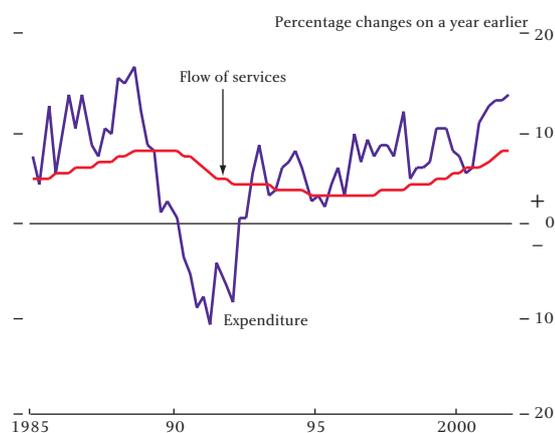
(1) Semi-durables, which include clothing and books, can also be used repeatedly for several periods, although they typically have shorter lifespans than durable goods and/or are less expensive.

(2) We follow the procedures used by Williams (1998). The approach is often referred to as the 'perpetual inventory model'.

average lifetimes, although these are assumed to have remained unchanged over time (see Table A).

The flow-of-services measure of durables consumption is significantly less volatile and far less cyclical than the standard National Accounts expenditure measure (see Chart 5). This is unsurprising because the methodology in effect spreads the expenditure on durable purchases over the lifetime of the goods. The level of services derived from durables has tended to be lower than the expenditure on the goods, reflecting the growth of expenditure on durables over time.

Chart 5
Durables: expenditure and flow of services



The service-life assumptions adopted are the medium life-length assumptions recommended in Williams (1998). They are also similar to those used by the Bureau for Economic Analysis (BEA) for the United States. Table B shows the growth rate of the flow-of-services measure of durables consumption if the medium service-life assumptions used in this article are replaced with the long or short life assumptions, also provided by Williams (1998). All variants grew by considerably less than the standard expenditure measure in 2001.

Table B
Durables growth in 2001 under alternative service-life assumptions

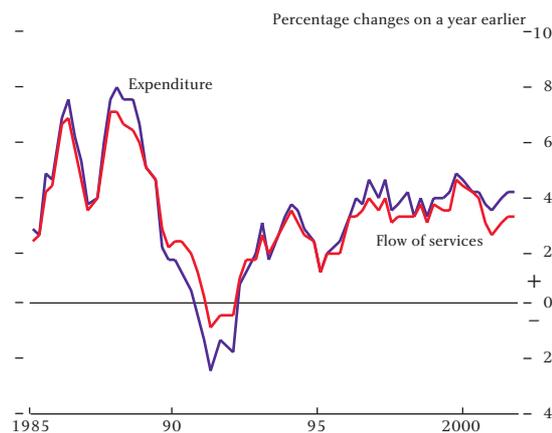
Short	9.6
Medium	7.9
Long	6.7
Expenditure	13.4

A flow-of-services measure of total consumption (C^{flow}) can be calculated from the standard expenditure measure (C^{exp}) by removing expenditure on new durable goods (D^{exp}) and replacing it with the flow of services from the stock of durable goods discussed above (D^{flow}):

$$C^{flow} = C^{exp} - D^{exp} + D^{flow}$$

Chart 6 shows that growth in the flow-of-services measure of consumption has slowed markedly since 2000. Such a slowdown might have been expected given movements in the main determinants of consumption, which include current household wealth and income (Bank of England (2000)).

Chart 6
Consumption: expenditure and flow-of-services measures



Why has durables spending been so strong?

(a) Relative price movements

One of the most persuasive explanations for the strength of consumption of durable goods (in constant prices) is that they have experienced a fall in their price relative to the price of other consumption. And, as the relative price of durable goods has declined, consumers have substituted towards these goods.

As shown in Chart 7, although expenditure on durables has trended upwards as a proportion of total consumption in constant prices (using National Accounts expenditure deflators), the ratio has remained relatively stable when measured in current prices.

This suggests that much of the current level of real durables expenditure reflects relative price movements. Indeed, under a number of simplifying assumptions, standard price theory suggests that the current price share should remain roughly constant over time, with the increase in volume purchased offsetting the reduction in the price (Varian (1992)).⁽¹⁾

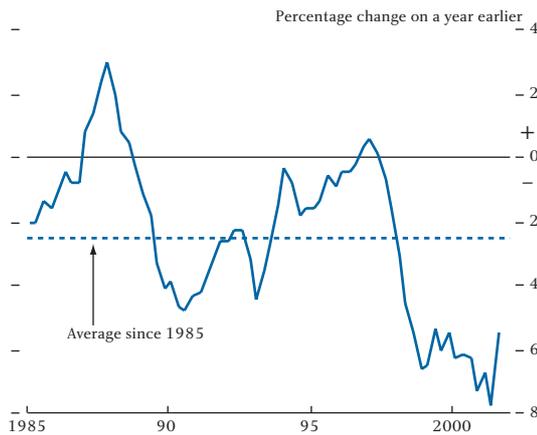
(1) One criticism of this theory is that it disregards the notion of satiation. That is, even in the presence of continuing falls in relative prices, consumers may decide that the number of durable items they hold is sufficient.

Chart 7
Share of durables in total consumption



The recent exceptionally strong growth of durables spending may therefore be because relative prices have fallen particularly quickly over the past two or three years (see Chart 8).

Chart 8
Relative price of durable goods^(a)



(a) Ratio of price deflator of durable goods to that of other consumer goods and services.

Chart 9 shows that, although growth of different durable goods' components in current prices has been broadly similar, relative price movements have caused a large degree of variation in the constant price growth rates.

The decline in prices was particularly marked for IT goods, where the deflator fell by 20% in 2001. This partly reflected the increase in the quality of these goods, rather than a fall in their price per physical unit.

But even after taking into account relative price movements, recent expenditure on durables has been relatively strong. Chart 10 shows that growth in expenditure on durables in 2001 as measured in current prices was almost twice as strong as that on other

Chart 9
Durables spending in 2001

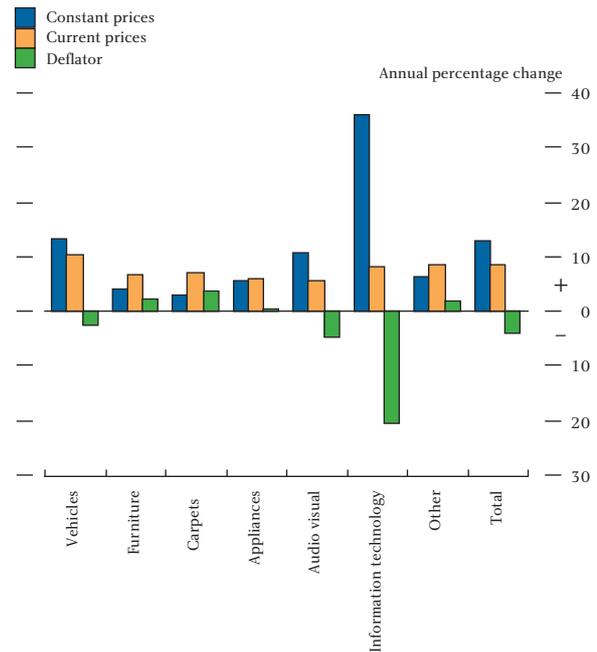
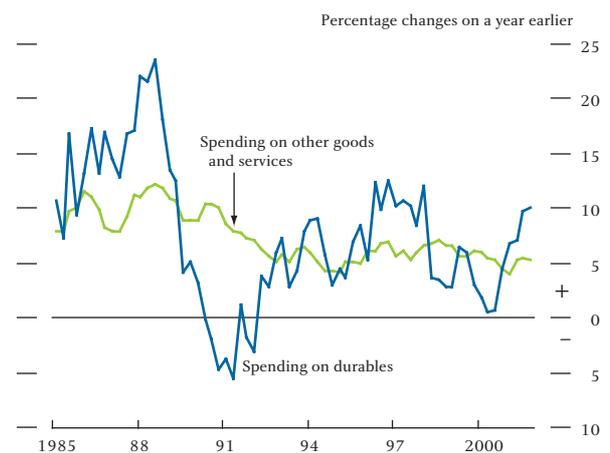


Chart 10
Consumer spending (current prices)



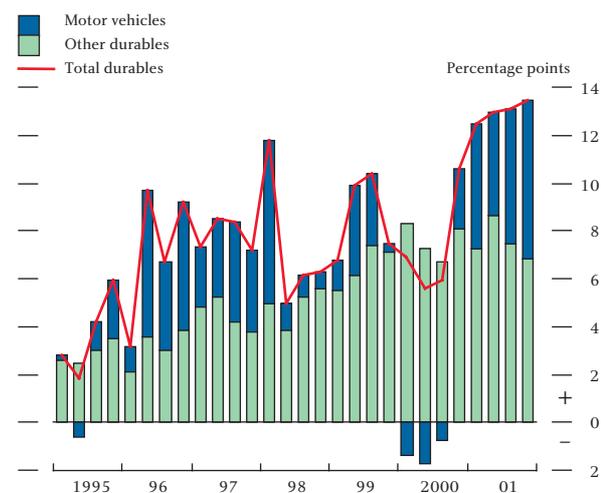
consumption. What other explanations are there for this strength?

(b) Delayed expenditure on vehicles

Some of the recent strength in durables spending can be attributed to the pick-up in expenditure on motor vehicles, following a period of unusually subdued spending during 1999–2000 (see Chart 11).

In addition to possibly being related to some of the other factors discussed in this section, the pattern of vehicle expenditure may have been influenced by the Competition Commission's inquiry into UK car retailing. Households may have delayed their purchases in the expectation that the inquiry would ultimately lead to a reduction in car prices.

Chart 11
Contribution of vehicles to annual growth in durables spending (in constant prices)



Following the publication of the Commission's Report, car producers were required to offer retailers volume-related discounts, equivalent to those offered to fleet buyers, by 1 December 2000. Around this time, new car prices fell considerably and expenditure on cars started to pick up. The flow-of-services measure of consumption presented earlier helps smooth through the effects of such temporary shifts in expenditure.

(c) Lower interest rates

Lower interest rates may allow individuals to fund additional expenditure on durable goods through borrowing. A reduction in nominal interest rates may have had a disproportionately large effect on durables spending, because purchases of these goods are more likely to be financed via borrowing than are other types of consumption.

(d) Strength of the housing market

There is a possible link between the housing market and the strength of durables spending (Carruth and Henley (1992)). In addition to the possibility that furniture, carpets and household appliances may be bought by those having recently moved home, 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 (mortgage equity withdrawal or MEW) is generally cheaper than borrowing via a personal loan or on a credit card. So an increase in house prices raises

the amount of collateral available to homeowners, which in turn may encourage them to borrow more to finance desired levels of consumption.

Data on the uses of MEW by UK households show that by far the largest proportion of consumption-related spending is accounted for by spending on 'new goods for the property'.⁽¹⁾ So the recent strong growth in durables spending may in part be linked to the recent high rates of house price inflation.

(e) A perceived increase in future income growth

If households have recently come to believe that their financial situation is healthier than previously thought, they may have decided to increase the flow of services that they receive from durable goods. In order to do this, they may have had to increase their current expenditure on these goods very sharply. For example, increasing the flow of consumption services by one unit from a good lasting ten years would require expenditure of ten units now.

The resulting 'bunching' in the timing of purchases caused by the desire to reach a higher flow of services from durables can generate an initial aggregate consumption boom. Growth would be likely to slow following such a boom, once households reached their new desired stock.

Conclusions

The estimated flow-of-services measure of consumption has grown considerably less rapidly than the standard expenditure series over the past year, as consumers have significantly increased their purchases of durable-type goods.

Much of the recent strength of durables can be considered a natural response by households to relative price movements. If the relative price of durables continues to fall, the upward trend in the durables share of consumption, and the relatively strong (constant price) growth in durables spending may be sustained. However, any weakening in the rate of decline of relative prices is likely to be accompanied by some slowdown in durables spending growth.

Some of the current strength of durables spending also appears to reflect the delayed purchase of vehicles. As

(1) See Davey (2001) for more details.

such, growth in durables spending should weaken once households' stock of vehicles has returned to more 'normal' levels.

It is also possible that the reductions in interest rates, or a perceived increase in future income, have temporarily increased households' desire to purchase durable goods. These factors also suggest that durables spending may weaken once the new higher desired level of durables is reached.

But the effect of any slowdown in durables spending growth on measured aggregate consumption expenditure is difficult to gauge. Aggregate consumption growth could slow sharply, given the current weakness of spending on other goods and services. But part of the current weakness in non-durables spending might reflect substitution towards durables. So any slowdown in durables spending may be accompanied by some offsetting rise elsewhere. If so, any slowdown in aggregate consumption would be more muted.

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Working time in the United Kingdom: evidence from the Labour Force Survey

By Fergal Shortall of the Bank's Structural Economic Analysis Division.

This article examines the evolution of working time from a macroeconomic perspective using data from the Labour Force Survey. Its main findings can be summarised as follows:

- *Once one abstracts from the effects of overtime, average hours worked are still falling. This can largely be accounted for by the rise in the proportion of part-time workers (though recent changes in full-timers' and part-timers' hours remain puzzling).*
- *Above and beyond the full-time/part-time split, changes in employment composition by industry, gender, occupation, employment status and age explain little of this downward trend.*
- *Overtime has shifted from being paid towards being unpaid. Changes in the occupational mix can account for some of this shift.*
- *Paid overtime is the only component of hours that exhibits strong cyclicalities. All other components lag GDP and in some cases lag employment too. This is consistent with aggregate changes in hours being the result of compositional effects (for example, changes in the shares of long-hours and short-hours workers), rather than those in the same job changing their hours.*

Introduction

There are two principal reasons why the behaviour of working time is of macroeconomic interest. First, hours worked per person are one of the margins along which labour usage can expand and contract, and therefore form part of the economy's productive inputs. Knowledge of the longer-run trend in average hours is useful in judging the supply potential of the economy. Similarly, actual output may be less than potential because average hours worked are below their trend level. Establishing how often this occurs, how long it persists and how it interacts with other variables may help to understand the business cycle. Second, economic theory suggests that average hours worked may be one of the first observable variables to react to shocks—if there are costs to reducing employment, a firm's initial response to adverse operating conditions may often be to decrease the hours worked by existing staff. Movements in average hours could then contain information about the future evolution of employment and, by extension, of other macroeconomic variables.

With these two applications in mind, this article examines hours worked in the United Kingdom along a number of dimensions. After looking briefly at the

available data and what insights they can offer, the next section examines the time-series behaviour of average hours at an aggregate level. Particular attention is paid to cyclical patterns but with some regard also to structural trends. The article then looks at more disaggregated data (by gender, industry, occupation, etc). Though macroeconomists may have no inherent interest in the working practices of individual occupations, movements in a small number of categories may be driving aggregate trends. Alternatively, hours worked by the same individuals in the same jobs may not vary much, with aggregate movements being largely determined by changes in composition.

Consistent data on working time are available from the Labour Force Survey (LFS) since 1984 on an annual basis and since 1992 on a rolling-quarter basis. Though some authors have attempted to construct longer-run time series for average hours (most notably O'Mahony (1999) and O'Mahony and de Boer (2002)), and there are other sources of hours data at a lower frequency, the LFS remains the most comprehensive and most timely source of data on working time. In the survey, respondents are asked a series of questions on their working patterns, including their basic hours,

whether they work overtime and, if so, whether it is paid, and on hours worked in second jobs. The survey also distinguishes between hours actually worked in the previous week and hours 'usually' worked. This enables us to decompose the headline average hours figures published each month by the ONS (the average hours actually worked by respondents in the previous week in both main and second jobs) into their components (shown in Table A). By combining these responses with information on gender, age, occupation, etc, it is possible to account, at a quite detailed level, for movements in the aggregate variables. Though only a limited selection of data is published regularly by the ONS, all these characteristics can be extracted from the underlying micro data to give time-series and cross-sectional information from 1984 on an annual basis and from 1992 on a seasonal quarter basis (spring, summer, autumn and winter).⁽¹⁾

Table A
Components of working time available from the LFS

	Average hours worked per week in Winter 2001–02 (a)	
	Actual	Usual
Basic hours, main job only	30.0	34.9
+ Paid overtime hours, main job only	1.1	1.4
+ Unpaid overtime hours, main job only	1.1	1.4
= All hours worked, main job only	32.2	37.7
+ Hours worked in second job	0.4	n.a.
= All hours worked, main and second job	32.5	n.a.

n.a. = not available.

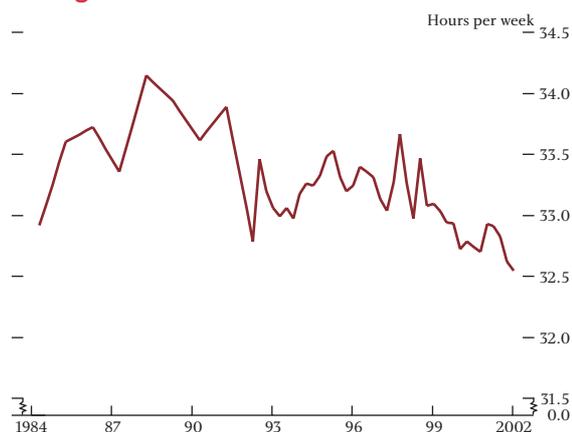
(a) Seasonally adjusted by the author.

Working patterns over time

All hours worked in main and second jobs

Chart 1 plots the headline average hours series from Spring 1984 to Winter 2001–02. Though we may think of the normal working week as being 40 hours long, sickness, holidays and part-time work mean that it is on average considerably shorter. Those in employment worked just over 32.5 hours per week on average in Winter 2001–02, down from a recent peak of 33.7 hours per week four years earlier. There is some evidence that hours worked are procyclical: the average rose during the mid-1980s as the economy expanded, reaching a peak in 1988, before falling back sharply in the early 1990s. The recovery of the mid-1990s was accompanied by a much less marked recovery in hours worked, however, which may indicate a dampening of their cyclical response.

Chart 1
Average actual hours worked^(a)

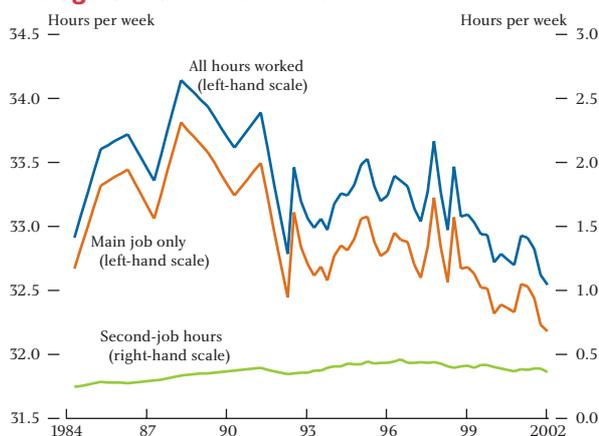


(a) Main and second job.

Main and second job hours

Chart 2 plots the headline hours measure alongside average hours worked in the main job only, and average second-job hours. The profile of main job hours is virtually identical to that of the headline variable: peaks and troughs occur at the same points, and the series are equally volatile. Second-job hours form just over 1% of all hours worked and show much less variation in absolute terms. It is unlikely therefore that they are a significant factor in aggregate movements. Indeed, most of the movement in average hours worked in second jobs has been a result of movements in the share of second jobs in total employment, rather than movements in the hours worked in those jobs, though they usually move in tandem.

Chart 2
Average actual hours worked



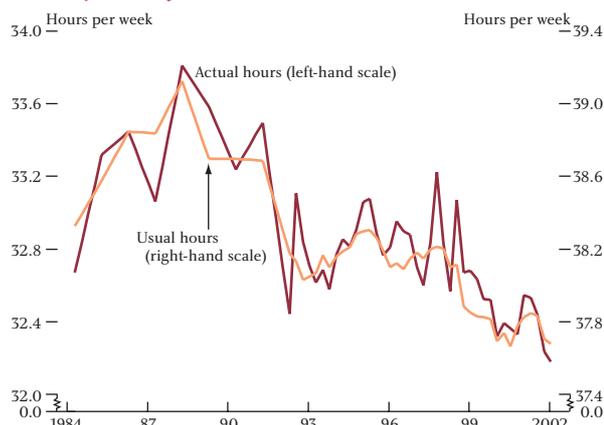
Actual versus usual hours

For the main job, the LFS also distinguishes between hours actually worked in the previous week and hours

(1) Data from the quarterly CDs have been seasonally adjusted using the US Census Bureau's X12 seasonal adjustment program in *EViews*. For this reason they may not match precisely the aggregate series published by the ONS.

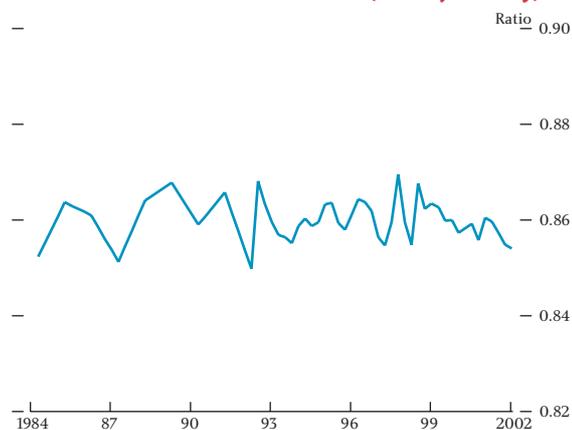
'usually' worked. The questionnaire does not give a definition of 'usual' hours, so it is not immediately clear how respondents interpret the term. One would expect average usual hours to exceed average actual hours, if only because the latter would include absences from work (holidays, sickness, etc). Chart 3 shows that actual and usual hours track each other quite closely once allowance is made for this difference in levels.

Chart 3
Average actual and usual hours worked (main job only)



In fact, the ratio of actual to usual hours has varied within a remarkably small range around 0.86 (see Chart 4) and it has little discernible pattern, be it secular or cyclical. Conceivably this could be due to recall or proxy-response bias: respondents may be more certain of the hours they work in a normal week than the hours they actually worked last week. It may well be the case that actual hours worked provide little or no useful information about the current state of working time above and beyond that contained in usual hours.

Chart 4
Ratio of actual to usual hours (main job only)



At the very least, movements in usual hours worked should help to interpret movements in actual hours since usual hours seem much smoother.

Basic versus overtime hours

It is clear, though, that there is some cyclical pattern in both usual and actual hours. The LFS allows us to go a step further in identifying the source of this cyclicity, by distinguishing between basic hours and overtime hours (both usual and actual). Chart 5 plots all usual hours in the main job and basic usual hours.⁽¹⁾ The gap between the two—usual overtime hours—is shown in Chart 6. There is less—if any—cyclical variation in basic hours, while overtime hours exhibit significant variation (this will be tested more formally later). Moreover, focusing on basic hours highlights the downward trend in the average working week. In contrast, there is no obvious trend in overtime.

Chart 5
Basic and all usual hours worked

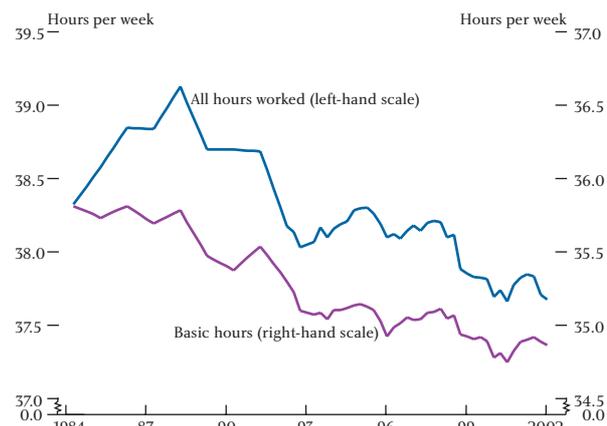
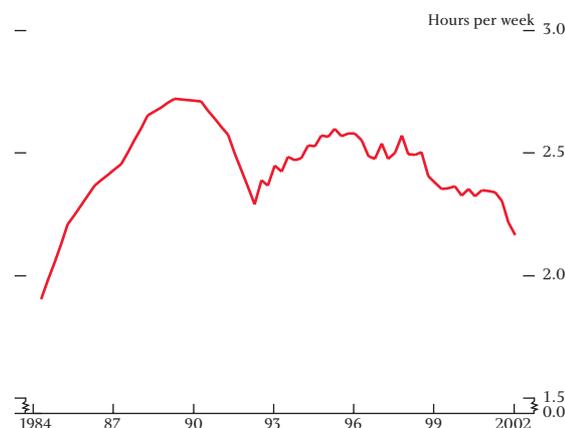


Chart 6
Usual overtime hours worked

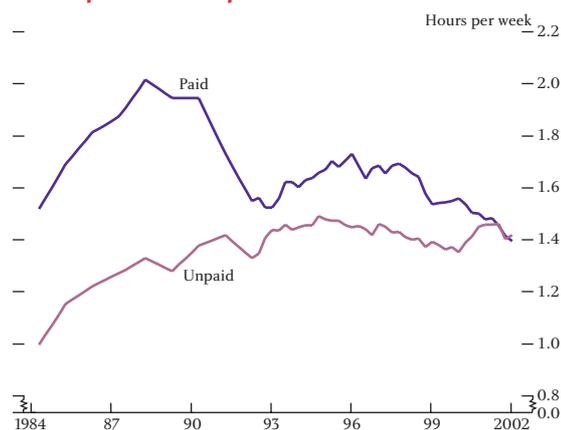


Overtime can in turn be decomposed into paid and unpaid hours (see Chart 7), and though there may be

(1) Since the difference between actual hours variables and their usual hours counterparts seems to reflect little more than spurious volatility, the remainder of this article focuses on usual hours concepts.

little evidence of an aggregate trend, this masks offsetting movements: average unpaid overtime is increasing over time, while average paid overtime may, if anything, be declining. Indeed, in Autumn 2001, average unpaid hours exceeded average paid hours for the first time.⁽¹⁾ Paid and unpaid overtime also differ in their cyclical pattern. Paid overtime is strongly procyclical, while unpaid overtime is only weakly so, if at all.

Chart 7
Usual paid and unpaid overtime hours



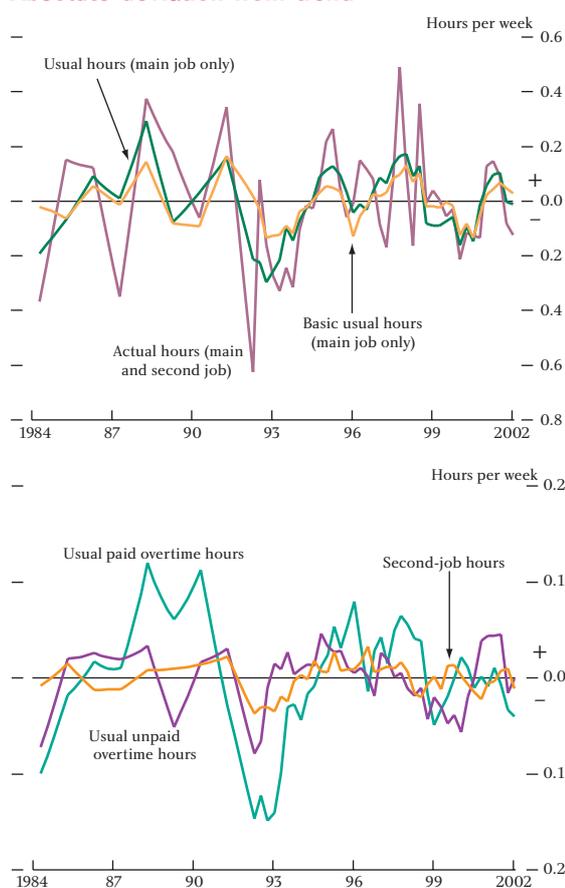
Average hours and the business cycle⁽²⁾

The previous section has focused solely on descriptive analysis of the data. This is sufficient to form a general picture, but distinguishing cyclical movements in hours from trend movements may provide additional insights. The conventional way to do this is to pass the data through a statistical filter. The filtered series captures longer-run patterns; deviations around this represent cyclical movements. This section reports the results of such a process performed on the series described previously. To maximise the sample period, seasonally adjusted quarterly data from 1992 to 2002 have been spliced on to interpolated, non-seasonally adjusted, annual data from 1984 to 1991.⁽³⁾

Chart 8 contains the cyclical analogues to the unfiltered series shown previously. The principal differences between the deviations from trend of actual hours and usual hours lie in their amplitude and their persistence

(particularly over the period for which quarterly data are available). Consistent with Chart 3, short-run movements in actual hours tend to be large, but often change sign from one quarter to the next. Usual hours behave in a more regular fashion, with recognisable peaks and troughs. Peaks and troughs are also discernible in the deviations from trend of (usual) paid overtime hours. Their amplitude is greater than that of either unpaid overtime hours or second-job hours, neither of which ever deviate more than 0.1 hours from their respective trends.

Chart 8
Absolute deviation from trend^(a)



(a) Trend based on a Hodrick-Prescott filter of data from Spring 1984 to Winter 2001–02 ($\lambda = 1600$).

Table B makes the same point in a more formal fashion. Usual hours have a much lower percentage standard deviation than actual hours and a higher first-order autocorrelation coefficient. In other words, though

(1) The term 'unpaid overtime' may be slightly misleading. The employer and employee may well have an implicit contract that says that the employee will on average work a certain number of hours beyond his or her basic hours. Or those hours may be reflected in larger bonus payments.

(2) This section follows the approach of Blackburn and Ravn (1992).

(3) Using the quarterly data only (from 1992 onwards) would limit the time span to barely one business cycle and, since the filtering process used here (the Hodrick-Prescott filter) has a greater margin of error at the beginning and the end of the sample period, would leave us particularly uncertain about movements around the end of the early 1990s recession. It is possible that the use of interpolated data for the pre-1992 period may affect the filtering process, but the trends derived by filtering only the annual data are very similar. A smoothing parameter (λ) of 1600 was used for the quarterly data, following standard practice.

usual hours are subject to smaller movements, these are more likely to persist. Overtime seems more persistent still: the first-order autocorrelation coefficient for paid overtime is 0.91. And though its absolute deviation from trend is quite small, its percentage deviation is much greater. Table B also shows the same statistics for several other macroeconomic variables. Average hours (whether usual or actual) are considerably less variable than output (though overtime is more variable) and are also less variable than heads employed. It is likely that more of the variation in total hours worked comes from changes in heads employed than from changes in average hours (this would especially be the case if total hours were calculated from a usual hours measure). The relative persistence of average hours varies with the choice of variable, but in all cases average hours are less persistent than both output and employment.

Table B
Cyclical properties of detrended variables^(a)

Hours variables	Standard deviation (per cent)	First-order autocorrelation
All actual hours	0.61	0.58
Actual hours (main job)	0.59	0.56
Usual hours (main job)	0.31	0.86
Basic usual hours	0.21	0.80
Usual paid overtime	3.63	0.91
Usual unpaid overtime	2.31	0.79
Average second-job hours	3.93	0.78

Memorandum items	Standard deviation (per cent)	First-order autocorrelation
GDP	1.26	0.92
Investment	4.45	0.78
Employment	1.18	0.97
Labour productivity	1.04	0.78
Real earnings per hour	0.99	0.63
TFP (b)	0.74	0.85
Total hours	1.56	0.90

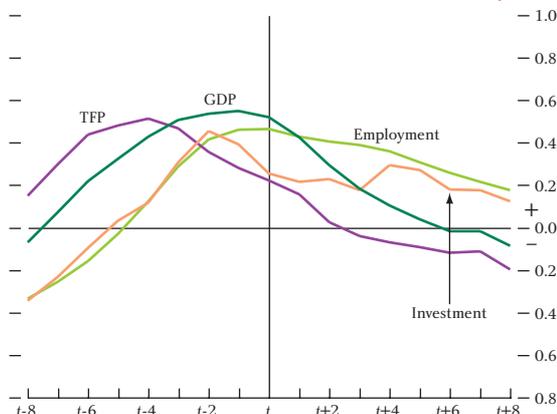
(a) Calculations based on filtered logarithms of data.
(b) Total factor productivity—author's estimate.

Co-movements with other variables

However, demonstrating that certain components of hours can manifest significant and prolonged deviations from trend does not establish whether these components are pro or countercyclical. Charts 9 to 12 plot the co-movement of the average hours series and its main components with a selection of macroeconomic variables, where natural logarithms have been taken of all variables, and trends calculated using the filter described above. Each figure plots how the correlation of the relevant hours variable changes with different lags of the comparator variable. For example, the first point on the dark green line in Chart 9 (-0.07 at $t-8$) is the correlation between the headline actual hours series and GDP eight quarters earlier, over the sample 1984 Q2 to 2001 Q4. The period of peak correlation will give us some indication whether

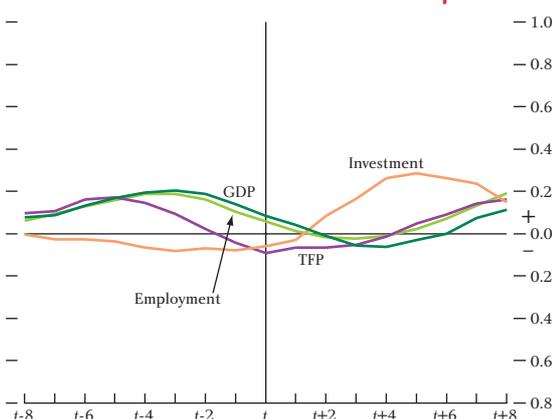
movements in average hours lead or lag movements in other variables: if the peak comes at $t-2$, say, it means that average hours lag that variable by two quarters.

Chart 9
Correlation between average actual hours at t and macroeconomic variables at different periods



Though the peak correlations of average actual hours with other variables are easy to spot (see Chart 9), none of them are particularly strong (the highest is about 0.6), and not all of them conform to the notion that hours move early in the cycle. If movements in detrended output are taken as a measure of the cycle, then average hours seem to be broadly procyclical, being positively correlated with GDP. The peak correlation occurs at $t-1$, which suggests that rather than being a leading indicator of cyclical movements, detrended average hours lag detrended GDP by one quarter. If there are lower costs to adjusting working times than there are to adjusting employment or the capital stock, average hours would be a leading indicator of firms' hiring and investment decisions. In fact, average hours lead neither investment nor heads employed.

Chart 10
Correlation between basic usual hours at t and macroeconomic variables at different periods



Looking at the subcomponents, basic usual hours (see Chart 10) are much less correlated with other variables. The same is true for unpaid overtime (and indeed for second-job hours). Paid overtime (see Chart 11) is the only component of average hours that moves with output in the cycle. The peak correlation with GDP of almost 0.9 is contemporaneous (see also the

Chart 11
Correlation between usual paid overtime at t and macroeconomic variables at different periods

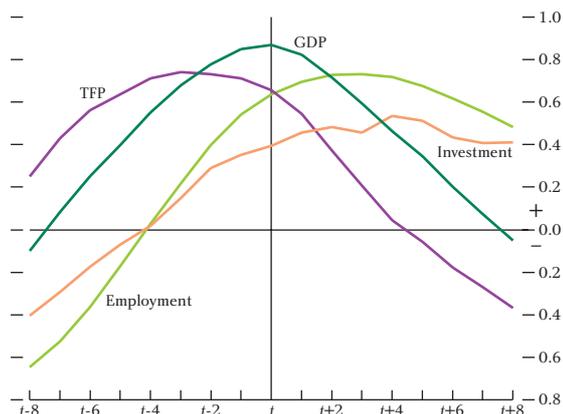


Chart 12
Correlation between usual unpaid overtime at t and macroeconomic variables at different periods

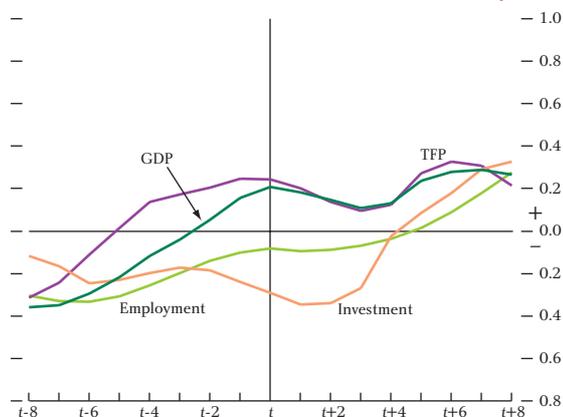
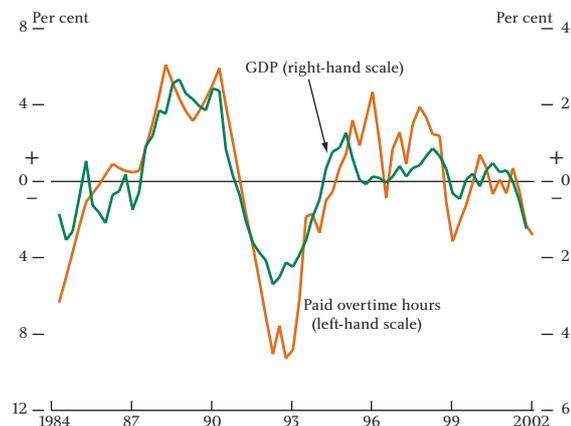


Chart 13
Deviation from filtered series



coincidence of peaks and troughs in Chart 13) and its correlation with detrended employment three quarters later is also quite high at 0.75. This is consistent with firms initially responding to productivity shocks by adjusting paid overtime hours and only later (perhaps because of adjustment costs) heads employed, with implications for average basic hours.

Cross-sectional analysis

The Labour Force Survey contains detailed information on various characteristics of its respondents, some of which may be relevant in the determination of working times. This section breaks down the data along those dimensions that may have a significant bearing on aggregate movements: gender, age, employment status, occupation, industry, and full-time and part-time employment.⁽¹⁾

Average hours by gender

Chart 14 plots basic usual hours worked by gender. Apart from the fact that men work longer basic hours in paid employment than women, what is most striking is

Chart 14
Basic usual hours by gender (spring quarters)

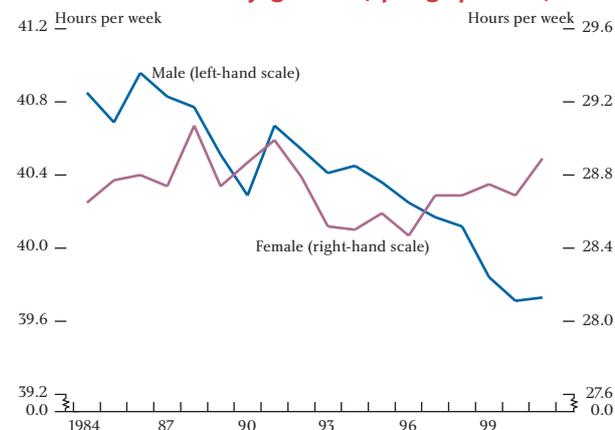
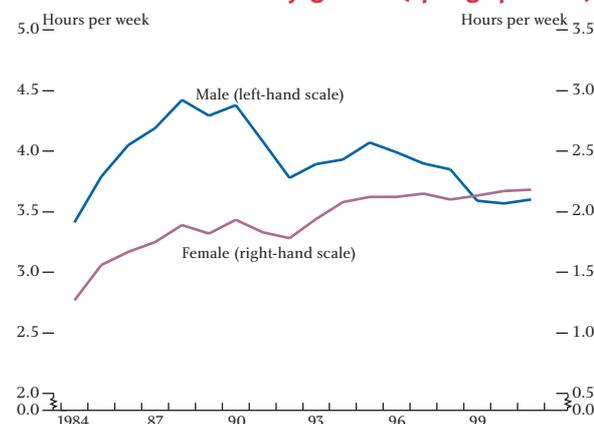


Chart 15
Usual overtime hours by gender (spring quarters)



(1) There is very little regional variation in working times.

the difference in the trends of the two series. Female basic hours are roughly stationary (though they have risen over the past five years), while basic hours worked by men seem in trend decline. Chart 15 shows how usual overtime (aggregating paid and unpaid hours) has evolved for men and women. Again, abstracting from the difference in levels, the trends diverge. Female overtime hours also seem to exhibit less cyclical variation.

Average hours by age

Charts 16 and 17, respectively, plot basic and overtime hours by age. Though the broad pattern of hours worked by age has not changed much compared to the 1988 peak, the distribution tails off more rapidly at both ends. While the increasing numbers in higher

Chart 16
Basic usual hours by age

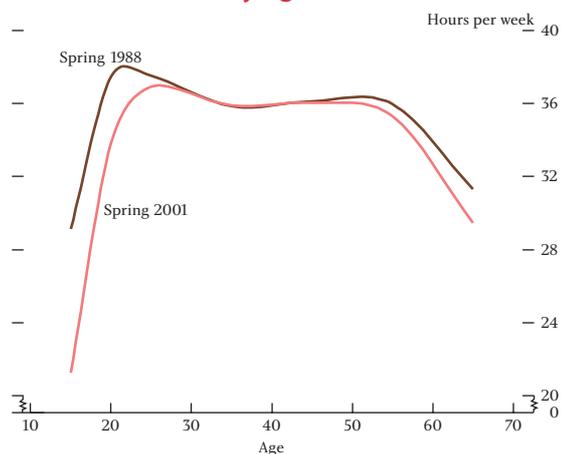
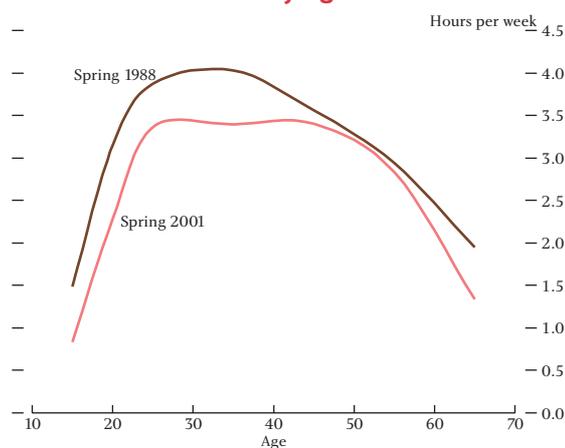


Chart 17
Usual overtime hours by age

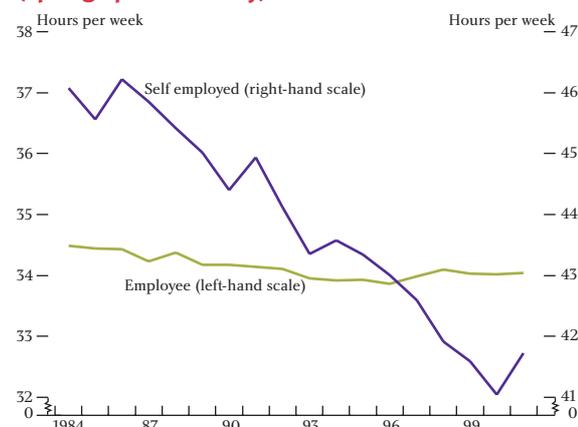


education are a likely explanation for the change at the bottom of the age distribution, it is not clear what is driving the change at the top of the distribution.⁽¹⁾

Average hours by employment status

Employment status is one of the more stark examples of a dimension along which the component categories exhibit differing trends. As shown in Chart 18, basic usual hours worked by employees have generally fallen over time (though they show signs of stabilising since 1997).⁽²⁾ But the fall in employee hours is small in comparison with that in self-employed hours. In 1984 the self employed worked on average 46 basic hours per week (overtime is not a very meaningful concept for this category); by 2000 this had fallen to 41 hours per week. Though they are a relatively small fraction of total employment (around 12%), over 40% of the decline in average basic hours since 1984 can be accounted for by the decline in hours worked by the self employed.

Chart 18
Basic usual hours worked by employment status (spring quarters only)



Average hours by occupation⁽³⁾

Basic hours by occupation have also shown diverging trends. The basic usual hours of both managers and professionals, and clerical, personal and sales occupations have declined steadily over the sample period, albeit from different starting-points. In contrast, craft, plant and machinery workers' hours have increased steadily, as Chart 19 shows. Overtime hours have

(1) McGrattan and Rogerson (1998) find evidence of a cohort effect for working time in the United States, namely that those who began their working lives in the 1960s and 1970s have worked longer hours at any given age than those who began their working lives in the 1980s and 1990s. Unfortunately we do not have the same time span of data to investigate whether this is also true for the United Kingdom.

(2) This stabilisation may reflect reclassification of jobs from self employed to employed on the back of the IR35 tax change and other regulatory interventions.

(3) Only a broad categorisation is possible because the classification scheme for occupations has changed twice since the start of the Labour Force Survey, most recently in 2000. All series, particularly for 2001, should be treated with caution.

followed a similar pattern for all three categories (see Chart 20). Though clerical, personal and sales occupations work less overtime in general, and the overtime of craft, plant and machinery workers shows more variation, all three show evidence of two cycles, with peaks in the late-1980s and mid-1990s. Nevertheless, the proportions of paid and unpaid overtime vary significantly across category. 80% of the overtime worked by managers and professionals is unpaid (and is perhaps less cyclical as a result), while the share is 25% for clerical, personal and sales occupations and 10% for craft, plant and machinery workers.

Chart 19
Basic usual hours by occupation (spring quarters)

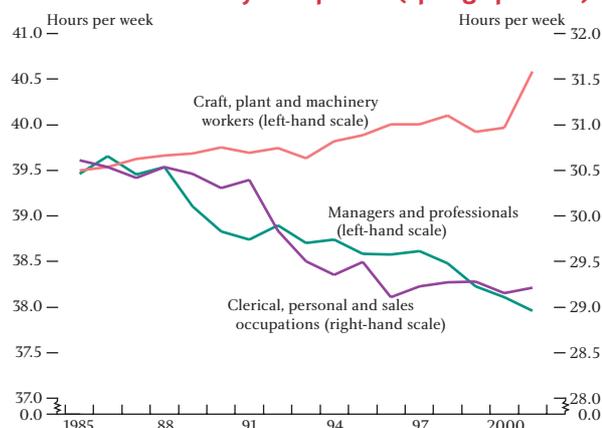
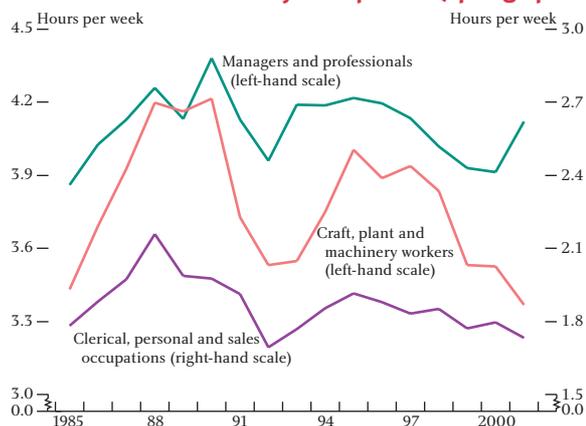


Chart 20
Usual overtime hours by occupation (spring quarters)



Average hours by industry

Though the period from 1988 to 2001 has seen a large fall in basic usual hours at an aggregate level, Chart 21 shows that the variation is greater between industries. The average working week in the ‘other services’ and ‘distribution’ sectors is around 30 hours long, while it is over 45 hours long in agriculture. The aggregate decline

in basic hours is concentrated in two sectors, distribution and agriculture;⁽¹⁾ hours worked in other sectors have changed very little. Overtime has declined since 1990 in all sectors except business services (see Chart 22).

Chart 21
Basic usual hours by industry (spring quarters)

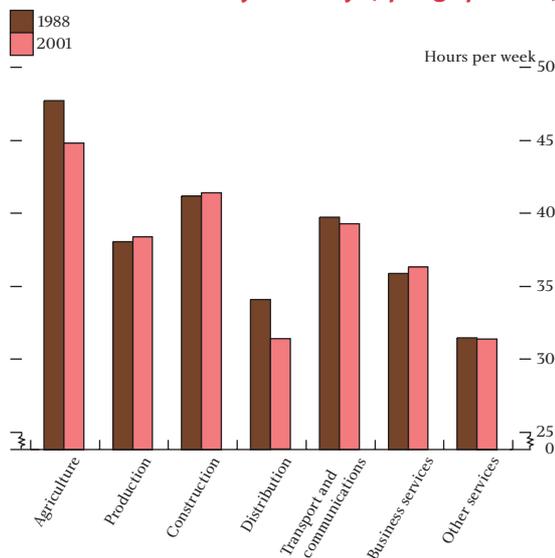
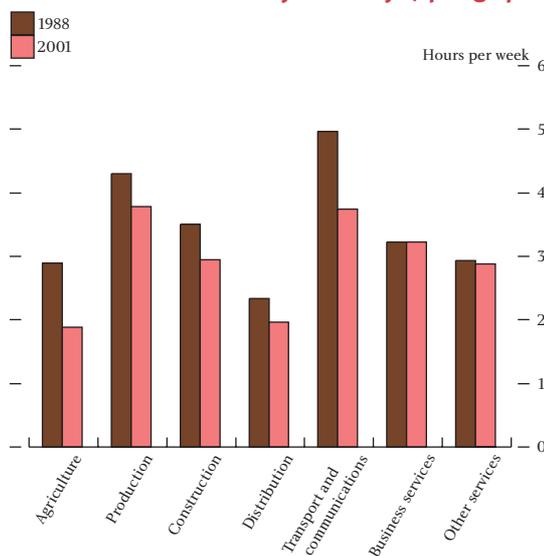


Chart 22
Usual overtime hours by industry (spring quarters)



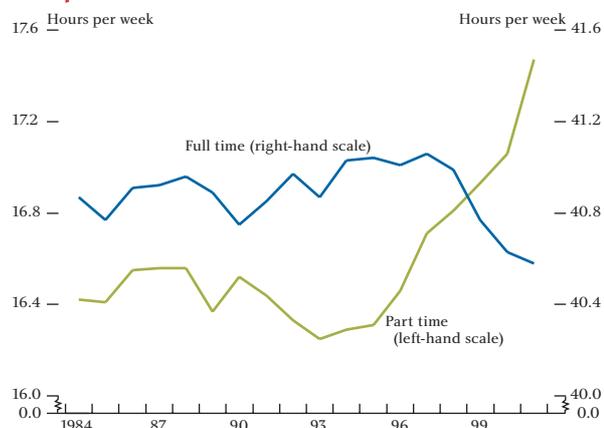
Full-time and part-time hours

Chart 23 shows basic usual hours worked by full timers and part timers. Though they show a similar cyclical pattern initially, they diverge markedly from the mid-1990s onwards. Since 1995, the average hours of part-time workers have increased from 16.5 hours per week to 17.5 hours per week, a large rise when compared with previous patterns. In contrast, the average hours of

(1) The decline in average working time in agriculture must in part be a corollary of the decline in hours worked by the self employed (about 90% of those working in this sector are self employed).

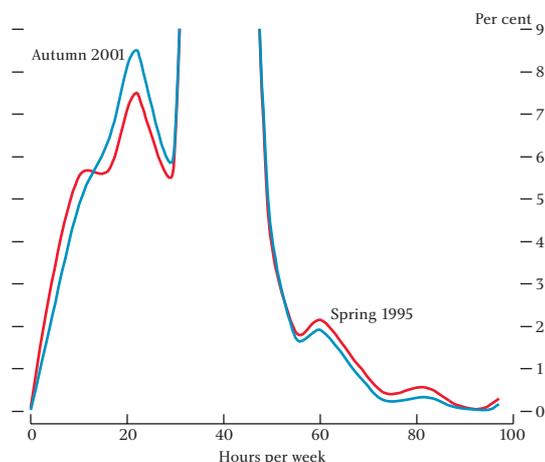
full timers have fallen quite sharply, though this fall only began in 1998.⁽¹⁾

Chart 23
Basic usual hours worked by full timers and part timers



Though these two trends are clear, that does not necessarily mean that they are distinct. If part-time workers' hours increase over time, these employees may at some point reclassify themselves as full time (thus lowering the full timers' average), while remaining in the same jobs. But evidence from the distribution of hours worked shown in Chart 24 suggests that this is unlikely to be the principal explanation. There is a peak in the distribution at 20 hours per week, which indicates that the full-time/part-time distinction is a meaningful one. Moreover, much of the increase in part-timers' hours is due to a decrease in the proportion working very low hours (less than 15 per week), and an increase in the proportion working around 20 hours per week. In

Chart 24
Distribution of basic usual hours worked^(a)



(a) Vertical axis of this chart is truncated so as to make the tails of the distribution more visible.

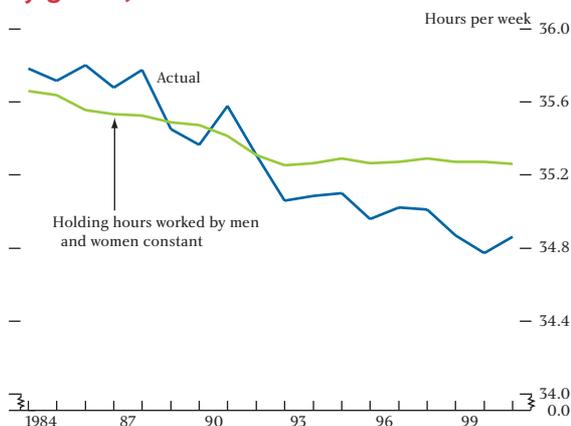
contrast, the decline in full timers hours is due to a general reduction in the proportion of the population working long hours (more than 50 hours per week).

The effects of compositional change

The previous section has shown that some individual categories (be they men, the self employed, the young, etc) have shown much greater trend or cyclical movements than others. But even if a specific category's hours have not changed, there could still be an effect on the whole-economy average. For example, with a couple of exceptions, basic hours worked within industries have been stable over the past 15 years, even though they vary quite considerably across industries. But we know that the employment shares of different sectors have changed quite dramatically. These compositional shifts may themselves be enough to account for changes in the whole-economy average.

Comparing the actual average for a specific variable with the average that would have prevailed if within-category working times had been held fixed gives a good first pass at the extent of compositional change. The blue line in Chart 25 shows average basic usual hours, while the green line shows the average obtained by holding the average hours of men and women unchanged (in this case, at their 1992 level). Any movement in the green line is due to compositional change, ie changes in the shares of men and women in total employment. The closer the green line is to the blue line, the greater the influence of compositional change; if the green line were flat, then compositional change would explain none of the change in hours. Changes in the gender mix of

Chart 25
Average basic usual hours worked (aggregated by gender)



(1) Whether someone is considered full time or part time in the LFS is up to the individual respondent, so it could be that the implicit 'border' between full time and part time has changed (which would have no implications for aggregate hours). But using a fixed cut-off point of 30 hours per week does not change the picture.

employment seem to have had some effect during the 1980s. Since the early 1990s, though, the share of women in total employment has changed very little, so compositional change along this dimension has not been important in recent years.

Charts 26 to 28 repeat this exercise for some of the other dimensions analysed in the previous section. There is not much evidence that changes in the occupation or age shares of the working population have affected average hours and the same is true for employment status during the 1980s. Changes in the composition of industries and, since the 1990s, in the composition of employment statuses may have contributed to the decline in basic hours but, as shown in Chart 28, the evidence is most stark for full-time and part-time workers. The increase in the part-time share has almost exactly mirrored the decline in average basic hours since the beginning of the sample period.

Chart 26
Average basic usual hours worked (aggregated by employment status)

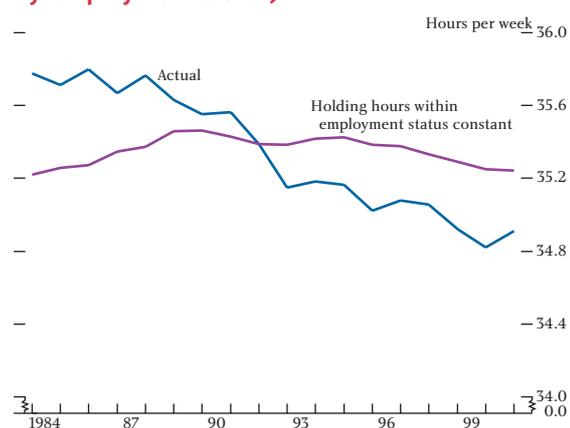
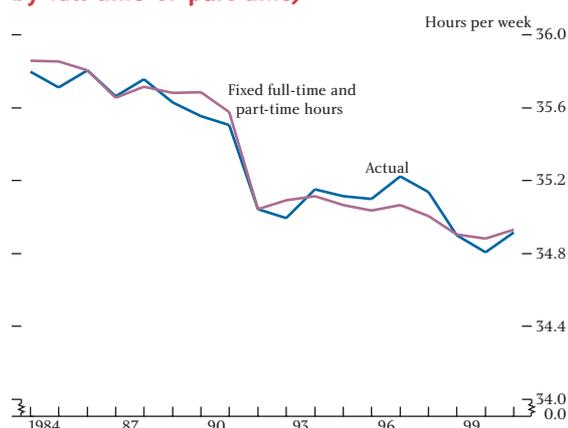


Chart 27
Average basic usual hours worked (aggregated by industry)



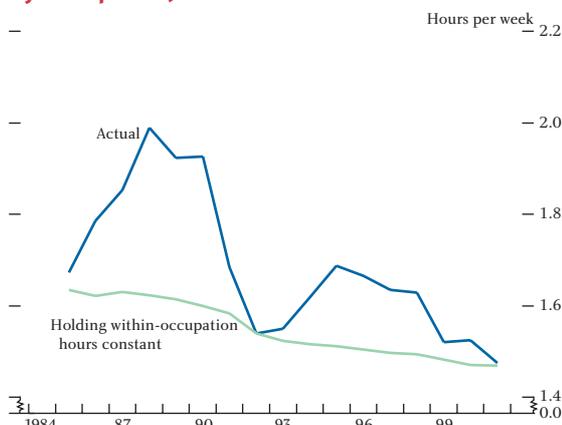
Chart 28
Average basic usual hours worked (aggregated by full time or part time)



Moreover, this is still the case when also controlling for changes in industry or employment-status composition. Changes in the part-time share seem, on the face of it, to be the driving force in the evolution of basic usual hours worked, with only a small additional effect from changes in industry composition and very little effect from compositional change along any other dimension.⁽¹⁾

In contrast, there is no evidence that compositional change along any dimension can explain how overtime as a whole has behaved. There is, though, support for compositional change as a determinant of the paid/unpaid mix of overtime. Charts 29 and 30 show that both the declining trend in paid overtime (though not its cyclical pattern) and the increasing trend in unpaid overtime can be accounted for by changes in the occupational mix, even though they cannot explain movements in overtime as a whole.⁽²⁾

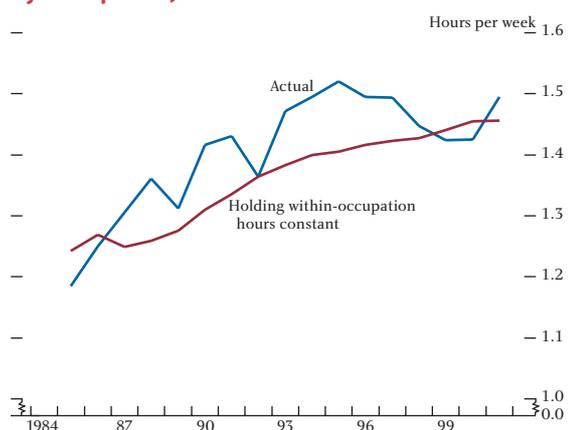
Chart 29
Average usual paid overtime hours (aggregated by occupation)



(1) Though compositional change along other dimensions explains little of the aggregate movement in hours, it might explain either the recent decline of full-time hours or the recent increase in part-time hours individually. That is not a question that this article addresses, though both phenomena remain a feature of the data even after controlling for changes in the industry mix and employment status of workers.

(2) There is little evidence for compositional change along any other dimension explaining the paid/unpaid overtime mix.

Chart 30
Average usual unpaid overtime hours (aggregated by occupation)



Conclusions

This article has examined the time-series and cross-sectional behaviour of average hours worked using data from the Labour Force Survey with a view to establishing some stylised facts about their trend behaviour and their relationship with the economic cycle. Focusing on 'usual' hours worked rather than 'actual' hours worked, a reasonably coherent picture emerges. Across time, over the cycle, and across

dimensions such as gender, age, employment status, occupation and industry, there is little systematic variation in the basic hours worked by full-time and part-time workers (though the recent evolution of full timers' and part timers' hours remains puzzling). The share of part-time workers has risen (particularly in the early 1990s) and it is this that has driven down the aggregate basic-hours average.

In addition to their basic hours in their main job, individuals may work overtime and may also work some hours in a second job. Overtime hours are not trended, though they have nevertheless shifted from being paid towards being unpaid (perhaps as a result of changes in the occupational mix). Paid overtime is the only component of hours that exhibits strong cyclicity. It follows detrended GDP closely and leads changes in employment. All other components lag GDP and in some cases lag employment. This suggests that when firms are confronted with adverse trading conditions, their first response is to reduce paid overtime, rather than any other component of hours or labour input. Most of the aggregate variation in these other components may be due to compositional change, rather than those in the same job changing their hours.

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Why are UK imports so cyclical?

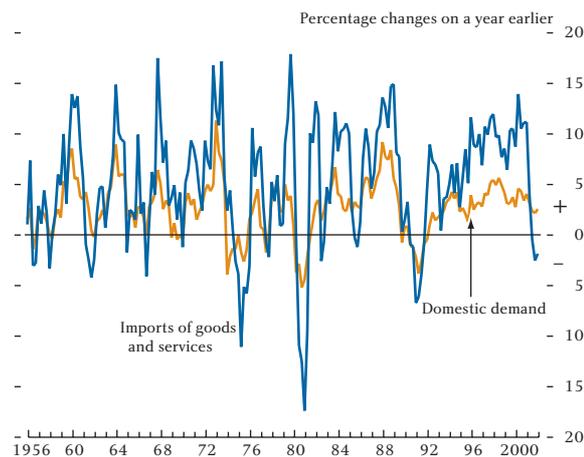
By Valerie Herzberg, Maria Sebastia-Barriel and Simon Whitaker of the Bank's Structural Economic Analysis Division.

The recent economic slowdown in the United Kingdom has been characterised by declines in business investment and exports. The impact on domestic output has been alleviated by robust household spending, but also by a sharp decline in imports of goods and services. This article shows that these divergent trends in the components of demand, and differences in their import content, can help explain the weakness in imports during 2001. More generally, close attention to the relative contribution of the components to aggregate demand can help explain fluctuations in imports. The analysis has been aided by the recent publication of updated information from the ONS on the import content of different expenditure categories.

Introduction and summary

Economic conditions in the United Kingdom have recently been characterised by a moderate slowdown in domestic demand growth, coinciding with a much sharper decline in import volumes of goods and services. Chart 1 suggests that this is not a unique experience, as imports have generally been more cyclical than domestic demand.

Chart 1
UK domestic demand and import volumes



In this article we show that individual components of demand differ in the extent to which they fluctuate over the economic cycle, and in their import content. So examining the strength of different components of demand helps the assessment of prospects for imports. In particular, we demonstrate that imports have been

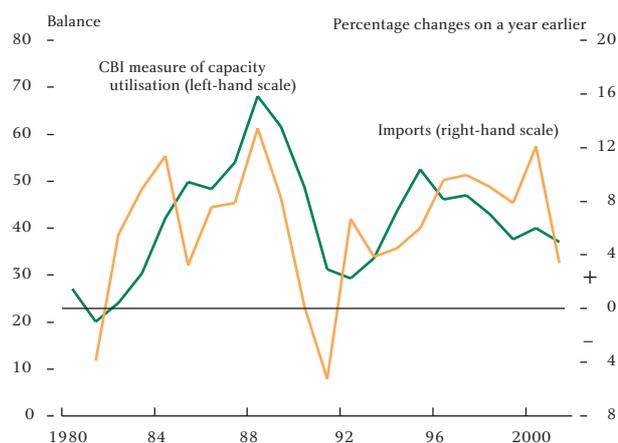
particularly weak recently because the slowdown in demand has been disproportionately concentrated in domestic corporate expenditure and in exports, demand components that have a relatively high import content.

The cyclicity of different components of demand

Imports are more cyclical than domestic demand, in part because domestic producers may face costs in rapid adjustment of output, so that increases in demand are initially met disproportionately from overseas suppliers. Indeed the Confederation of British Industries' (CBI) survey measure of capacity utilisation for manufacturing firms has tracked growth in goods import volumes reasonably well over the past 20 years (see Chart 2). This feature is captured in the Bank's medium-term macroeconomic model (MTMM): in response to an increase in domestic demand, imports rise by almost twice as much in the short run as they do in the long run.

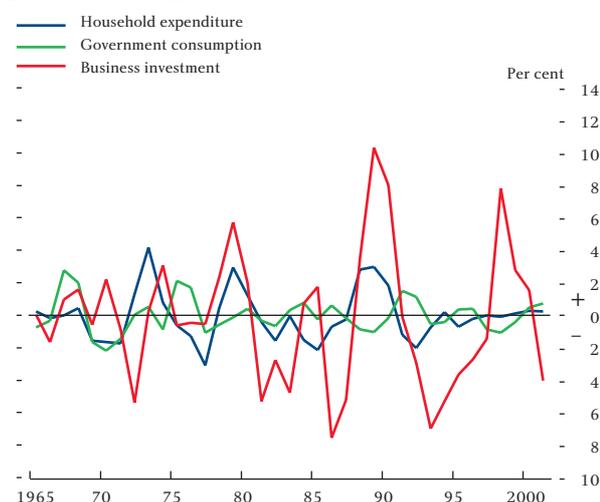
But imports may also be more cyclical than aggregate domestic spending because some components of demand vary more than others over the cycle. Chart 3 shows that deviations from trend are far greater for business investment than for aggregate household consumption or government expenditure. This matters because there are differences in the import content of these demand components, as will be discussed below.

Chart 2
Capacity utilisation and imports of goods



Sources: ONS and CBI.

Chart 3
Deviations from trend^(a)



Source: Bank of England estimates.

(a) Estimated using the Hodrick-Prescott filter.

The import content of different components of demand

Information on import content is available from the input-output tables published by the ONS, see Table A. The latest figures, for 1995, were published in May 2002. These data give an estimate of the imports required, directly and indirectly, to generate a given amount of final demand. So, to take the example of consumption, that would include both the consumption goods that are directly imported, and the imports required as inputs to domestically produced consumption goods.

There is a wide variation in the import content of different demand components. That reflects the different types of goods and services purchased by households, business and the government, and the extent to which they are tradable. For example in 1995

Table A
Import content of UK final expenditure

Expenditure component	Per cent	
	Import content in 1990	Import content in 1995
Household consumption	20.3	20.3
Government consumption	13.2	11.5
Whole-economy investment	51.8	55.9
Changes in inventories	73.9	45.6
Domestic demand	20.9	21.3
Exports of goods and services	22.4	26.0

Source: ONS input-output tables for 1990 and 1995.

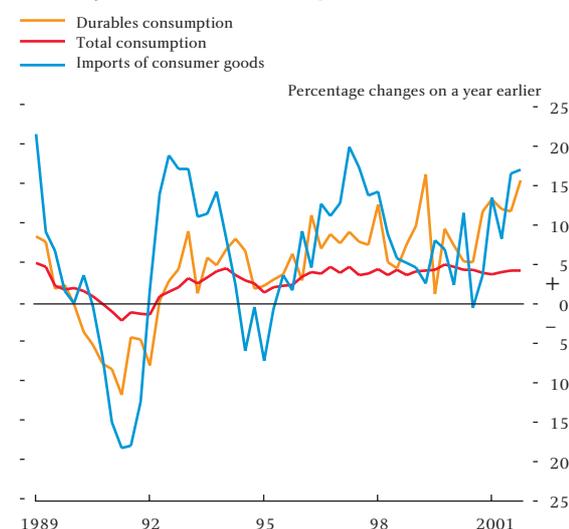
government consumption had an import content of around 12%, which meant that government consumption of £1 million required £120,000 worth of imports. That contrasts with inventories, where spending of £1 million gave rise to £460,000 worth of imports. Between 1990 and 1995 there was an increase in the import content of investment and exports, approximately offset by a decline in the import content of government consumption and expenditure on inventories.

Of course these numbers represent only two snapshots of the economy. The marginal response of imports to changes in several demand components may differ over time from that indicated in the table—depending, for example, on the degree of spare capacity in the domestic economy.

Household consumption

The import content of household expenditure is not particularly high. That reflects the fact that around one half of household expenditure is on services, many of which are not traded. While disaggregated import content data for consumption are not available, consumption of durable goods, which accounts for

Chart 4
Total consumption, consumption of durables, and imports of consumer goods



around 15% of consumption, is likely to have a much higher import content. Chart 4 illustrates the correlation between consumer goods imports and durables consumption, which supports that point.

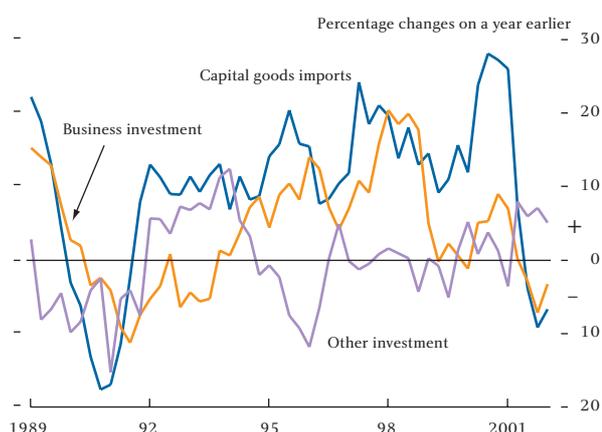
Government spending

Government consumption appears to be the component of demand that has the lowest import content. That reflects the fact that much of government spending is on the procurement of domestically provided services such as healthcare, education and law and order. Import content data are not separately available for government investment, but it is unlikely to be as high as the figure for whole-economy investment quoted in Table A, as government investment tends to include mainly construction work.

Business investment

The trade data indicate that consumer and capital goods account for broadly similar proportions of total imports, whereas investment spending is only equivalent to around one third of household consumption. So it is not surprising that input-output tables indicate a much higher import content for investment than for consumption. The import content figure in the input-output tables (see Table A) is for whole-economy investment—that is, investment by government, business and by the household sector (in dwellings). The import content of business investment, which tends to be focused on machinery and equipment, is likely to be higher than that. As Chart 5 shows, imports of capital goods correlate more closely with business investment than with investment by other sectors of the economy.

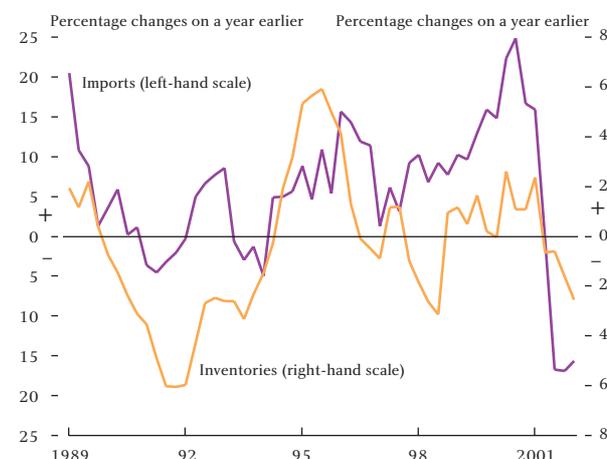
Chart 5
Imports of capital goods, business investment and other investment



Inventories

Manufacturers' inventories consist of materials and fuel, work in progress and finished goods to an approximately equal extent. But quarterly expenditure on inventories is the most volatile component of aggregate demand, and expenditure each period is unevenly distributed across the different types of inventories. So the snapshot of its import content in a particular year may not be as generally applicable as it might be for other components of demand. The input-output tables provide some evidence for that, as the import content was very different in 1990 and 1995. Some fluctuation in inventory expenditure is involuntary, reflecting unanticipated changes in final demand relative to supply, and these would not have any immediate counterpart in the import data. So, as shown in Chart 6, while there is a relationship between manufacturers' inventories and imports of materials, fuels, and intermediate goods, it is not a very close one. The decline in manufacturers' inventories during 2001 contributed to the weakness in import volumes.

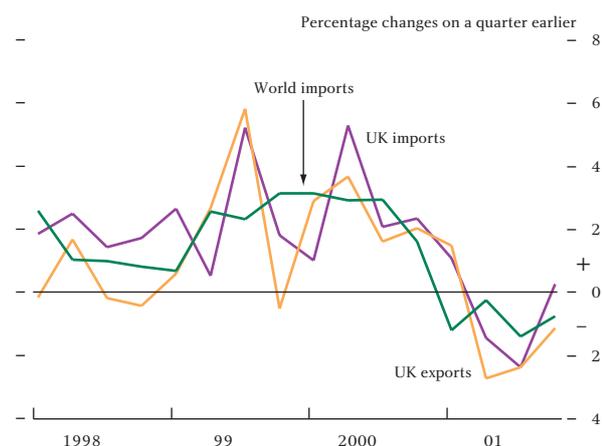
Chart 6
Manufacturers' inventories and imports of intermediate goods, basic materials, and fuels



Exports

As UK export growth slowed in response to slower growth in world demand, the impact on net UK trade was mitigated by lower import volumes (see Chart 7). A contributory factor to that development may have been the above-average import intensity of exports. This can be partly explained by international production links: because of declining transport costs, it is profitable for firms to locate the various stages of the production process in different countries. A product can cross the border several times before reaching the final customer,

Chart 7
UK trade and world import volumes

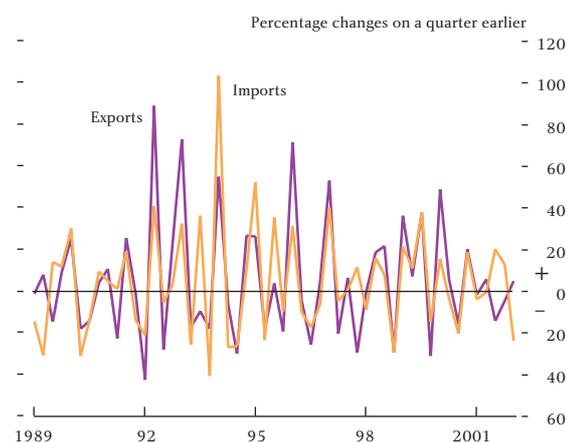


Sources: ONS and Bank of England.

generating trade flows as it does so. Scope for this is greater for products high in value relative to their weight, for example high-technology goods, and those subject to a number of processes.

Some goods may also only be in transit, with little value added in the United Kingdom. In part, that could reflect London's historical role as a trading centre for goods like precious stones or commodities: imports of precious stones and silver correlate highly with exports in the same quarter (see Chart 8). Though at times this may account for a considerable share of movements in total exports and imports, these 'erratic' items account for only a small share of trade on average (around 3%). So this cannot explain the overall important links between imports and exports. But re-exporting may have become more prevalent for other products too: improved technology and lower transport costs may have encouraged the use of international distribution centres, thereby encouraging such trade flows.

Chart 8
Trade volumes of precious stones and silver



A disaggregated model of imports

In many macroeconomic models, imports are modelled as a function of aggregate demand and relative prices. In effect, that assumes that the import content of each demand component is the same, though Table B indicates that in practice they are not. And it cannot allow for the different cyclical profiles of demand components. Drawing together the implications of cyclicalities and import content, it is evident that the components of demand that tend to be more cyclical, such as business investment and inventory expenditure, also tend to have higher import contents. So a disaggregation of the demand components may help to explain movements in imports more accurately.

Input-output data on import content give an indication of the amount in £ million by which imports would change for a given £ million change in demand. But when modelling the impact of fluctuations in demand on imports, the responses in percentage terms are often more interesting. That is, by what percentage would total imports change for a 1% change in one of the demand components—the elasticity of imports with respect to demand. This can be calculated by combining information on the import content with the average size of the different demand components relative to total imports. That is shown in Table B below.

Table B
Implied elasticities of imports with respect to demand components

Expenditure component	(1) Import content (per cent) (a)	(2) Ratio to total imports (b)	(3) Implied long-run elasticity (c)
Household consumption	20.3	2.4	0.5
Government consumption	12.4	0.8	0.1
Whole-economy investment	33.9	0.6	0.2
Changes in inventories	59.8	0.0	0.0
Domestic demand	21.1	3.8	0.8
Exports of goods and services	24.1	1.0	0.2

Sources: ONS input-output tables for 1990 and 1995 and Bank of England.

(a) Average of 1990 and 1995 input-output tables.

(b) Average over period 1980–2001.

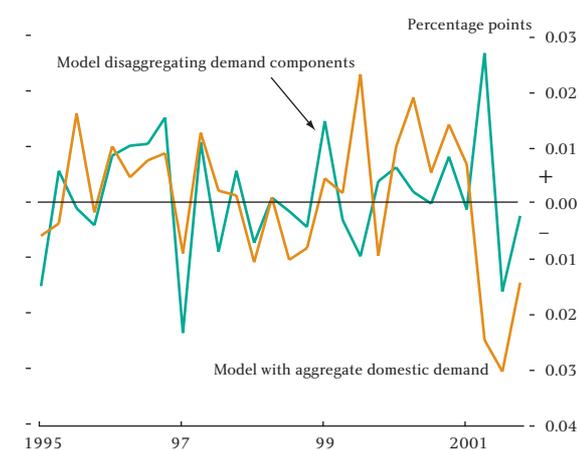
(c) Column (3) is equal to column (1) multiplied by (2) and the components sum to one. Note that this analysis assumes that industry output can be represented as a linear combination of its inputs.

Take the example of consumption: averaging the information in the 1990 and 1995 input-output tables, the import content of consumption is 20%. Averaging over a long time period, consumption is about two and a half times as large as total imports. So the implied long-run elasticity of total imports with respect to consumption is 0.5. This can be interpreted as a relative import share: on average, 50% of all imports are used directly and indirectly for consumption. By comparison, on average 20% of total imports are used for investment.

Even though each pound spent on consumption does not generate as much in imports as a pound spent on investment, expenditure on consumption is far greater than expenditure on investment. The short-run elasticity of imports with respect to the different demand components is likely to be larger than the long-run effect, because domestic capacity constraints mean that it can be some time before domestic sources of supply can satisfy higher demand. And the extent of the difference between short and long-run impacts is likely to vary between demand components depending on their cyclical profile.

Chart 9 shows the residuals, or unexplained movements in import volumes, from two different estimated relationships. One takes a traditional approach where there is a single aggregate demand variable, domestic

Chart 9
Residuals of import volume equations



Source: Bank of England.

demand. The other separates out the effects of different demand components, including exports. The disaggregated relationship is better able to explain fluctuations in import volumes in the recent past, when the residual has on average been closer to zero. In contrast, imports were stronger than the simple relationship predicted in 2000, but weaker than predicted in 2001. The difference between the explanatory power of the two models is less obvious in earlier years, when the divergence between trends in world trade, corporate sector and household spending was not as great. For more details on the equations estimated see the appendix.

Conclusion

This article discussed the extent to which movements in the various components of domestic demand and exports can explain fluctuations in UK imports of goods and services. For example, business expenditure on capital goods and inventories is particularly cyclical and contains a relatively large proportion of imports, as do exports. Changes in these demand components can therefore have larger effects on total imports than would be expected based on their share in total final expenditure. Indeed, the unusually pronounced decline in imports in 2001, relative to aggregate domestic demand growth, seems to reflect the combined effects of the world slowdown and the weakness of UK corporate sector spending on capital goods and inventories. Looking forward, as the composition of demand growth shifts from the private to the public sector, growth in import volumes might be weaker than would be projected from looking at simple aggregate relationships.

Appendix

The following equation was estimated:

$$\Delta m_t = \alpha + \beta \Delta c_t + \chi \Delta ib_t + \delta \Delta g_t + \phi \Delta inven_t + \psi \Delta x_t + \theta (m_{t-1} - tfe_{t-1} + \gamma rxrm_{t-1} - \rho spec_{t-1})$$

m , c , ib , g , $inven$ and x stand for total imports of goods and services, household consumption, business investment, government spending (consumption and investment), inventory expenditure and exports of goods and services, and tfe , $rxrm$, and $spec$ stand for total final expenditure (with expenditure components weighted together using information on import content), the price of imports relative to domestic prices, and trade specialisation—measured as the world trade to world GDP ratio. Δ denotes the one-quarter change. All variables except $inven$ and $spec$ are in natural logarithms.

The explanatory power of this equation is compared in Chart 9 with a much simpler form of import volume equation, where imports are only a function of aggregate domestic demand, relative prices and trade specialisation.

Note that the estimated short-run responses for the demand components are much larger than the long-run elasticities. That divergence is particularly marked for exports, which is consistent with the observation that some commodities are imported and then exported again during the same quarter.

Table 1
Estimated coefficients in disaggregated import volume equation

Short run	Coefficient	<i>t</i> -value
<i>c</i>	0.84	3.9
<i>ib</i>	0.29	5.7
<i>g</i>	0.25	1.7
<i>inven</i>	1.07e-0.5	6.5
<i>x</i>	0.62	7.0
Long run		
Error correction term (θ)	-0.18	-3.7
<i>rxrm</i>	0.46	2.1
<i>spec</i>	0.47	2.6
Weighted <i>tfe</i> (a)	1.00	
Adjusted R ²		0.68
Standard error of equation		0.02
Durbin Watson		2.17
Sample period		1980–2001

(a) $Tfe = (0.5 \cdot \text{Household consumption} + 0.2 \cdot \text{Investment} + 0.1 \cdot \text{Government consumption} + 0.002 \cdot \text{Inventory expenditure} + 0.2 \cdot \text{Exports})$.

Do changes in structural factors explain movements in the equilibrium rate of unemployment?

Working Paper no. 153

Vincenzo Cassino and Richard Thornton

Movements in the unemployment rate relative to its equilibrium level are potentially an important indicator of inflationary pressure. The equilibrium unemployment rate is, however, unobservable and can vary over time in response to changes in an economy's structure. In this paper we follow the approach of Layard, Nickell and Jackman (LNJ) to examine the extent to which movements in the equilibrium unemployment rate can be explained by changes in the structure of the UK economy since the early 1960s. In the LNJ model the equilibrium unemployment rate is determined by the interaction of the price and wage-setting behaviour of firms and workers. The price-setting curve is determined by firms' mark-up over their unit labour costs, while the wage-setting curve is determined by the wage bargaining of firms and workers. The natural rate of unemployment is a function of exogenous structural variables such as the replacement ratio and union power that affect the size of firms' and workers' mark-ups. In theory, this framework can be used to determine the contributions of each of these structural variables to movements in the natural rate.

There are well-known problems identifying the price and wage equations separately and, given that we are interested primarily in the model's solution for equilibrium unemployment, we estimate a reduced-form equation in which the natural rate is a function of exogenous structural variables such as the replacement ratio and union density. Dynamic adjustment terms capture the divergence between the actual unemployment rate and the natural rate in an error-correction model. To estimate the model we construct a database for the period 1960–98. Most of the structural variables are unobservable or difficult to measure, so we produce a range of proxy

variables to approximate the variables in the theoretical model.

A wide range of specifications for the estimated models were tested. Overall, the empirical results can be summarised with three main findings. First, the coefficient on the unemployment rate was often statistically insignificant, indicating that the unemployment rate was not cointegrated with the structural explanatory variables. Second, in many of the equations tested the long-run coefficients on structural variables were statistically insignificant or did not have the expected sign. Finally, equations in which the long-run coefficients were statistically significant generally included variables with a positive trend over the sample period. One example was the owner-occupied housing rate, which can be used as a proxy for the degree of labour mobility. However, typically, re-estimating the equation with a linear trend rather than the trended variable produced similar results, suggesting that these variables are simply capturing the upward trend in actual unemployment over most of the sample period, rather than capturing a structural link.

The finding of a lack of a robust and significant relationship does not necessarily mean that the natural rate does not exist, or that it is unaffected by structural economic changes. Rather, it highlights the difficulty in identifying the relationship, possibly due to the difficulty in accurately measuring structural changes, and is consistent with the findings of several other recent studies. We suggest that future work aiming to model movements in the natural rate should concentrate on alternative techniques, for example using the Kalman filter.

A monetary model of factor utilisation

Working Paper no. 154

Katharine S Neiss and Evi Pappa

The current workhorse for the study of monetary policy is a sticky-price stochastic general equilibrium model. A central component of this 'New-Keynesian' framework is that monetary shocks have real and protracted effects, which can be achieved by assuming a relatively high degree of nominal rigidity. Alternatively, the introduction of real rigidities may serve to amplify a low degree of nominal rigidity and the non-neutrality of monetary shocks. A related issue is the importance of investment in the transmission mechanism of monetary policy. A problem with sticky-price models which include capital is that output becomes excessively responsive to monetary shocks if capital can be costlessly adjusted. In order to generate realistic dynamics, sticky-price models with capital typically introduce a real rigidity in the form of capital adjustment costs—in essence making these models behave similarly to sticky-price models without capital.

The aim of this paper is to investigate the persistence properties of a sticky-price model in which variations in the intensity at which labour and capital are used in the production of goods and services. To this end we consider a dynamic stochastic general equilibrium model, modified to incorporate factor hoarding in the form of variable capital utilisation rates and labour effort, due to Burnside and Eichenbaum (1996). We build on the existing literature by introducing nominal rigidities in the form of Calvo (1983) price setting. In order to draw out the implications of nominal rigidities in the model, we compare our results to other sticky-price models both with and without capital and capital adjustment costs. We calibrate the model and examine its response to shocks to both technology and the money supply. In addition, we examine the relationship between real marginal cost and output across the model variants, and compare the persistent response of output to an unanticipated monetary policy shock.

Our key results may be summarised as follows. First, contrary to standard sticky-price models both with and without capital, a model of time-varying factor utilisation can generate a significant and relatively persistent response to monetary policy shocks, even at low levels of assumed price rigidity. The impact effect of a shock is enhanced because firms have an additional margin by which they can respond to unanticipated shocks, namely capital utilisation. Although fluctuations in capital utilisation affect depreciation, thereby introducing an additional propagation mechanism in the model, persistence is driven by the assumption of labour hoarding.

Second, stochastic simulations indicate that investment becomes even more sensitive to monetary policy shocks in a model with time-varying factor utilisation compared with standard models, which include capital. The enhanced sensitivity of investment reduces the model's reliance on nominal rigidities. This allows for a reduction in the assumed degree of nominal rigidity without sacrificing the model's response to monetary policy shocks.

The assumption of labour hoarding is therefore crucial for generating persistence, while the assumption of variable capital utilisation allows us to generate realistic investment volatility without having to introduce capital adjustment costs. These are the mechanisms that a model of time-varying factor utilisation exploits to generate real and persistent effects of nominal shocks at relatively low degrees of nominal rigidity.

Finally, the introduction of variable factor utilisation reduces the sensitivity of real marginal cost to changes in output, thereby introducing the possibility of endogenous price stickiness in a staggered price-setting. This is because firms are better able to control their marginal costs by varying the utilisation of their physical inputs in production, and so have less of a need to adjust their prices to restore their mark-up.

Monetary policy and stagflation in the UK

Working Paper no. 155

Edward Nelson and Kalin Nikolov

The volatile data for inflation, output, and interest rates in the United Kingdom prior to the 1990s, and the relative macroeconomic stability associated with inflation targeting, provide a rich basis for discriminating between rival explanations for the outbreak of stagflation. We examine alternative hypotheses with a New Keynesian model of aggregate demand and inflation determination, estimated on quarterly UK data for 1959–2000. Our model features IS and Phillips curves based on optimising behaviour, and fully incorporates the distinction between detrended output and the output gap stressed by optimising analysis. The parameters, dynamics, and definition of natural levels of output and interest rates in this model are all rigorously based on optimising behaviour. This model is suitable for monetary policy and business cycle analysis.

The particular application of the model pursued in this paper is to the ‘Great Inflation’ of the 1970s in the United Kingdom. We supplement the quantitative analysis with documented statements by UK monetary policy makers. Such an approach has been used previously to inform analysis of the US experience. Using simulations of our model as well as information on the ‘real-time’ views of policy-makers, we test alternative explanations for the outbreak of inflation in the United Kingdom in the 1960s and 1970s.

Our analysis emphasises other causes of the Great Inflation from those stressed in other studies. The

evidence we present here suggests that ‘monetary policy neglect’—the failure in the 1960s and 1970s to recognise the primacy of monetary policy in controlling inflation—is important in understanding the Great Inflation in the United Kingdom. Evidence from UK policy-makers’ statements as well as our estimated policy reaction function for the 1970s are consistent with inflation control being delegated to devices beside monetary policy.

Our model simulations suggest that the inflation outcomes of the 1970s can be understood as a combination of monetary policy neglect—which implies that policy-makers did not let interest rates respond strongly to the take-off of inflation—and mismeasurement of the degree of excess demand. The latter factor is stressed by Orphanides (2000) for the United States, and implies that policy-makers were slow to recognise the 1970s productivity slowdown, and accordingly used out-of-date and over-optimistic estimates of productive potential when setting policy. For the United Kingdom, this measurement problem was, if anything, larger than in the United States (see Nelson and Nikolov (2001)).

Our results provide support for the ability of monetary policy to deliver stable inflation, even in the face of very large shocks, provided policy follows an inflation-targeting framework.

Equilibrium exchange rates and supply-side performance

Working Paper no. 156

Gianluca Benigno and Christoph Thoenissen

How do changes in supply-side behaviour and market structure affect equilibrium exchange rates? Much discussion of exchange rate movements in recent years has linked exchange rate appreciations with beneficial supply-side developments, but to date there has been relatively little careful evaluation of the proposition. To address this issue, we propose a two-country dynamic stochastic general equilibrium model of the real exchange rate building upon Obstfeld and Rogoff's 'New directions for stochastic open economy models' paper. Our model allows us to analyse the theoretical implications of steady-state shocks to the degree of monopolistic distortion in both the goods and the labour markets as well as improvements in total factor productivity. We model each of our two economies as having two production sectors, one producing traded goods and the other producing non-traded goods. We also assume that firms producing tradable goods are able to price discriminate between the home and the foreign market for their products. A further assumption that is crucial to our results is that agents are assumed to have a bias for traded goods produced in their own country. These three modelling choices allow us to isolate three commonly used concepts of the real exchange rate, the relative price of non-traded to traded goods, the law of one price for traded goods and the relative price of imports over exports. Our analysis shows that, depending on the source of the shock, deviations of these three definitions of the real exchange rate can move in opposite directions from one another, with the deviation of the consumption-based real exchange rate equal to the sum of the individual deviations.

Given the relative weight of the euro in the ERI, we calibrate our model to match some of the salient characteristics of the United Kingdom and euro-area economies. Conditional on our calibration, we find that

increases in competitiveness, in either the goods or the labour market, brought about by a reduction in the degree of monopolistic distortion that pushes the affected sector closer towards a perfectly competitive allocation, results in a real exchange rate depreciation. This result holds for both economy-wide as well as sector-specific shocks. Increases in total factor productivity that shift the economy-wide production possibility curve outwards also result in a real depreciation. This result holds even in the case where the productivity improvement is concentrated in the traded goods sector. In this case, a model that assumes that all domestic producers of traded goods are price takers would predict a real appreciation. In our case, the fact that firms act monopolistically ensures that the domestic price of traded goods falls, resulting in a real depreciation working through the terms of trade, which, conditional on our calibration, outweighs the real appreciation that arises from our non-traded to traded goods price measure of the real exchange rate.

Having established that, for our calibration, the model predicts a real depreciation when supply-side improvements result in immediate increases in output, we examine the model's response to an anticipated future increase in total factor productivity concentrated in the United Kingdom's traded goods sector. Here, the anticipated increase in total factor productivity immediately raises the discounted value of the representative consumer's human wealth, while the productive capacity of the economy stays initially unchanged. Under certain conditions, we show that the transitional dynamics associated with such a shock result in an initial real exchange rate appreciation, followed by a real depreciation in the new equilibrium. Our paper concludes by pointing towards possible extensions to our analysis that might offer interesting avenues for future research.

Monetary challenges

*In this speech⁽¹⁾ the **Governor** described the United Kingdom's present monetary policy framework, compared it with previous arrangements, and explained the rationale behind the pursuit of consistently low inflation, noting the United Kingdom's recent strong macroeconomic performance. He elaborated the benefits of delegating the technicalities of setting interest rates to independent experts, and stressed the importance of a sound framework of accountability and transparency. The **Governor** acknowledged that despite its overall stability, the UK economy suffered from imbalances, particularly between its externally exposed and domestic sectors. He explained the MPC's decision to bolster domestic demand to offset external weakness, in line with the view that unbalanced growth was better than no growth at all. Looking forward, the **Governor** anticipated global recovery and a moderation of domestic demand leading to better-balanced UK growth in 2002, with inflation remaining around target.*

I've had a long-time interest in the RSA. I was honoured to be elected as a fellow in 1986. But this is the first time I've participated in one of your programmes.

The Society, unusually, brings together people from different backgrounds and disciplines—across the arts to the sciences, but with a common interest in social and economic progress in the broadest sense. That diversity, but also commonality, of interest is reflected in the RSA Journal, which I find a fascinating read—whenever I get the time. It's reflected, too, in your lecture programme so that I find myself slotted in between a lecture entitled 'The feel good factor', on a medical theme, and another entitled 'Chaos is good for you!' describing a creative approach to business management!

In fact I have been invited to talk about the 'Monetary challenges' we are currently facing—and, when you've heard what I have to say, you may feel that this juxtapositioning is not wholly inappropriate.

But let me begin by explaining what it is that we are trying to do through monetary policy at the Bank of England, and why.

For much of the first half of my 40-year career at the Bank of England, the emphasis of macroeconomic policy as a whole was on short-term demand management designed to manage the perceived trade-off between growth and employment, on the one hand, and inflation

and a manageable balance of payments position, on the other. Monetary policy was used in conjunction with fiscal policy and supported with various forms of direct control to pump up demand, when the economy declined and unemployment rose, until inflation and the balance of payments threatened to get out of hand, at which point all the policy levers were thrown into reverse. It was a recipe for short-termism throughout our economy.

We gradually learned from experience—perhaps more slowly in this country than some others—that there is no trade-off between growth and stability in the medium and longer term, and that, in managing demand—which of course we continue to do—we needed to pay far more attention to the underlying, supply-side, capacity of the economy to meet that demand. We came to recognise that direct controls merely addressed the symptoms of instability rather than its causes. We realised increasingly that fiscal policy was not well suited to the task of short-term demand management, and needed to be constrained within prudent limits if debt levels were to be sustainable in the medium and longer term. And this left a more distinctive and clearly defined role for monetary policy as the primary instrument for maintaining broad balance consistently over time between aggregate demand and underlying supply.

All this has become the accepted wisdom just about everywhere.

(1) Given at the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA), Birmingham, on 11 April 2002. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech167.htm

Since 1992 in this country the explicit objective of monetary policy has been to achieve stability defined in terms of a target for retail price inflation. And since 1997 the Bank of England—through the Monetary Policy Committee—has been delegated responsibility for setting short-term interest rates with the consistent aim of hitting the Government's symmetrical 2½% inflation target (on a precisely defined measure of retail price inflation—RPIX).

Now the reason we've been set that task is not—as some people imagine—because either we or the Government think that consistently low inflation is the be all and end all of economic life. It is because we learned from our earlier experience that consistently low inflation is a necessary (though not in itself a sufficient) condition for the sustained growth of output of the economy as a whole, for high levels of employment, and for rising living standards, which are more fundamentally the things that we are all seeking to achieve.

'Stability is a necessary condition for sustainable growth' has become the universal central banking credo.

So our objective—and the reasons for it—could not be clearer. But meeting that objective is not as straightforward as it may sound. The reason, of course, is that there is no simple, direct, link between our essential instrument—the short-term interest rate—and our objective, the rate of inflation.

Interest rates essentially affect the demand side of the economy. They do not directly influence the supply side, which depends upon a whole host of structural characteristics of the economy which are largely beyond the direct reach of monetary policy. What we have to do in managing short-term interest rates is to keep overall demand growing broadly in line with the underlying—sustainable—supply-side capacity of the economy as a whole to meet that demand. In other words, we are trying to maintain overall, macroeconomic, stability in a much broader sense, in the medium and longer and not just the short term; and the Government's inflation target is the criterion against which our success, or otherwise, in achieving that broader macroeconomic stability is to be measured.

Our problem is that we don't know with any great precision or confidence exactly what is happening on the supply side—that's to say precisely what rate of growth we can hope to sustain. We don't know precisely

either what is currently happening, or what is likely to happen, looking forward over the next couple of years or so, to overall, aggregate, demand. And we don't know precisely what the full impact of a change in interest rates will be on aggregate demand, or how long it will take before that full impact is felt.

Ours is not a precise science. In fact it's more of an art than a science. And, although we bring as much economic and statistical science to bear as we can, we know that our forecasts, and indeed our policy judgments, are subject to a range of error. They cannot be accurate to every last digit. We can't expect to hit the target all the time, but by consistently aiming to do so (and we do consistently aim to do so looking two years or so ahead) we can hope to get reasonably close to the target on average over time.

I'll come back in a moment to the objective, and to our experience measured against it. But perhaps I might digress briefly to make a couple of points about the principle of delegation of operational responsibility for monetary policy to the Bank.

Some people I know had misgivings about that when it was introduced in 1997 on the grounds that interest rates are intrinsically a matter for elected politicians. But that neglects the fact that within the present framework in this country the Government specifies the objective of policy. That is a political decision insofar as there may be a short-run trade-off between growth and inflation—and the Government delegates only the technical task of setting interest rates to achieve that objective to the Bank. I'm bound to say I welcome that distinction because the fact that the Government sets the target for monetary policy means that it is unambiguously committed to what we are tasked to do, and that, in turn, helps in some degree to distance the Bank from political debate.

But there are two necessary consequences of this arrangement.

The first is that you need independent, technical, experts to do the technical job entrusted to the MPC—not people appointed for their political convictions, nor representatives of particular economic or social interests. In that respect I think we have been extremely well served: the members of the Committee have been invariably well qualified for the technical jobs they've had to do; but more than that they have typically known

enough, including about the inevitable uncertainties I have referred to, to know when they could be reasonably confident in their views and when they were guessing—as we all have to do at the margin. The Committee has been divided, generally very narrowly divided, in its forecasts and policy judgments more often than not since we started. That is both natural and healthy. But what is important is that the debate has typically been measured and reflective—and remarkably free of acrimony and dogma. And that to my mind is fundamental to the strength of the process.

The second corollary is that the MPC process should be transparent and that its members should be individually and collectively publicly accountable for their decisions. Transparency is assured by the publication of detailed minutes of our monthly meetings just two weeks after the event, and by the publication of our quarterly *Inflation Report*. These publications, and the continuous stream of speeches and interviews all around the country by members of the MPC, ensure broad accountability to the public at large. We see this as very much in our own interest, as monetary policy is likely to be more readily accepted—and more effective—if people generally understand what it is we are doing and why. But, beyond this, we publish each individual MPC member's voting decision each month—which they can then be expected to explain. Our procedures (though not our decisions) are regularly reviewed by the Bank's Court of Directors, and reported on to Parliament through the Bank's *Annual Report*. We regularly appear before the Treasury Select Committee of the House of Commons and the Economic Affairs Committee of the House of Lords. And, as Chairman of the MPC, I am required to write an open letter to the Chancellor if inflation strays by more than 1% either side of the 2½% target, explaining why inflation was adrift, how long the divergence might last, and the action we propose to take to bring it back on course.

So far as I am aware, taken as a whole, these arrangements provide far greater transparency of, and greater accountability for, the monetary policy process than anywhere else in the world.

But let me revert to my main theme of the monetary policy objective and our performance against it.

Since an inflation target was first adopted in October 1992, inflation on the target measure has averaged just 2.6%—and has been more stable than at any time in our

history. Since 1997 when the present target—and accompanying regime—was introduced, inflation has averaged 2.4% against the 2½% target. And, on the latest reading, RPIX inflation was 2.2% in the year to February.

Now some people have suggested that, because inflation has recently been fairly consistently below target—albeit marginally below, by less than 0.5 percentage points on average over the past two years—monetary policy has been unnecessarily restrictive over this period. They've even suggested that we are not behaving 'symmetrically'—aiming to avoid an undershoot, below 2½% as determinedly as we aim to avoid an overshoot, which is of course what we are tasked to do.

Well, of course, hindsight is a wonderful thing!

Quite frankly I am amazed that we've been as consistently close to the inflation target as we have, and I'm astonished that I have not—or not yet at least—had to write an open letter to the Chancellor. Quite apart from the more general uncertainties, there have inevitably been a series of surprises (or 'shocks' in the jargon)—including a persistently stronger-than-expected exchange rate against the euro, pronounced swings in the oil price, or varying rates of increase in excise duties, for example, any of which can have a significant and persistent impact on the outturn. That's not a matter of self-justification—it may well be more by luck than judgment; to be honest I'm more interested in the result. But I am concerned that people should understand that operating monetary policy is an inevitably imprecise process, and that they should not expect from it more than it can deliver.

But however that may be, the even better news is that since 1992, stable, low, inflation has been accompanied by steadily increasing overall output and employment, and by a progressive fall in the rate of unemployment.

Over the same period, to the fourth quarter of last year, GDP growth averaged just under 3% a year—which is well above most estimates of our trend rate of 2¼%–2½%. GDP had in fact grown for 37 successive quarters which is the longest period of sustained quarter-by-quarter growth we have enjoyed since quarterly records began in the United Kingdom in 1955.

Employment has increased steadily from a low point of 25½ million people in the Spring of 1993 to its current

level of 28 million. And the rate of unemployment fell from a peak of over 10¹/₂% on the LFS measure to around 5% last summer; on the claimant count measure it fell from some 10% to just over 3%, which meant that the number of people claiming unemployment benefit, at under 950,000, was the lowest for 26 years.

Short-term interest rates are at a 38-year low.

All of that, it seems to me, gives the lie to a view that was quite widespread a decade ago, that sustained low inflation would inevitably mean continuous suppression of the real economy. I'd go further myself and suggest that it provides considerable positive support for the central bankers' credo.

Now some of you—given what's been happening to your own businesses, to certain particular business sectors, and in regions of the country where those sectors are particularly heavily concentrated—may think that I've been living on a different planet. The problem is—and it is a real problem—that with the best will in the world macroeconomic stability, the stability of the economy as a whole, cannot guarantee stability at the more microeconomic level: it can not guarantee the prosperity of every individual business or even of whole business sectors or geographic regions. Once you look beneath the apparently benign surface of the economy as a whole in recent years, you find very substantial differences, in particular between many internationally exposed sectors of the economy—including particularly many manufacturing businesses—which have recently been having a really tough time, and other businesses largely serving our domestic market, which have been doing pretty well.

Let me assure you that the MPC is only too well aware of the problem. We receive regular monthly written reports from the Bank's twelve regional Agencies all around the country on the state of the economy as seen through the eyes of their 7,000 or so business contacts. That includes reports from John Bartlett, our Agent here in Birmingham, and Chris Brown, our Agent for the East Midlands based in Nottingham, both of whom will be known to many of you. And about half the Agencies by rotation attend our monthly pre-MPC meeting in London to brief us face to face. Beyond that, each individual MPC member makes regular visits to businesses located all over the country to see and hear for themselves. All of this plays a vital role in informing our interpretation of the bare economic and financial

statistics. It's not that we do not know what's happening at the microeconomic level, the question is what can we—what should we—do about it in setting monetary policy?

It has to be said at the outset that some of the pressures businesses are facing are the result of long-run structural change affecting the global economy. The spread of international free trade under the auspices of the WTO is undoubtedly a positive development for all of us at the macroeconomic level, but it is an added challenge to existing producers at the microeconomic level, and this country is not alone in resourcing supplies to some of the transition economies in Eastern Europe or to emerging markets in Asia and elsewhere. Nor can we—or should we seek to—avoid the impact of technological change.

But there are two main reasons for the particular pressures recently affecting the internationally exposed sectors of our economy: the synchronised economic slowdown over the past year or so in all major industrial countries, on the one hand; and the puzzling and persistent weakness of the euro in foreign exchange markets not just against sterling but even more against the dollar, on the other.

It is a striking fact that world trade in goods, which has grown at an average rate of around 7% since 1990, and grew by over 12% in the year 2000 alone, hardly grew at all last year! What that has meant for the UK manufacturing sector is that output in the year to January (the latest month for which we have internationally comparable data) fell by around 6%, and employment in manufacturing fell by 165,000 people, or by some 4%. (I'm delighted to note, however, that manufacturing output picked up modestly in February—the first monthly increase since August.) For what it's worth, we were not alone in experiencing the earlier decline. Comparable figures show that manufacturing output fell by over 11% in Japan, and by close to 5% in both the United States and Germany, while manufacturing employment fell by 6¹/₂% in Japan and 7¹/₂% in the United States—that's to say by more than in this country—although it fell by less than 2% in Germany.

The frustrating thing is that, with the best will in the world, there was not much that either we at the Bank, or the UK Government, could have done to ward off the pressures on UK manufacturing, which had their origins abroad.

That's fairly obvious where we are talking about the global slowdown—with negative overall growth last year of about 2% in Japan (fourth quarter on a year earlier) and close to zero growth in the United States and Germany. This compared with growth of just over 1½% in this country—by some margin the highest in the G7. We can go to international meetings and encourage the respective authorities there to stimulate their economies, but there is nothing that we can do about it directly ourselves.

What we were able to do—given that inflation was marginally below target—was to try to compensate for that external weakness by stimulating domestic demand here in the United Kingdom. The Bank sought to do this by cutting interest rates to buoy up consumer spending. And the Government stepped up its own spending, which was helpful given the international environment. Although we couldn't avoid an overall slowdown altogether—the economy on the latest data ground to a halt in the fourth quarter of last year—we have managed for most of the time to keep the UK economy as a whole moving forward, despite the recession in the internationally exposed sectors of manufacturing.

Of course we'd all have been much happier with better balanced growth. Stimulating domestic demand to offset the external weakness—the only option available to us—was very much a second-best option. It was not without its own risks, including the build-up of household debt and the current exuberance in the housing market. But it was better than doing nothing at all. That would have meant a much sharper slowdown, and probably recession, in the economy as a whole. And, given that inflation was well under control, it would have meant a quite unnecessary loss of overall output—and income and employment. In effect, we took the view that unbalanced growth was better than no growth.

It is perhaps less obvious that we could not have done more to weaken the exchange rate. At around \$1.40–\$1.50, sterling's value against the dollar through this period was not seen by most people even in the internationally exposed sectors as a particular problem. The problem—for businesses trading or competing with firms in the eurozone, our largest trading partner—was the persistent and puzzling weakness of the euro. Now many people think that we could have caused the pound to fall against the euro simply by cutting our interest rate somewhat further relative to the interest rate in the

eurozone. But it really isn't as simple as that. The United States has reduced its interest rate far more aggressively than the ECB over the past year or so, and to well below the ECB's rate (to 1.75% as against 3.25%), but the dollar is actually stronger today against the euro than it was at the start of last year. And the same is true, though to a lesser degree, of ourselves: UK interest rates were reduced by 2 percentage points from the beginning of 2001 compared with a fall of 1½ percentage points in the eurozone, yet sterling is stronger against the euro (though weaker against the dollar) than it was to begin with.

I don't think I can offer you a wholly convincing explanation for the euro's weakness since its introduction. It seems to have been driven by capital flows reflecting expected medium and longer-term future corporate earnings growth rather than short-term interest rate differentials, and it is often suggested that these expectations reflect perceived supply-side rigidities within the eurozone. But whatever the explanation, the resulting strength of sterling against the euro has contributed to the pressure on the internationally exposed sectors of our economy, and a stronger euro would, from my perspective, help us towards better balanced growth in this country. It would also incidentally facilitate debate about sterling's possible entry into the single currency, in the sense that the undoubted attraction of nominal exchange rate certainty *vis à vis* our European trading partners, which is a major potential advantage of our adopting the euro, must depend to some degree on the likely exchange rate at which we might join.

These then are the monetary challenges that we have faced over the recent period.

The question now, of course, is where do we go from here?

There has recently been encouraging evidence—in the US data particularly, but also, for example, in many of the more forward-looking indicators of European economic activity—that we are now in the early stages of global recovery. We cannot be sure that the early momentum will be maintained; nor do we know just how strong the expansion will prove to be or how long it will last; but the signs are promising, and indeed far more positive than any of us would have dared to hope just six months or so ago in the aftermath of the terrorist attacks on New York and Washington.

As it becomes clearer that the international environment really is improving, and that we really are seeing a sustained pick-up in external demand, then we can look forward to better balanced and generally stronger growth in our own economy.

That will in due course mean that domestic demand growth—and consumer demand growth in particular—will need to moderate if we are to avoid a build-up of inflationary pressure. It's quite possible, even still quite likely, that the necessary moderation of consumer demand—and I emphasise the word moderation—will come about of its own accord.

And that would be the best possible outcome for our own economy. But if consumer spending were not in due course to moderate of its own accord, and depending on the timing and the strength of the recovery abroad, we would clearly need at some point to consider raising interest rates to bring that moderation about.

But for the time being, and whatever the precise numbers, the overall prospect for the British economy over the next couple of years is for output growth picking up to around trend and inflation to around target. And if that is indeed how things turn out, we will have weathered the international storm as well as anyone could reasonably have expected.

The Monetary Policy Committee: five years on

In this speech,⁽¹⁾ Mervyn King, Deputy Governor, reflects on the first five years of the Monetary Policy Committee. He poses four questions about the role and record of the MPC. First, why give the power to decide interest rates to a committee rather than an individual? Second, does it matter that the MPC frequently disagrees about its decision? Third, has the Committee communicated clearly the reasons for its decisions? Fourth, does the MPC require reform?

Five years ago, the power to set interest rates in this country was given to a new Monetary Policy Committee (the MPC). That decision is still widely regarded as the most important taken by the incoming new Labour government. At the time, the decision to create the MPC was controversial. That is hardly surprising. Few decisions have as much economic impact as the level of short-term interest rates. They attract the interest of politicians and the media, yet when the MPC sets interest rates, it acts independently of government. The Government sets the target, but the Committee sets interest rates to meet that target.

Compared with many other countries central bank independence in the United Kingdom is relatively recent, although not unprecedented. The most famous cartoon of the Bank of England—Gillray's *The Old Lady of Threadneedle Street*—shows Pitt, Prime Minister at the time, ravishing an old lady—personifying the Bank—whose dress is made of one-pound notes. The Pitt Government had made repeated demands on the Bank of England for gold to pay for the wars against France. Eventually, the fall in the Bank's reserves forced it to suspend convertibility of its notes into gold, and low denomination notes were issued for the first time. The Gillray cartoon—which appeared in May 1797—was the origin of the moniker, the Old Lady of Threadneedle Street. Was it mere coincidence, or divine retribution, that it was exactly two hundred years later, to the very month, in May 1997, that the Bank of England regained its independence?

In an age when governments are increasingly held responsible for more and more aspects of our lives, there

are not many examples of major decisions being delegated to a non-political body. The Monetary Policy Committee has broken new ground in British constitutional history. Only three months before the MPC was set up, Peter Hennessy described the British system of government as dependent upon 'a handful of inside advisers spinning between them what Phillip Ziegler has called "instantly invented precedents" from the warp and woof of past constitutional practice and experience'. For much of the past 40 years there have been rather too many 'instantly invented precedents' in the conduct of monetary policy. But, very occasionally, a constitutional reform occurs which leads to a new piece of machinery. That was the case with the MPC.

The Committee itself has an interesting and unusual structure: five executive members of the Bank and four external non-executive members, all chosen for their expertise on monetary policy and not as representatives of different interest groups. You may wonder whether the nine members of the MPC have any historical antecedents. If you look carefully you can see them in one of our few remaining great Jacobean houses—Aston Hall in Birmingham. In the Great Dining Room there is a frieze, a marvellous example of early 17th century plasterwork, showing a set of nine warriors. These are known as the 'nine worthies', described as 'high-relief figures in their own niches separated by scrolling'; a pretty good description of the MPC. The Nine Worthies of Chivalry as they are known, comprise three groups: three honest heathens, three Old Testament heroes and three champions of Christendom. It is interesting to speculate into which of these groups various members of

(1) Delivered to the Society of Business Economists in London on 22 May 2002. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech172.pdf. I would especially like to thank Clare Lombardelli, James Proudman and James Talbot for their expert help in conducting and analysing the experiment reported in this paper. I have also benefited from useful comments from Charlie Bean, Mark Cornelius, Spencer Dale and Peter Rodgers. Richard Geare provided help with the data.

the MPC fall, but I will leave that to you. But, wait a moment, there are two additional figures in the frieze. One is Perseus—presumably the minute taker. The other is described as a ‘so-far unidentified figure, certainly a later pastiche’. This must be the Treasury representative. Sadly, the debates among the nine worthies, presumably recorded in the minutes and reported to Sir Thomas Holte who commissioned the frieze, are lost to posterity. In contrast, the debates among the MPC are published in the monthly minutes and are the subject of much commentary in the press.

This evening, I want to pose four questions about the role and record of the MPC. First, why give the power to decide interest rates to a committee rather than an individual? Second, does it matter that the MPC frequently disagrees about its decision? Third, has the Committee communicated clearly the reasons for its decisions? Fourth, does the MPC require reform?

Let me try to answer those questions in turn.

First, why give the power to decide interest rates to a committee?

The academic argument for central bank independence is well established, but why delegate monetary policy to a committee rather than an individual? In many other situations where expertise is crucial, groups of experts are often regarded as superior to individuals. So one motive could be that committees make *better* decisions. The technical nature of the monthly interest rate decision gives a natural division of responsibilities between a democratically elected government that chooses the target and an appointed group of experts who set rates to meet that target.

One dissenting voice comes from Sir Alec Issigonis—inventor of the Mini—who once said, ‘A camel is a horse designed by a committee’. Despite this view, there is a wide range of evidence to suggest that in many other real-world scenarios, a committee is often the preferred decision-making body. Really important people are treated by teams rather than a single doctor, and when legal decisions reach the highest level of appeal it is to a panel of judges such as the Law Lords and the Supreme Court, not a single individual, to whom the case is referred.

Decisions that depend on technical knowledge seem, by revealed preference, to be given to groups rather than individuals, and setting interest rates by committee is no exception. A wide-ranging survey undertaken by the Centre for Central Banking Studies at the Bank of England found that 79 central banks out of a sample of 88 use some form of committee structure when setting monetary policy.⁽¹⁾ But there is, by its very nature, rather little empirical evidence on the relative merits of decision-making by individuals versus groups. And, even if one accepts that some decisions should be delegated to technical experts, what is the best way to weight together the opinions of those experts?

This problem motivated Alan Blinder—a former Vice-Chairman of the Federal Reserve Board—and his colleague John Morgan at Princeton to adopt a different approach: carrying out two ‘laboratory experiments’ using groups of Princeton students to test whether groups do indeed make decisions differently.⁽²⁾ Their first experiment was purely statistical: subjects were asked to identify when a one-off change in the proportions of red and blue balls in an electronic urn took place. The second asked participants to play a simple monetary policy game, setting a short-term interest rate in order to minimise a loss function described by deviations of unemployment and inflation from desired target levels. The data-generating outcomes for this hypothetical economy came from a two-equation macroeconomic model of a fairly standard kind. Again a structural change—this time to the ‘natural’ real rate of interest—would occur at some point during the game, and, by observing data generated by this economy, players would need to learn about the change in structure in order to set the appropriate interest rate.

All the students who participated played both as individuals and in a group. In both experiments success could be measured on a quantitative scale, and both led to a common conclusion: that decisions made by committees were superior to those of individuals. How robust was this result? And what explained it?

Last year, a team from the Bank of England attempted an exercise very much like Blinder and Morgan’s monetary policy experiments using a sample of just under 200 economics students from the London School of

(1) Fry, M, Julius, D, Mahadeva, L, Roger, S and Sterne, G (2000), ‘Key issues in the choice of monetary policy framework’, in Mahadeva, L and Sterne, G (eds), *Monetary frameworks in a global context*, Routledge.

(2) Blinder, A S and Morgan, J (2000), ‘Are two heads better than one: an experimental analysis of group vs individual decision making’, *NBER Working Paper*, No. 7909, September.

Economics.⁽¹⁾ Using a simple macroeconomic model that was broadly representative of the UK economy, the experiments examined how the performance of groups differed from that of individuals. And again they found striking evidence that committee decisions were superior.

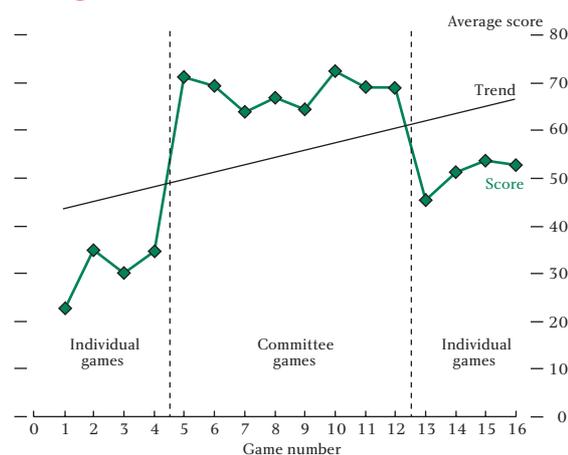
In the Bank study, each participant was asked to play a simple, computer based, monetary policy game 16 times: four rounds as individual policy-makers, followed by eight rounds in a committee of five players, and finally a further four rounds as individuals. The committee stages were divided into two parts: four rounds where committee members were not allowed to discuss their decisions—although they could observe the unattributed votes of other players—and a further four rounds where discussion was permitted. As a control for learning, the order of the ‘discussion’ and ‘no discussion’ set of games was randomised across the committees.

Each game consisted of ten periods of play in each of which the individual or committee had to decide what interest rate to set in response to the data for output and inflation generated in the previous period. In the committee stages, the majority—or, more precisely, the median—vote was implemented once all committee members had entered a vote into their respective computers.

Participants were told nothing at the start of the experiment about the structure of the economic model with which they were playing, or the disturbances that it was subject to, other than that a structural change occurred at some point during each play of the game. In short, they were operating—much like real-life monetary policy makers—in uncertain conditions, doing their best to identify the shocks that hit the economy and offsetting their impact by adjusting the short-term interest rate.

To quantify their performance, players were scored according to their ability to keep inflation close to a pre-specified target and to minimise output fluctuations, and were paid a modest amount for doing so. Chart 1 shows the pattern of average scores over the different stages of the game. Three features are striking:

Chart 1
Average committee scores over time^(a)



(a) Players are scored according to their ability to keep inflation close to a pre-specified target and to minimise output fluctuations across each of the sixteen ten-period games. The chart shows the evolution of scores over time:

- For the individual games, numbers 1–4 and 13–16, each diamond represents the mean individual score across the 170 participants.
- For the committee games, numbers 5–12, the diamonds represent the mean score across the 54 committees. In these stages, the five members of the committee vote in each period and the ‘majority’—or, more precisely, the median—interest rate is set. Each committee is then scored according to this median outcome.

- The significant upward trend in the results. Players clearly learned how to play the game as time went on.
- The large upward movement in scores when players moved to committee decision-making.
- The large downward move in scores when participants returned to playing as individuals.

These results support the idea that committee decisions represent a significant improvement over those of the individuals that comprise them. What might account for these results? The Blinder and Morgan and Bank studies suggest two main reasons. First, collective decision-making appears to give more weight to the better and less weight to the worse committee members, as judged by their scores when playing the game as individuals, than would be implied by taking the mean of individual performance. The best players had some influence on the decisions of the group of which they were a member. And the impact of the worst player was offset by majority voting. In other words, the median score of the players in the individual rounds was significantly above the mean, implying that the average was pulled down by a minority of relatively bad players.

(1) Lombardelli, C, Proudman, A J and Talbot, J I (2002), ‘Committees vs individuals: an experimental analysis of monetary policy decision-making’, *Bank of England Working Paper*, forthcoming.

Second, there was also evidence from the experiments consistent with the hypothesis that committees enable all members to improve their performance by sharing information and learning from each other. And it was striking that the performance of committees was on average somewhat better than that of the single best player on the committee when playing alone. So in terms of group decisions, it appears that the whole is different from—and generally better than—the sum of its parts.

Producing the perfect design of a committee structure that would make the best decisions is a task with no simple answer. But the MPC embodies several features that seem desirable. First, there is a clear objective given to the Committee from outside, in this case by the Government. Second, the members are chosen for their technical ability. Third, the votes on the MPC are transparent, and hence members can be held accountable. The merit of individual accountability is that each individual in the group has a genuine incentive to reach a good decision. This aspect leads us directly into my second question.

Second, does it matter that there are differences of view among Committee members?

From the outset, commentators have been unable to resist labelling members of the Committee as either ‘hawks’ or ‘doves’. I have argued before that it makes no sense to use these descriptions because each member of the Committee has the same objective. Members of the MPC cannot entertain closet views about their desired inflation rate because they will be held personally accountable for their judgments about the level of interest rates necessary to meet the mandated inflation target. As circumstances change, it is easy to imagine that ‘hawks’ shall be ‘doves’ and ‘doves’ shall be ‘hawks’.

But that is not to say that differences of opinion do not, and should not, exist amongst committee members. If part of the reason for the improvement of groups over individuals is their pooling of knowledge, then differences of opinion during the discussion that takes place at each MPC meeting should be central to the Committee’s performance. As *The Economist* put it back in 1998 (when there were only eight serving members):⁽¹⁾

‘With the economy on the turn, the MPC has to sift mixed evidence... It would be remarkable if eight

intelligent, well-briefed economists could be of one mind.’

But this point is not always readily understood, even by the most astute commentators. In July 1998 the *Financial Times* suggested:

‘...the MPC bears a closer resemblance to a post-graduate seminar than to a forum for strategic decision-making... To put [several] economists in the same room is to invite what one commentator has called paralysis by analysis.’

And in the same month, *The Times* described the MPC as ‘a committee bursting to the brim with individual opinions’ implying that ‘periods of badly co-ordinated and erratic behaviour are only to be expected’.

But it is precisely the exploration of alternative views about what is happening in the British economy, and the discussion of these views by the Committee in a spirit of investigation not advocacy, that is central to the pooling of knowledge through which committees reach decisions that are superior to those taken by individuals. I think that is increasingly understood by commentators, and helps to explain why split votes are now regarded as normal and not a source of great excitement. It is, nevertheless, important that there are no ideological differences among Committee members that would make rational debate difficult, and, in this respect, the Committee has so far been fortunate.

A famous 1970s’ laboratory experiment also showed the value of a frank exchange of views within a committee.⁽²⁾ It featured groups of senior managers working together to solve a complicated problem in a game called ‘Lost on the Moon’. Subjects were asked to rank a list of objects in order of their necessity for survival after their spaceship had inadvertently crash-landed on the moon. It was found that the best-performing groups—or those which got closest to the ranking suggested by experts at NASA—were those which were least consensual in the early stages of discussion, exploring all possible avenues and ideas. Groups which established a common consensus quickly were often ineffective, suggesting that at least some disagreement is beneficial for committee performance because it stimulates discussion and hard thinking. Differences of view on our Committee are an honest reflection of the uncertainty about both the data and the structure of the economy.

(1) *The Economist*, 18 April 1998, page 28.

(2) Hall, J (1971), ‘Decisions, decisions, decisions’, *Psychology Today*, November.

To date there have been 61 meetings of the Monetary Policy Committee. The votes cast at those meetings are summarised in Table A. It includes the votes of the May meeting which were published on 22 May. At those 61 meetings, interest rates were raised on nine occasions, were lowered on 14 occasions, and left unchanged at 38. At the first seven meetings during 1997, decisions were reached unanimously. The number of voting members varied between five and eight as the membership of the Committee built up. The first dissenting vote was cast in January 1998. Since the beginning of 1998, the voting has been divided reasonably evenly among all possible combinations of votes (remember that there were nine voting members only from June 1998 following the passage of the Bank of England Act). Of the 54 meetings since January 1998, four dissenting votes have been cast on six occasions, three on seven occasions, two on eleven occasions and one on 16 occasions. At only 14 meetings has the vote been unanimous, and no one—sensibly—has seen fit to abstain, so that during the past five years the frequency of unanimity among the Committee has been little more than one in four. Differences of view have become accepted as the norm, and this appears to have done little damage to the credibility of the Committee.

Nor has there been much sign of ‘blocs’ of votes, whether internal or external. There have been 15 occasions on which members of the executive of the Bank have been on opposite sides of the vote, and 37 occasions when externals have found themselves divided. It is true to say that dissenting votes have been more common among external than executive members. Of the 83 dissenting votes cast during the history of the MPC, 25 have been cast by executive members and 58 by external members. But of these 58, no fewer than 44 are accounted for by three of the eight external members, Willem Buiter, DeAnne Julius and Sushil Wadhvani. For the remaining five external members, the propensity to be in the minority has been

very similar to the Bank executive (excluding the Governor), with dissenting as a proportion of total votes at 12% and 11% respectively.

Moreover the differences in votes have been small. On only four occasions has the difference between the highest and lowest interest rate voted for exceeded 25 basis points, and, interestingly, all four were between August 1998 and April 1999, a period of great uncertainty about whether there would be a downturn in the world economy that did not in fact materialise. Since then differences of view have never exceeded 25 basis points. The average difference between the interest rate cast by the member voting for the highest average level of rates and the member voting for the lowest average level of rates is less than 15 basis points! Such a small difference hardly corresponds to a major difference of view about the outlook for inflation.

Third, has the Committee explained clearly the reasons for its decisions?

Transparency has been at the centre of the monetary policy framework since 1992 when it was recognised that clear explanations of policy would help to anchor inflation expectations on the target. The first major step in enhancing transparency was the Bank’s *Inflation Report*, which first appeared in February 1993, and was subsequently enhanced by publication of the minutes of the meetings between the Chancellor and Governor. That transparency was given a further boost by the creation of the Monetary Policy Committee where the votes of all members are published along with the minutes of the discussion at MPC meetings.

Despite its record on transparency, questions have been raised about whether the MPC could go further. Do the published minutes reveal enough about individual views? Should there not be individual paragraphs in the minutes explaining the position of each member? Why

Table A
Cumulative MPC voting record

Voting statistics (since June 1997)	Eddie George	Howard Davies	Mervyn King	David Clementi	Ian Plenderleith	John Vickers	Willem Buiter	Charles Goodhart	DeAnne Julius	Alan Budd	Sushil Wadhvani	Stephen Nickell	Christopher Allsopp	Charles Bean	Kate Barker	Actual
Meetings attended	61	2	61	58	61	28	36	36	45	18	37	25	25	21	13	61
Voted up	9	2	17	8	9	10	17	12	2	5	3	3	0	0	0	9
Voted down	14	0	12	14	13	7	10	7	18	6	16	7	10	8	4	14
Voted no change	38	0	32	36	39	11	9	17	25	7	18	15	15	13	9	38
Voted with majority	61	2	51	54	56	23	19	33	31	14	24	22	21	20	13	-
Voted different to majority	0	0	10	4	5	5	17	3	14	4	13	3	4	1	0	-
Voted no change when change	0	0	2	1	2	0	0	0	3	0	1	0	0	0	0	-
Voted change when no change	0	0	8	3	3	5	17	3	11	4	12	3	4	1	0	-

does the Committee not publish a forecast corresponding to the path of interest rates that it feels most likely to be necessary to meet the inflation target? Why does the central projection of the forecast always seem to end up at close to the target of 2.5%?

It is helpful to step back and ask three more fundamental questions. First, what is the MPC trying to communicate? Second, how should it communicate? Third, what is the role of the inflation forecast?

The basic message which the MPC is trying to communicate is that, over the medium term, inflation should be expected to average 2.5%, and that the Committee will respond to events as they unfold in order to keep inflation on track to meet that target. Hence the Committee needs to explain its view of the current state of the economy, how and why it has reacted to events that have already unfolded, and what it believes are the risks lying ahead. All of this can be encapsulated in its 'policy reaction function'. Commentators and others may form their own views about the likelihood of various economic shocks occurring, and in that respect it is more important for them that the Committee explains its policy reaction function than attempts to provide guidance on the likely future path of interest rates. And when the Bank of Canada tried to anticipate the likely future path of monetary conditions, it found that, despite its clear explanations of why the future could not be easily anticipated, markets took those anticipations as commitments, and were surprised when unforeseen events resulted in different policy outcomes. In contrast, the MPC does not attempt to anticipate its own decisions.

In addition to explaining the Committee's views on the economy, and the balance of risks to inflation, there is a second important role for communication. That is to explain the views of the nine individual members of the Committee so that they can be held accountable for their judgments. There is, therefore, an inherent tension between a system of nine individually accountable members, with their associated views, and a Committee from which a single decision emerges that requires a clear explanation each month. The former produces, as I have argued, better decisions; the latter is important for the predictability and thus the efficiency of monetary policy. The communication strategy of the MPC must provide a balance between these two objectives, a point acknowledged in the report by Don Kohn on the procedures of the MPC.

The need to achieve such a balance leads directly to the question of how the Committee should communicate its thoughts. The minutes of the MPC meetings, now released only 13 days after the decision itself, provide a detailed explanation of the issues that confronted the Committee and the arguments that were made during the meeting. They also contain the votes of individual members. The Committee has discussed, but rejected, the proposition that the minutes should contain individual paragraphs summarising the views of each member in turn. The reason is that such a procedure would alter the nature of our meetings quite radically. At present, they are a free-flowing discussion in which members discuss propositions and counter-propositions in a spirit of mutual enquiry rather than an exchange of fixed and conflicting views. Discussion focuses on the relative merits of different possible explanations for the current state of the economy. If each member faced a deadline by which they had to produce a polished paragraph summarising their views, members would enter the meeting with such a paragraph in draft form and the spontaneity of the discussion would be lost.

For the same reason, it is not clear that the publication of transcripts of meetings enhances transparency. The Federal Reserve provides a useful case study. Prior to 1994, members of the Federal Open Market Committee (FOMC) were largely unaware that monetary policy discussions were being transcribed verbatim from audio recordings of the meetings. Congress learned of the availability of the transcripts shortly after this, and in February 1995, insisted that they be published with a five-year lag. Once committee members became aware that their meetings were being recorded, the structure of the discussion appeared to change. Before 1995 meetings had begun with prepared speeches followed by a free-flowing debate characterised by a frank exchange of ideas. But after 1995, there appears to be a much greater tendency for meetings to become an exchange of prepared statements, and some of the colour of the previous discussion may have been lost.

Explanations of decisions in the form of press statements issued at the time of the announcement of decisions on interest rates have become less frequent. But this is principally because there have been fewer interest rate changes recently. In its first three years, the Committee moved rates 16 times and issued press statements on 14 of those occasions. It also issued two statements when it had not moved rates. Over the past two years the Committee changed rates seven times, accompanied by

six statements, with no statements when rates were left unchanged. The purpose of a press statement is to explain a decision reached, by definition by a majority of the Committee. Because it is brief it cannot do justice to the richness of the discussion at the Committee, and the balance of views is not represented. Hence the Committee has come to the view that, by and large, it is better to wait until the publication of the minutes when a fuller view of issues and views can be provided. That is not to say that press statements will not appear in future, but to stress that their purpose is limited to explaining a decision that might be unexpected, irrespective of whether that is a change or no change in rates.

On the whole, the minutes have been successful in creating a wider understanding of the issues discussed by the MPC, and have a devoted, if small, following. The *Inflation Report*, which pre-dates the MPC, has a broader objective in setting out a comprehensive view of the current state of the economy, and describing the outlook for inflation in terms of a forecast over a two-year horizon. The Committee puts great weight on explaining the forecast in terms of probabilities. Hence it has adopted the famous coloured fan charts for its forecasts for both growth and inflation. But there remains some confusion about the role of the forecast. With the advent of the MPC, the tensions between explaining nine individual views and presenting a coherent account of the Committee's view of the economy have complicated the production of the forecast. The *Inflation Report* now contains an explicit description of differences of view among the Committee in respect of both the central projection and the risks to the forecast, as well as the 'best collective judgment', or majority view, of the outlook. But the main focus of the *Inflation Report* is to present a collective view. To publish nine individual fan charts would hardly increase transparency, and the differences of judgment have to date been sufficiently small that it would be difficult for commentators to observe significant differences among those charts. This tension between the need to explain the diversity of members' views, and the need to provide a clear rationale for the single decision, suggests that the Committee may need to explore further ways of putting across its collective view.

It should be clear that there are both benefits and costs to a group decision-making process. The transparency

and accountability of individual views helps to make better decisions. But it also complicates the communication of the decision to a wider audience, whose expectations of inflation matter for economic behaviour. The avoidance of confusion requires some forbearance by individual members of the Committee, and a clear understanding of which forms of communication are appropriate to explain individual views and which forms are suitable for explaining the reasons for a collective decision. I am sure that the Committee will learn more about how best to achieve this balance as time goes by.

Fourth, does the MPC require reform?

Despite its youth, at least in central banking terms, the MPC has not suffered from lack of advice on how to improve itself. There have been six reports from the Treasury Select Committee, two reports from the House of Lords' Committee on the MPC, reports by a commission of the Conservative Party and by the Liberal Democrats, a report by the Engineering Employers' Federation, recommendations by many economists, including former MPC members, and, last but not least, the report commissioned by the Bank of England itself by Don Kohn, a senior staff member of the Federal Reserve Board and recently nominated by the President for appointment to the Board of Governors. Overall, the verdict on the Committee has been broadly positive. For example, in his 2001 review of the operation of monetary policy in New Zealand, Professor Lars Svensson describes the Bank of England and the Swedish Riksbank as examples of 'best practice' monetary policy.⁽¹⁾

Suggestions for improvement from the various groups cover the following areas: the definition of the inflation target; terms, appointments and composition of the membership of the MPC; arrangements for publication of the minutes; the forecast produced by the MPC; and, finally, a miscellaneous collection of technical matters.

The precise definition of the inflation target, and its numerical value, can be debated at length. What is important is that the target is for inflation and not additional objectives that would lead to confusion about the Committee's aims.

On the Committee itself various suggestions have been made: to extend the terms of appointment of members

(1) Svensson, L E O (2001), 'Independent Review of the Operation of Monetary Policy: Report to the Minister of Finance', www.princeton.edu/~svensson/NZ/RevNZMP.htm

of the MPC, to make those longer terms non-renewable, and to appoint people with more diverse backgrounds. By far the most fundamental of these suggestions is the proposal to appoint representatives of different industries or regions to the Committee, as opposed to monetary policy experts. That would change the nature of the debate and undermine the mutual confidence of members of the Committee in each other if it were felt that some were representing a specific interest group. With experience of the MPC, I think that this argument has come to be accepted.

The proposal that the minutes of MPC meetings should include more description of individual views I discussed earlier. The Committee has been opposed to such a change for the reasons I gave. In its early days the Committee was sensitive to the view that the minutes, then published six weeks after the meeting, should be published earlier, and it shortened that lag to 13 days in October 1998.

The forecast process has attracted much attention, and was discussed at length in the Kohn Report. Presenting the forecast in terms of a fan chart, in order to highlight the balance of risks to the outlook, has proved successful. But it has proved more difficult to explain the role of a projection conditioned on the assumption of constant official interest rates. So the Committee also publishes a forecast conditioned on market interest rates, in order to provide a guide as to how the forecast depends upon the profile of short-term interest rates.

The Committee has had more problems in trying to explain that there is no mechanical link between the central projection of the forecast for inflation two years ahead and the policy decision. This is for several reasons. First, the view of inflation both prior to and after the two-year horizon is important too. The optimal horizon over which to bring inflation back to target depends on the shock which moved inflation above or below target. Second, the risks to inflation around the central projection (defined as the mode of the distribution of inflation at future points) are also relevant to the policy decision. Third, there may be some risks to which the Committee does not wish to respond until they have materialised. But the Committee will continue to explain how its outlook for inflation relates to the policy decision, and, over time, we hope that this educational effort will pay off.

Finally, there have been several miscellaneous suggestions for change to the MPC. First, the MPC has

been accused of meeting too frequently and, as a result, changing rates too often. The EEF report suggested that the Committee meet only eight times a year, as does the Federal Reserve, because 'meeting once a month could lead a central bank into changing interest rates too often in response to potentially misleading monthly data'. In fact, since June 1997 the MPC has changed interest rates 23 times and the FOMC 20 times. Changes in rates reflect economic developments, not the frequency of meetings. In any event, the Bank of England Act 1998 states that we must meet at least once a month, and that we shall continue to do.

Second, there has been a suggestion that a more formal voting procedure be adopted for MPC meetings. The current voting procedure of the MPC is straightforward: discussion continues until each person's views are clear. The Governor then puts a proposition to the Committee which will command majority support. Some have questioned whether this procedure is robust and might bias the outcome. For example, the issue has been raised by the House of Lords Select Committee. But I think this is a misunderstanding of the way we work. It is important that our views are known to each other before we cast our votes because that is part of the process of making up our mind. The only complication with the current procedure would be if the Committee was split equally between three different courses of action. In theory, this could lead to a 'voting paradox'. The Governor would then need to decide which course was eliminated, leaving two policy choices for the Committee to choose between. That would normally be straightforward provided that, in the economist's jargon, preferences between interest rates were 'single peaked'. When this is the case the voting paradox does not apply. For preferences not to be single peaked, members of the Committee would have to prefer, for example, both no change and a rise of 50 basis points to an increase of 25 basis points. It is not easy to see under what circumstances this would represent rational preferences.

Third, the set, or as we call it suite, of models used by the Committee should be improved. They are in fact under continuous improvement and the Bank has commissioned Adrian Pagan to carry out a review of the technical aspects of modelling in the Bank. That review will be published in 2003.

Fourth, it has been suggested that the MPC should meet outside London. The Court of the Bank does indeed

meet once a year at a destination outside London, and these occasions have proved invaluable in expanding contacts between the Bank and the MPC on the one hand, and the local community, on the other. But MPC meetings themselves, as highly market-sensitive occasions surrounded by a *purdah* period, are quite unsuitable as opportunities to interact with the local business and other community. There would be little point in holding an MPC meeting outside London if the Committee were unable to speak and meet with local people. All members of the MPC travel widely around the United Kingdom outside of *purdah*, making some 50 visits during the past year, and these contacts are an important part of the process by which the MPC is informed about the state of the economy.

During its short lifetime the MPC has made changes in its procedures and remains open to the possibility of further improvements. But unnecessary tinkering would be a distraction from its main purpose. One does not have to go as far as Lord Falkland, who said in 1641 that 'If it is not necessary to change something, then it is necessary not to change it', to believe that, at least for the time being, major changes to the MPC are unnecessary. And if imitation is the sincerest form of flattery, then the Government can draw comfort from Michael Howard's speech in March of this year when he argued that 'Nor, given the importance of stability and continuity, do I think it right to propose any major changes in either the remit or the composition of the Monetary Policy Committee'. The fact that there is a broad, cross-party consensus on the objectives and broad framework of monetary policy is one reason to think that the stability we have experienced in the first five years of the MPC will continue in the future.

Conclusions

The idea behind the MPC was to take day-to-day politics out of monetary policy. It is now widely accepted that this was desirable. Macroeconomic policy in Britain had been much too exciting for comfort for most of the post-war period. In the 1970s, inflation averaged over 13% a year, and reached a peak of 27% in August 1975.

During the 1980s inflation averaged 7% a year, and it is only since the inflation target regime was adopted in late 1992 that inflation has returned to both low and stable levels. Britain tried most types of monetary regime: targeting monetary aggregates both narrow and broad; shadowing an exchange rate target, and an explicit exchange rate target through membership of the exchange rate mechanism. None was pursued for long, and none carried real credibility. It was following our exit from the exchange rate mechanism in 1992 that the opportunity arose to put in place a new monetary framework based on an explicit target for inflation and a floating exchange rate.

The aim of the MPC is to keep both inflation and inflation expectations at the target level of 2.5%. It is no small part of a central bank's role to create confidence and credibility in the belief that it will respond to any change in economic circumstances in order to maintain a broad degree of economic stability. In the economists' jargon, the public must believe that the central bank's 'policy reaction function' is consistent with stability, and if it is predictable, then announcements on interest rates should not come as news. The economic data will have led to expectations about the likely course of interest rates which, in most instances will prove a reasonable guide to the course of policy. A clear sign of the success of the MPC will be when we are no longer news.

The MPC has proved to be one of those rare 'instantly invented precedents' that seem to have worked. It may not achieve the cult status of the Nine Worthies who, in the Middle Ages, inspired poetry, sculpture and stained glass windows. As one writer has remarked, 'If one reviews the list of virtues that contemporaries found valuable in a knight—courtesy, loyalty, prowess, hardiness, largesse, and frankness—the Nine Worthies seem to meet the standard'. If that level of achievement is no more than an aspiration for its nine members, at least the MPC can claim a record of reasonable competence during its first five years. As Stephen Bayley remarked in 1986, 'civilisations are remembered by their artefacts, not their bank rates'.

Household indebtedness, the exchange rate and risks to the UK economy

In this speech,⁽¹⁾ Sushil B Wadhvani⁽²⁾ argues that the current rate of growth in household debt is unsustainable, but the vulnerability of the economy to rising debt should not be exaggerated. Australia and New Zealand have experienced significant exchange rate depreciations at a time when household debt rose strongly. So far, the impact on consumer price inflation and interest rates in these economies has been modest. He also notes that holding interest rates higher than necessary to hit the inflation target might lead to an even higher exchange rate, which may increase future inflation volatility and weaken the corporate sector.

Introduction

Over the past two years, the world economy has been subjected to some significant disturbances. Global share prices fell, notably in the technology-related sectors. Then, we had the tragic events of 11 September, with its associated impact on confidence.

In recent weeks, sentiment appears to have improved significantly, with a variety of business confidence surveys displaying a notable rise. The sharp reduction of inventories that followed the September tragedy obviously could not endure, and, in a variety of countries, consumption spending remained relatively resilient. *Consensus* forecasts for global economic growth have been revised up in recent weeks, and there are some tentative signs that corporate investment spending in the United States may not be as weak in 2002 as many of us had feared. If the economy-wide capital stock overhang proves to be a little smaller than the consensus had feared, then it is not implausible to expect current forecasts for global economic activity to be revised upwards further. On the other hand, the downside risks to global activity remain. For example, the recent rise in the oil price is unhelpful, and events might take it rather higher. However, the resilience of the global economy to the shocks of the past two years has been awesome.

With the global economy looking better than one might have expected last autumn, I intend to devote some time to discussing some of the other key risks confronting the UK economy—specifically, the growth in household debt and the vulnerability of the exchange rate.

The growth in household indebtedness

A great deal of attention has focused recently on the issue of ‘imbalances’ in the UK economy. Concerns have related to the rather high pace of growth of household indebtedness, which may be associated with a worsening of the current account deficit that could eventually trigger a sudden correction in the exchange rate. Any such move might imply higher future inflation and could lead to a rise in interest rates. Some believe that this could lead to a ‘bust’ with a housing market crash.

While the current rate of growth in household debt clearly cannot be sustained indefinitely, there may be reasons to believe that the concerns about the vulnerability of the macroeconomy to rising household debt might, at this point, be overstated. There has been a pick-up in recent years in the ratio of debt to income in the United Kingdom, but, as highlighted in Table A below, its level is not out of line with that in many other developed economies, and the recent rate of increase has been considerably higher in some countries (eg

(1) Delivered to the Macclesfield Chamber of Commerce on 25 March 2002. This speech can be found on the Bank’s web site at www.bankofengland.co.uk/speeches/speech166.pdf

(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 grateful to Joanne Cutler, Nick Davey, Jennifer Greenslade, Marilyn Tolle and Kenny Turnbull of the MPC Unit for their help with this speech. Guy Debelle and Alex Heath of the Reserve Bank of Australia (RBA) and David Hargreaves of the Reserve Bank of New Zealand (RBNZ) helped me navigate through the data for their respective countries. I am also grateful to Chris Allsopp, David Archer, Kate Barker, Don Brash, Guy Debelle, Paul Fisher, Ed Nelson, Michael Reddell and Peter Rodgers for commenting on an earlier draft. Of course, the views expressed in this speech are entirely personal, and do not reflect the views of either the MPC or the Bank of England.

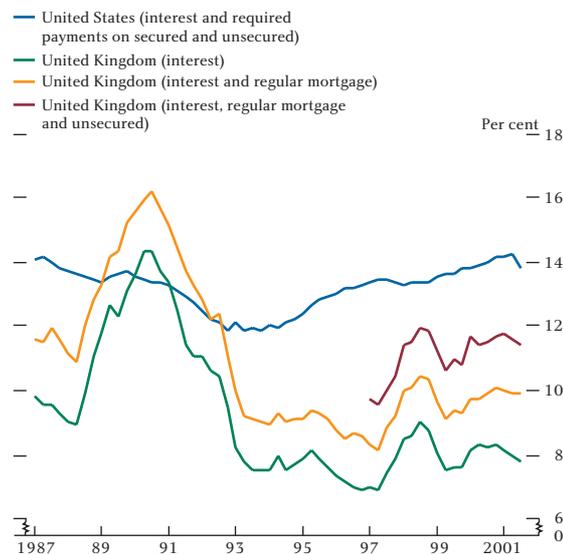
Table A
Ratios of household debt to income

Per cent	1990	1995	2000	1990–2000 (Percentage points change)	1995–2000 (Percentage points change)
United States	87.3	94.3	106.0	18.7	11.7
Japan	130.7	137.6	132.2	1.5	-5.4
Germany	70.0	100.6	115.1	45.1	14.5
France	88.3	63.7	70.8	-17.5	7.1
United Kingdom	115.7	106.4	117.2	1.5	10.8
Australia	52.4	72.4	102.6	50.1	30.1
New Zealand	57.3	81.8	111.3	54.0	29.5

Sources: OECD, national sources for Australia and New Zealand.

Australia and New Zealand).⁽¹⁾ Further, unlike in the United States, alternative measures of household debt-servicing ratios have been relatively stable over the past three years, despite the rise in debt (see Chart 1), and are still below their long-term average.⁽²⁾

Chart 1
US and UK measures of household income gearing



Sources: National Statistics, NOP financial research survey, Bank of England estimates and US flow of funds.

In order for household income gearing (ie the interest rate measure) to return to the peak seen in the early 1990s, debt would almost have to double at current levels of interest rates or, at the current level of debt, interest rates would need to increase to almost 11%. Of course, it is possible to envisage circumstances where interest rates might need to rise considerably, but, in my personal view, the rise in the ratio of debt to income should make us more cautious about doing so.

- (1) Of course, the fact that the rise in the ratio of debt to income may have been greater in other countries is not necessarily reassuring—see, for example, Brash (2002) for some of the risks it poses to the New Zealand economy.
- (2) The US measure of debt servicing incorporates both interest payments and required repayments on secured and unsecured debt. The commonly used income gearing measure in the United Kingdom excludes such repayments, although Chart 1 includes some Bank estimates of regular repayments. There are, of course, subtle issues here about which repayments should be included when attempting to assess the contractual burden on households' cash flow.
- (3) The very low inflation-adjusted savings ratio in the 1970s is partially attributable to unanticipated inflation. However, note that the inflation-adjusted savings ratio was also low in the 1960s.

It is also worth observing that the ratio of debt to financial assets in the United Kingdom has fallen from just over a third in 1990 to around one quarter in 2001 (see Table B). In this context, note that the ratio of debt to assets in the United Kingdom is in line with the average ratio for the major six economies (M6), and that, indeed, the ratio of debt to assets rose during the 1990s in some other countries, including Germany, Australia and New Zealand.

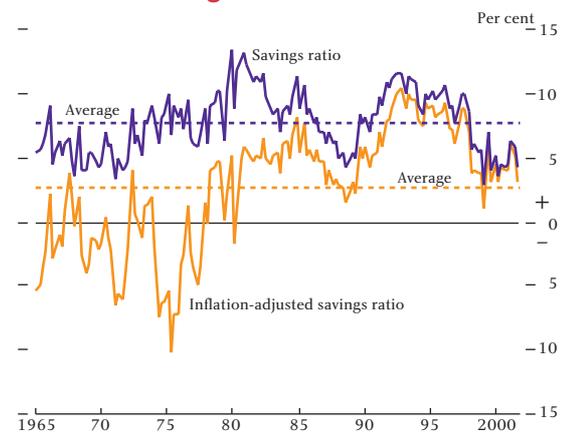
Table B
Ratios of household debt to financial assets

Per cent	1990	1995	2001	1990–2001 (Percentage points change)	1995–2001 (Percentage points change)
United States	25.0	23.6	23.8	-1.2	0.2
Japan	33.4	32.7	27.1	-6.3	-5.6
Germany	34.9	42.5	41.1	6.2	-1.4
France	40.5	25.8	17.3	-23.0	-8.5
United Kingdom	35.6	24.9	24.4	-11.2	-0.5
Italy	12.9	12.9	12.9	0.0	0.4
M6	30.4	27.0	24.4	-5.9	-2.6
Australia	30.5	36.1	40.3	9.8	4.2
New Zealand	39.1	47.3	64.5	25.4	17.2

Sources: Brash (2002) and national sources.

The fall in the household savings ratio to a level below its historical average has also led to some concern about future consumption prospects. But the recent strength of consumption may, at least in part, be due to a low inflation environment. First, there is a measurement issue. The inflation-adjusted savings ratio is above its historical average (see Chart 2).⁽³⁾ Second, there is a behavioural issue. It is plausible that the absence of index-linked mortgages implies that consumers react

Chart 2
Household savings ratios



Sources: ONS and Bank of England estimate.

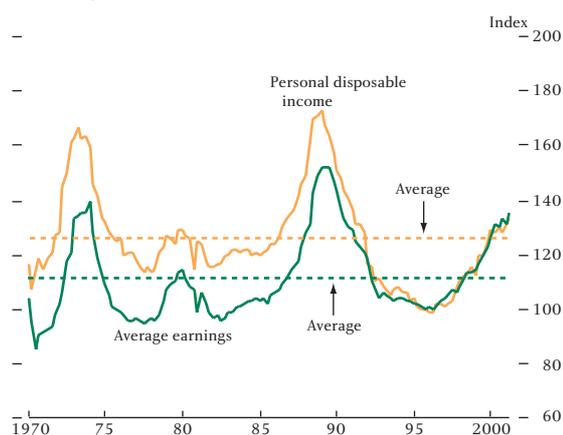
more significantly to fluctuations in nominal interest rates (with real interest rates held constant) than standard economic theory might imply. Certainly, back in the 1970s, economic forecasters were initially surprised by the weakness of consumption when inflation rose. The absence of index-linked mortgages implied that current mortgage-servicing costs rose steeply as inflation increased, and many consumers were forced to cut back even though the real duration of the loan fell,⁽¹⁾ ie the so-called front-end loading problem. Now, the significant fall in inflation has led to the situation being reversed, whereby the fall in current mortgage-servicing costs has enabled households who were previously liquidity constrained to consume more now. If this hypothesis is valid, one might expect lower inflation and nominal interest rates to be associated with a gradual rise in the ratio of debt to income to a new, higher equilibrium level, at which point this process could come to a halt relatively autonomously.

However, one concern that some of us have is that not all consumers are able to distinguish between real and nominal interest rates. Consequently, it is possible that some individuals might, in the years to come, be surprised by the fact that debt repayments as a fraction of income do not fall as quickly as they did in a high inflation period. At that point, one would expect consumption to adjust, though it is unlikely to be abrupt.

Spending on durables and semi-durables has grown at a higher rate than overall consumption over the past year. Thus, the share of consumption accounted for by durables has surged recently, perhaps because of a desire by households to invest in physical rather than financial assets or because of falls in the relative price of these goods. Durables and semi-durables provide consumers with a flow of services over a number of future periods, unlike non-durables, which are consumed immediately. Data on household consumption record the value of new purchases. A more appropriate measure of consumer spending might adjust for this by dividing spending on durables and semi-durables by the life time of those goods. A savings ratio computed using such a measure of consumption shows a less marked fall than the conventional ratio.

Turning to the housing market, the ratio of house prices to average earnings is considerably higher than its historical average (see Chart 3) and this, at first sight, is

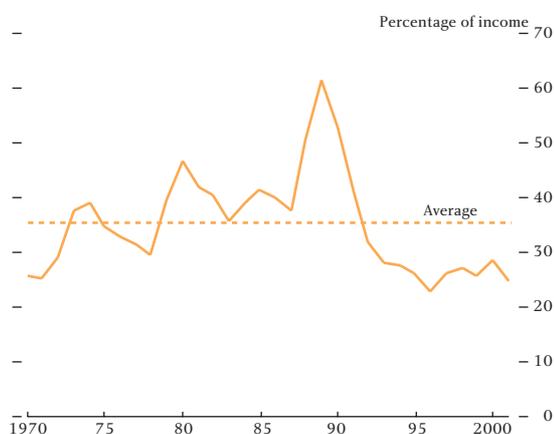
Chart 3
House prices relative to income



Sources: DTLR and ONS.

worrisome. However, the ratio of house prices to total personal disposable income is only marginally higher than its post-1970s' average and is considerably lower than during the late 1980s. This might be a better guide to market valuation as, for example, it does allow for dual-income households. It must be noted that even on this measure, London house prices look stretched. But some other measures of housing affordability—for example, the interest cost of servicing a mortgage relative to income—remain below their historical average (see Chart 4), for the United Kingdom and London alike. This is obviously intimately related to our earlier discussion about the effects of low inflation. In the absence of index-linked mortgages, it is likely that lower inflation might boost the equilibrium ratio of house prices to earnings, because it reduces the initial cash-flow burden associated with a mortgage. Hence, at least some of the recent rise in house prices may well

Chart 4
Housing affordability^(a)



(a) ONS, Bank of England estimate based on a 25-year repayment mortgage, average DTLR house prices and a 100% loan-to-value ratio.

(1) See, for example, Flemming (1976) for an excellent discussion of this issue.

represent an adjustment to a new equilibrium. Having said that, of course, the current high rate of increase in house prices clearly cannot be sustained for very long, and we shall remain vigilant.

Although I have offered some reasons as to why some of those who fret over the level of household indebtedness might be overstating the risks to the economy, there is no getting away from the fact that the current rate of growth of consumer debt is obviously unsustainable. Moreover, if things were to go wrong for some other reason, and unemployment were to rise, the high levels of household debt could make the situation worse than it might otherwise have been. Of course, we shall need to continue to monitor the situation.

The exchange rate and future instability

The key issues

A recurring theme in popular discussions of the economy is that the higher current account deficit that is associated with rising household indebtedness will eventually undermine the exchange rate, which might then fall abruptly, leading the MPC to increase interest rates rapidly, thereby causing consumption and house prices to crash. Hence, some argue that it would be better for the MPC to set interest rates now at a (higher) level, to reflect the risk of an exchange rate fall. So they are implicitly recommending a strategy that implies an undershoot of the inflation target, if sterling does not, in fact, fall. This is justified by asserting that the economy would be better placed to absorb the inflationary shock associated with an exchange rate depreciation if we were already starting below target.

The February 2002 *Inflation Report* published a forecast that allowed for the mean inflation forecast to be about 0.4 percentage points higher at the two-year horizon to reflect a risk that the exchange rate might fall,⁽¹⁾ with some members also inclined to place weight on this forecast for policy purposes today.

As I have said before,⁽²⁾ I am uneasy about the above arguments. First, the relationship between current account deficits and the exchange rate is far from straightforward. In recent years, commentators who have pointed to a rising US current account deficit as a

reason to sell the dollar have been repeatedly confounded by a tendency for the US currency to rise further. Second, while I do not set much store by consensus forecasts of the exchange rate, it is notable that they have actually risen significantly over the past year (from a long-term forecast for the ERI of 93 a year ago, to a revised forecast of 102 now), and now point to only a modest depreciation from current levels (around 106).⁽³⁾ In any case, forecasts for the sterling exchange rate have, since late 1996, consistently predicted a depreciation—a period during which the exchange rate has actually appreciated by over 25%.

Given the difficulties of exchange rate prediction, a relevant consideration is whether one thinks that there is time to react to an exchange rate fall if and when it occurs. Recall that our remit states that:

'The framework is based on the recognition that the actual inflation rate will on occasions depart from its target as a result of shocks and disturbances. Attempts to keep inflation at the inflation target in these circumstances may cause undesirable volatility in output.'⁽⁴⁾

This might permit the MPC to be less worried about a temporary overshoot of the target that might be caused by an exchange rate fall if and when it occurs.

In any case, the appropriate policy response to a fall in sterling will depend on why the exchange rate falls, therefore making it rather risky to be pre-emptive. An exchange rate depreciation could lead to a change in relative import prices without necessarily increasing the overall inflation rate, though one would obviously need to monitor the situation carefully, looking especially for signs of indirect, second-round effects.

These considerations are perhaps best illustrated by way of historical examples. Therefore, I turn to the recent experience of some other countries.

The exchange rate and inflation: some lessons from down under

Both Australia and New Zealand have experienced significant exchange rate depreciations in recent years,

(1) Note that the calibration assumed a probability of 10% per quarter of a fall in the real exchange rate of 5%, which, in the model, is assumed to lead to a rise in inflation of as much as 1.6 percentage points if the exchange rate did fall. This is a rather higher rate of pass-through into inflation than was seen in Australia and New Zealand in recent years—a subject to which I return below.

(2) See, for example, Wadhvani (2001).

(3) Bank of England calculations based on *Consensus Economics*' forecasts of bilateral exchange rates.

(4) See 'Remit for the Monetary Policy Committee', letter from the Chancellor of the Exchequer to the Governor, 29 April 2001.

with falls of 36% and 40% respectively versus the US dollar since their 1996 peaks (see Chart 5).⁽¹⁾ Both countries have inflation-targeting central banks, and it is notable that, although consumer price index (CPI) inflation has risen in both countries, the extent of the rise has been relatively modest (see Chart 6), especially if one allows for the other important factors that have a transient impact on measured inflation.⁽²⁾ For example, although measured CPI inflation in New Zealand rose to 4% at the end of 2000, stripping out the effects of petrol (international oil prices rose rapidly in 2000) and excise duty on tobacco would lead to a rather lower inflation rate of 2.7%.⁽³⁾

Chart 5
Australia and New Zealand daily exchange rates

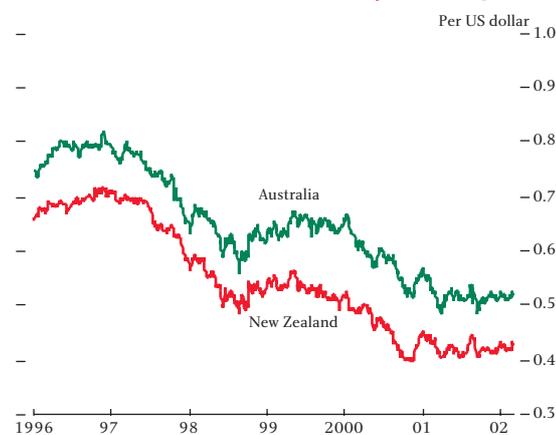
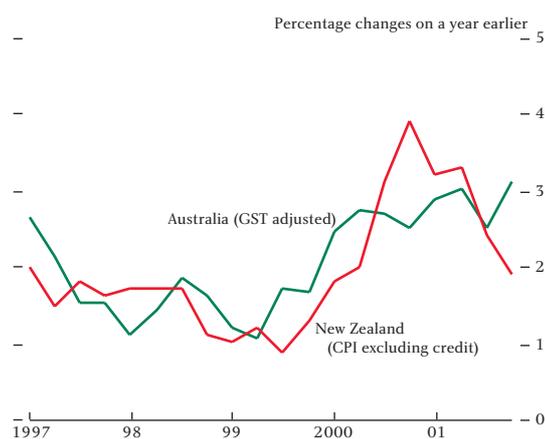


Chart 6
Australia and New Zealand CPI



Sources: Reserve Bank of Australia and Reserve Bank of New Zealand.

Indeed, research carried out at the central banks of these two countries has suggested that the impact of the fall in the exchange rate on consumer price inflation has

been rather less than would have been suggested by past historical relationships.⁽⁴⁾ For example, Debelle and Wilkinson (2002) argue that:

'the effect of exchange rate changes on inflation has become more muted ... the Australian economy has become more resilient to temporary price level shocks' (page 30).

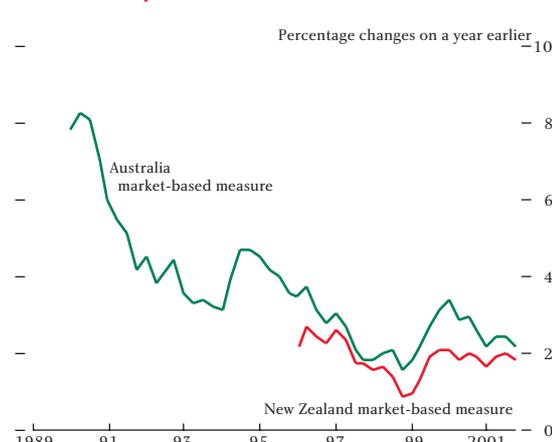
Similarly, Hampton (2001) asserts that:

'Earlier internal research done at the RBNZ ... suggested that the long-run import price pass-through coefficient was around 0.25 to 0.30. The much lower level of 0.15 estimated in this paper is consistent ... (with the observation) that the recent depreciation in the exchange rate has not resulted in increases in consumer prices as large as we had expected' (page 14).

It is, of course, possible that the exchange rate pass-through has become more protracted than before—only time will tell.

In both countries, measures of medium-term inflation expectations have been relatively well anchored (see Chart 7) despite the fall in the exchange rate (and, indeed, in 2000, a rise in oil prices and indirect taxes). In both countries, market expectations of medium-term inflation have remained close to the target band in recent years. Hence, although the measured inflation rate of tradable goods rose after the exchange rate fell

Chart 7
Inflation expectations



Sources: Reserve Bank of Australia and Reserve Bank of New Zealand.

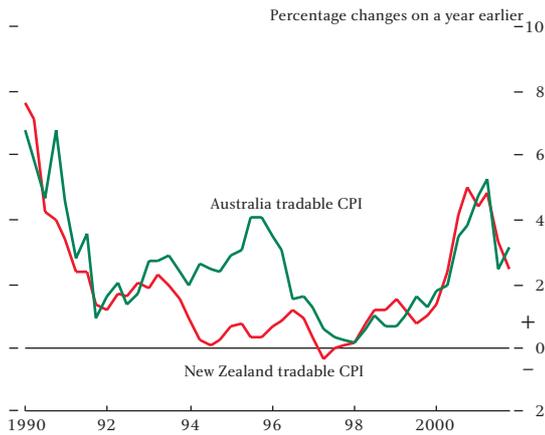
(1) The falls in the effective exchange rate indices from their 1997 peaks are somewhat smaller, at around 23% and 28% respectively. But since their exchange rates have recovered in recent months, the peak-to-trough falls were larger.

(2) The measure of inflation for Australia in Chart 6 adjusts for the impact of the Goods and Service Tax in 2000.

(3) See RBNZ (2001).

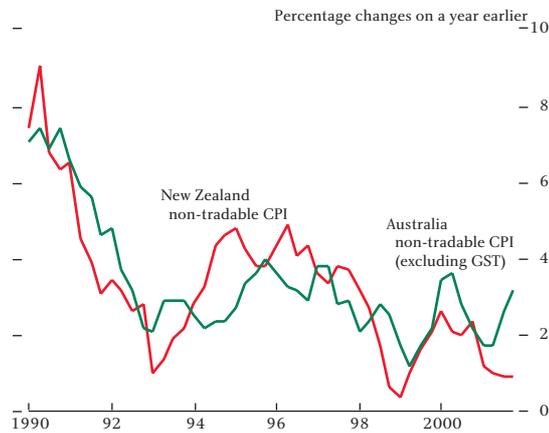
(4) I have greatly benefited from very useful conversations with various officials at the RBA and the RBNZ, though, of course, the views expressed here are entirely my own and do not necessarily reflect those of either central bank.

Chart 8
Tradables inflation



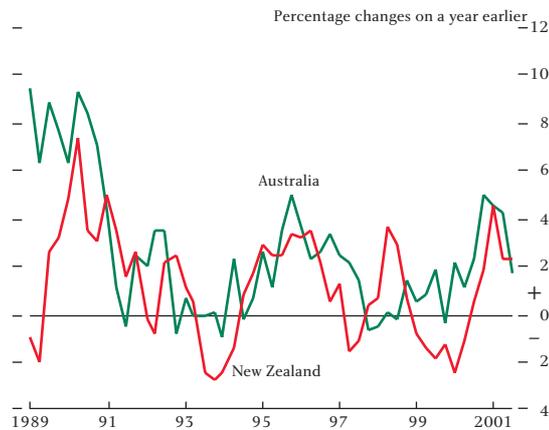
Sources: Reserve Bank of Australia and Reserve Bank of New Zealand.

Chart 9
Non-tradables inflation



Sources: Reserve Bank of Australia and Reserve Bank of New Zealand.

Chart 10
Unit labour cost growth



Sources: Reserve Bank of Australia and Thomson Financial Datastream.

(see Chart 8), the behaviour of non-tradables' inflation (see Chart 9) and unit labour cost growth (see Chart 10) has been relatively benign. Note that inflation has remained low after a significant exchange rate decline,

Chart 11
Unemployment rates



Sources: Reserve Bank of Australia and Thomson Financial Datastream.

although unemployment continued to fall in New Zealand, and only rose modestly in Australia (see Chart 11). Indeed, the exchange rate depreciations occurred at a time when unemployment rates were low by recent historical standards.

The RBA actually cut interest rates during the 1997–98 exchange rate depreciation. While interest rates went up somewhat in both countries in the wake of the 1999–2000 exchange rate depreciations, the rhetoric of the respective central banks suggests that they were not responding to the direct price level effects, but only to the indirect effects on demand, inflation expectations, wages, etc, so that the actual rise in interest rates was not out of line with the recent amplitude of interest rate changes (see Chart 12). As we noted above, ratios of consumer debt to income have actually continued to grow very significantly in both countries, and there has been no 'hard landing' in their respective housing markets (see Chart 13), though it must be recognised that these ratios were starting from lower levels than

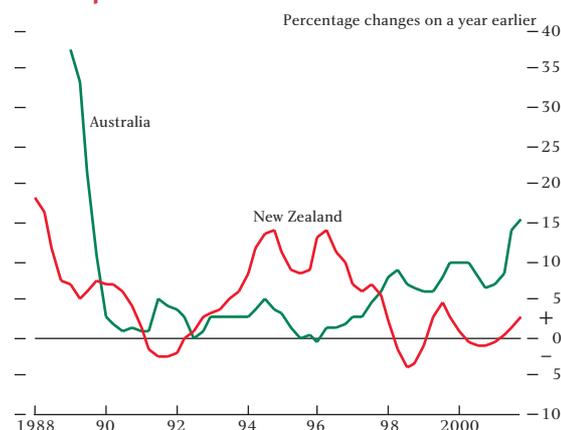
Chart 12
Interest rates



Sources: Reserve Bank of Australia and Reserve Bank of New Zealand.

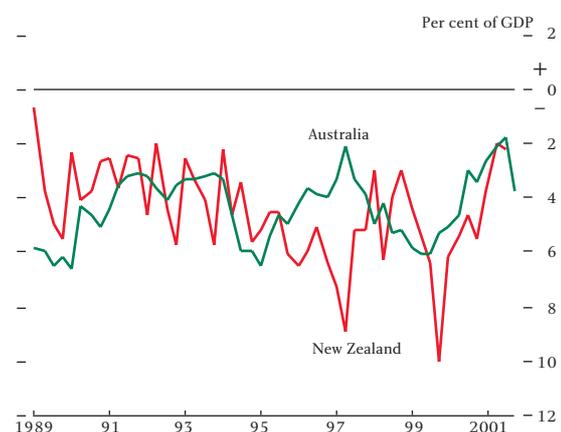
currently prevailing in the United Kingdom. With domestic inflation having reacted only a little to the significant exchange rate depreciations, the international competitiveness of the two economies has improved, and this has been reflected in an improvement in their respective current account positions (see Chart 14). The latter is especially significant given that both economies have grown rather faster than the G7 aggregate over the past year, with the Australian economy registering a growth rate of 4% despite the weak global economy.

Chart 13
House prices



Sources: Thomson Financial Datastream and Reserve Bank of New Zealand.

Chart 14
Current account balance



Source: Thomson Financial Datastream.

It is also worth noting that neither central bank raised interest rates because they expected an exchange rate fall and there was, therefore, no deliberate attempt to 'prepare the economy' for such an eventuality. Instead, they waited until it actually fell, and even then appear to

have proceeded cautiously because of their uncertainty about the magnitude and timing of the impact on inflation.

On balance, I am much encouraged by the recent experience of the Australasian economies following their recent exchange rate depreciations. There are many who, in the British context, are pessimistic about the UK economy if a large fall in sterling's effective exchange rate were to occur. Until now, the experience of Australia and New Zealand would suggest that these economies were able to cope with very large exchange rate changes without any significant problems.⁽¹⁾

Of course, it remains possible that things might yet go wrong over there. If, say, headline inflation rates were to stay at or above the high end of the normal range, they may yet have a significant impact on inflation expectations, so we shall have to wait and see regarding the final verdict regarding their recent experiences.

Moreover, there may be good reasons as to why the United Kingdom's experience with a significant exchange rate fall might be less benign. Note that the 1997–98 fall in the currencies of Australia and New Zealand coincided with the so-called Asian crisis, which implied that there was a significant deflationary impulse from abroad helping to keep inflation in check, although it should be recalled that Australian interest rates were actually reduced during that episode. The reaction of inflation to an exchange rate fall during a period when the international economy was buoyant might have been different, though in this regard, the failure of inflation to rise much as a result of exchange rate effects during 2000 is quite encouraging.

A key common feature of the success of Australia's and New Zealand's central banks in managing the adjustment to a large exchange rate fall was that inflation expectations remained low, perhaps in part because the respective central banks said that they would remain vigilant and respond forcefully to any signs that the exchange rate falls were beginning to spill over into higher medium-term inflation expectations.

Obviously, the appropriate response to an exchange rate fall depends on why it has occurred. If, for example, there were a domestic inflationary shock which happens

(1) It may, of course, be that many of us have been using the wrong models to analyse the effect of an exchange rate change on inflation. McCallum and Nelson (2001), in contrasting their model to others, argue that: 'In general, our model provides little support for inflation-targeting central banks to be driven to large increases in interest rates in the face of even significant exchange rate depreciations, unless the depreciations are associated with large increases in output above potential' (page 26).

to drive the exchange rate down, then, it would be important to respond aggressively to prevent it from becoming embedded in inflation expectations.

It would be both foolish and imprudent to ignore the very real risks confronting the UK economy because of rising household indebtedness, a deteriorating current account deficit and an 'overvalued' exchange rate. However, as I have argued above, all these features of our current problems also confronted Australia and New Zealand in recent years, and yet, at least until now, there has been no 'bust' there. Hence, while not wishing to sound complacent, their experience suggests that, notwithstanding the considerable risks confronting us, we may similarly avoid a 'bust', though, of course, we shall need to remain vigilant.

High consumer debt, an overvalued exchange rate and appropriate monetary policy

It has, as we noted above, been argued that the high levels of consumer indebtedness and an overvalued exchange rate should lead the MPC to be 'prudent', and to hold interest rates higher than is necessary to hit the inflation target two years ahead. The argument is that by allowing inflation to undershoot modestly at a two-year horizon, one might avoid a much larger deviation from target at some future date.⁽¹⁾ I have discussed this argument at some length in the past,⁽²⁾ so I shall be necessarily brief here.

If interest rates are indeed held higher than necessary to hit the inflation target, this leads to a higher sterling exchange rate, other things being equal. This has the effect of potentially exacerbating the imbalances today, as a higher current value of the exchange rate leads to a higher trade deficit.

Relatedly, for many years, students of macroeconomics have, therefore, been taught that a central bank which is interested in stable output and inflation should 'lean against the wind' of significant asset price movements if these disturbances do not reflect economic fundamentals.⁽³⁾

About two years ago, some academic work⁽⁴⁾ that I was associated with showed that this basic insight was still valid in the context of a more general model of the economy currently used at the Bank of England. If one

were interested in minimising the volatility of inflation around an inflation target, then the correct policy response to a high, overvalued exchange rate would be to keep interest rates a little lower than might be necessary to achieve a 2¹/₂% inflation rate at a two-year horizon. This is primarily because the alternative of a somewhat higher interest rate is likely to exacerbate and prolong the 'overvaluation' of sterling, which would then increase the volatility of future inflation.

Holding interest rates higher than may be necessary to achieve the target two years ahead might also hurt the corporate sector, through both the direct interest rate channel and the indirect exchange rate channel. A worsening of the financial position of the corporate sector could leave it rather more vulnerable to adverse events. One could envisage circumstances where higher interest rates than necessary to achieve the inflation target two years ahead would weaken the corporate sector so much that unemployment would increase by more than would otherwise have been the case. This, in turn, would lead to a greater degree of retrenchment by the household sector.

Hence, in both examples, the desire to reduce inflation volatility by holding interest rates higher today could actually result in an increase in future inflation volatility. Of course, I do not exclude the possibility that there would be circumstances in which it might be appropriate to respond to imbalances in the household sector. One could, for example, envisage a situation where it might be appropriate to increase interest rates because it was felt that a house price 'bubble' might destabilise the economy. I should re-emphasise that one would only be worrying about the bubble because of its implications for future inflation volatility, which is entirely consistent with our remit. In my judgment, taking the United Kingdom as a whole, we are not in that situation as yet, but one must remain vigilant. Even in that situation, difficult judgments about whether we could easily communicate what we were doing would be a highly relevant consideration.

Finally, to conclude, I have tried to argue today that although the UK economy faces considerable risks, it is important that we do not exaggerate them. Nevertheless, I promise you that we shall attempt to remain vigilant to the evolving risks.

(1) This can be interpreted as a desire to reduce future inflation volatility.

(2) See Wadhvani (2001).

(3) See Poole (1970).

(4) See Cecchetti, Genberg, Lipsky and Wadhvani (2000).

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Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

The Monetary Policy Committee: five years on.

Speech by Mervyn King, Deputy Governor to the Society of Business Economists at the Royal College of Pathologists, London on 22 May 2002.

www.bankofengland.co.uk/speeches/speech172.pdf Reproduced on pages 219–27 of this *Bulletin*.

The MPC: some further challenges.

Speech by Sushil Wadhvani, Member of the Monetary Policy Committee to the National Institute of Economic and Social Research Governors' Seminar, London on 16 May 2002.

www.bankofengland.co.uk/speeches/speech171.pdf

Property and the economy.

Speech by David Clementi, Deputy Governor, at the Chartered Surveyors' Livery Company International Dinner, Goldsmith's Hall in London on 29 April 2002.

www.bankofengland.co.uk/speeches/speech170.htm

Monetary Policy in the UK: challenges ahead.

Speech by Mervyn King, Deputy Governor, delivered to the British Chambers of Commerce National Conference, Queen Elizabeth II Conference Centre in London on 23 April 2002.

www.bankofengland.co.uk/speeches/speech169.htm

Contingency planning and systemic stability.

Speech by Alastair Clark, Executive Director at the Association of Corporate Treasurers in Birmingham on 16 April 2002 (added to the site on 18 April 2002).

www.bankofengland.co.uk/speeches/speech168.htm

The Royal Society for the Encouragement of Arts, Manufactures and Commerce (RSA).

Speech by The Rt Hon Sir Edward George, Governor in Birmingham on 11 April 2002.

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Household indebtedness, the exchange rate and risks to the UK economy.

Speech by Dr Sushil Wadhvani, Member of the Monetary Policy Committee to the Macclesfield Chamber of Commerce on 25 March 2002.

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Asian Business Association Dinner.

Speech by The Rt Hon Sir Edward George, Governor in London on 19 March 2002.

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A Bank for all Regions: promoting monetary and financial stability in the United Kingdom.

Speech by David Clementi, Deputy Governor, at The Ulster Society of Chartered Accountants in Belfast on 14 March 2002.

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The MPC two years on (S)
Price stability in the United Kingdom (S)
The impact of the international environment on recent monetary policy (S)

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Sterling's puzzling behaviour (S)
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Interest rates and the UK economy—a policy for all seasons (S)

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British unemployment and monetary policy (S)
Before the Millennium: from the City of London (S)

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155	Monetary policy and stagflation in the UK (<i>May 2002</i>)	Edward Nelson Kalin Nikolov
156	Equilibrium exchange rates and supply-side performance (<i>June 2002</i>)	Gianluca Benigno Christoph Thoenissen

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's web site at www.bankofengland.co.uk/mpc/extmpcpaper0000n.pdf (where *n* refers to the paper number). The following papers have been published recently.

No.	Title	Author
5	Monetary policy for an open economy: an alternative framework with optimising agents and sticky prices (<i>October 2001</i>)	Bennett T McCallum Edward Nelson
6	The lag from monetary policy actions to inflation: Friedman revisited (<i>October 2001</i>)	Nicoletta Batini Edward Nelson
7	The future of macroeconomic policy in the European Union (<i>February 2002</i>)	Christopher Allsopp
8	Too much too soon: instability and indeterminacy with forward-looking rules (<i>March 2002</i>)	Nicoletta Batini Joseph Pearlman
9	The pricing behaviour of UK firms (<i>April 2002</i>)	Nicoletta Batini Brian Jackson Stephen Nickell

Monetary and Financial Statistics

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 (four 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
A work programme in financial statistics— April 2002 update	Ben Norman	April 2002	5–7
Prices indices: a report on a meeting of the Financial Statistics and Business Statistics Users' Groups	Darren Tucker (Office for National Statistics)	April 2002	1–4
Statistics for financial stability: a report on a meeting of the Financial Statistics Users' Group	Pat O'Connor Andrew Moorhouse and Lisa Zammit	November 2001	1–3
2000 gilt ownership survey	Bruce Devile	September 2001	7–9

Financial Stability Review

The *Financial Stability Review* is published twice a year, in June and December. Its purpose is to encourage informed debate on financial stability; survey potential risks to financial stability; and analyse ways to promote and maintain a stable financial system. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policy-makers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available from Financial Stability Review, Bank of England HO-3, Threadneedle Street, London, EC2R 8AH.

Practical issues arising from the euro

This is a series of booklets providing a London perspective on the development of euro-denominated financial markets and the supporting financial infrastructure, and describing the planning and preparation for possible future UK entry. Recent editions have focused on the completion of the transition from the former national currencies to the euro in early 2002, and the lessons that may be drawn from it. Copies are available from Public Enquiries Group, Bank of England, Threadneedle Street, London, EC2R 8AH.

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.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

Back issues of the *Quarterly Bulletin* from 1981 are available for sale. Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's web site at www.bankofengland.co.uk/bulletin/index.html

The *Bulletin* is also available from ProQuest Information and Learning: enquiries from customers in Japan and North and South America should be addressed to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to White Swan House, Godstone, Surrey, RH9 8LW, telephone 01444 445000.

An index of the *Quarterly Bulletin* is also available to customers free of charge. It is produced annually, and lists alphabetically terms used in the *Bulletin* and articles written by named authors.

Bound volumes of the *Quarterly Bulletin* for the period 1960–85 (in reprint form for the period 1960–85) can be obtained from Schmidt Periodicals GmbH, Ortsteil Dettendorf, D-83075 Bad Feilnbach, Germany, at a price of €105 per volume or €2,510 per set.

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:

<i>Quarterly Bulletin</i>		<i>Inflation Report</i>	
Spring	18 March	February	13 February
Summer	18 June	May	15 May
Autumn	23 September	August	7 August
Winter	16 December	November	13 November

Quarterly Bulletin and Inflation Report subscription details

Copies of the *Quarterly Bulletin* and *Inflation Report* can be bought separately, or as a **combined** package for a discounted rate. Subscriptions for a full year are also available at a discount. The prices are set out below:

Destination	2002						2001			
	<i>Quarterly Bulletin and Inflation Report package</i>		<i>Quarterly Bulletin only</i>		<i>Inflation Report only</i>		<i>Quarterly Bulletin and Inflation Report package</i>		<i>Inflation Report only</i>	
	Annual	Single	Annual	Single	Annual	Single	Annual	Single	Annual	Single
United Kingdom, by first-class mail (1)	£27.00	£7.50	£21.00	£6.00	£10.50	£3.00	£40.00	£10.00	£12.00	£3.00
<i>Academics, UK only</i>	<i>£18.00</i>	<i>£5.00</i>	<i>£14.00</i>	<i>£4.00</i>	<i>£7.00</i>	<i>£2.00</i>	<i>£27.00</i>	<i>£6.75</i>	<i>£8.00</i>	<i>£2.00</i>
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European countries including the Republic of Ireland, by letter service	£33.00	£9.00	£25.00	£7.00	£13.00	£4.00	£48.00	£12.00	£14.00	£3.50
Countries outside Europe: Surface mail	£33.00	£9.00	£25.00	£7.00	£13.00	£4.00	£48.00	£12.00	£14.00	£3.50
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