Markets and operations

This article reviews developments since the Winter Quarterly Bulletin *in sterling and global financial markets, in market structure and in the Bank's balance sheet.*(1)

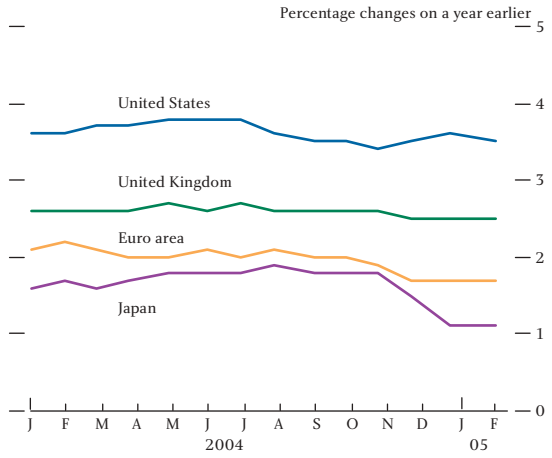
- *Sterling short-term interest rates increased as market participants appeared to revise upwards the probability they attached to a rise in official rates during 2005. US dollar short-term interest rates also increased as the Federal Reserve continued to withdraw its accommodative monetary policy. Short-term euro rates were little changed.*
- *The US dollar strengthened over the review period supported by higher short-term dollar interest rates and signs of robust economic growth in the United States.*
- *Long-horizon sterling nominal forward rates rose slightly, although there were marked falls in dollar and euro nominal long forward rates. But real long forward rates declined across currencies. This continued a general drift down in sterling and euro real forwards over the past year or so.*
- *Equity markets rose internationally, credit spreads narrowed and measures of implied volatility remained historically low in a number of markets. Risk premia appeared to fall across financial markets, perhaps consistent with the so-called 'search for yield' having continued. This may have reflected better risk diversification, but risk may have been underpriced.*
- *The Bank announced interim changes to its official operations in the sterling money markets with the aim of stabilising overnight market interest rates further.*

Following a soft patch in 2004 Q3, GDP growth in the United Kingdom was estimated to have picked up during the final quarter of 2004. And output growth was robust in the United States in 2004 Q4.

But the recovery in Japan and the euro area faltered slightly and economists' forecasts suggested that some of this weakness was expected to persist: Consensus forecasts for euro-area and Japanese GDP growth in 2005 were revised down (Chart 1).

Against this background, market participants' views about the future path of monetary policy in the United Kingdom were revised slightly — short-term implied interest rates rose and by the end of the review period suggested that official rates would remain unchanged over the next few months, with some possibility of a further rate rise later this year (Table A). Elsewhere, market prices suggested that the Federal Reserve was expected to continue its measured pace of tightening in the United States, whereas, in the near term, interest rates were expected to remain on hold in the euro area.

Chart 1
Expected real GDP growth for 2005



Source: Consensus Economics.

(1) The period under review is 26 November (the data cut-off for the previous *Quarterly Bulletin*) to 18 February.

Table A
Summary of changes in market prices

	26 Nov.	18 Feb.	*Change*
December 2005 three-month interbank interest rate (per cent)			
United Kingdom	4.68	5.00	*32 bp*
Euro area	2.49	2.57	*8 bp*
United States	3.61	3.88	*27 bp*
Ten-year nominal forward rate (per cent)(a)			
United Kingdom	4.53	4.57	*4 bp*
Euro area	4.80	4.50	*-30 bp*
United States	5.81	5.33	*-48 bp*
Equity indices (domestic currency)			
FTSE All-Share	2362	2535	*7.3%*
DJ Euro Stoxx	262	282	*7.5%*
S&P 500	1183	1202	*1.6%*
Exchange rates			
Sterling effective exchange rate	101.8	103.4	*1.6%*
$/€ exchange rate	1.33	1.31	*-1.4%*

Columns may not correspond exactly due to rounding.

Sources: Bank of England and Bloomberg.

(a) Three-month forward rates, derived from the Bank's government liability curves. Estimates of the UK curve are published on the Bank of England's website at www.bankofengland.co.uk/statistics/yieldcurve/main.htm.

At longer horizons, sterling ten-year forward rates increased a little, while dollar and euro rates fell. But long-horizon *real* forward rates declined across currencies.

Risk premia in credit markets also seem to have fallen. Spreads on high-yield, investment-grade and emerging market bonds narrowed further over the review period and remained close to historical lows.

Implied volatility — a market-based measure of uncertainty — remained low across a number of markets. This might suggest that market participants expected a period of continued macroeconomic and financial market stability, which may have contributed to lower risk premia across asset classes. Alternatively, these developments may have reflected a more temporary increase in risk appetite with investors seeking to maintain/increase returns in an environment of low risk-free interest rates — the so-called 'search for yield'.

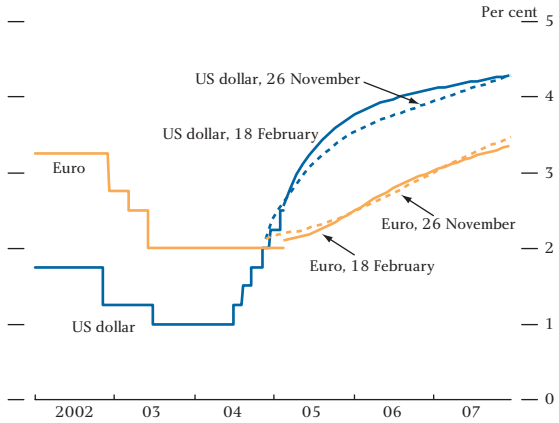
Against this backdrop, financial markets could be vulnerable to particular shocks; for example, a sharper-than-expected pace of monetary policy tightening in the United States, a more abrupt unwinding of the imbalances that exist in the global economy or a large-scale credit event. A risk remains that the search for yield could unravel quite quickly.(1)

Short-term interest rates

As had been widely anticipated, sterling, euro and yen official interest rates remained unchanged over the review period, but US dollar official rates were raised by 50 basis points, in two 25 basis point moves.

A slightly more pessimistic near-term outlook for growth in some continental European economies may have contributed to a fall in the very short end of the euro forward curve, although the market still expected an upward move in euro policy rates in 2005 H2 (Chart 2). By contrast, the short end of the US dollar forward curve steepened slightly; implied rates for end-2005 rose by around 20 basis points. The dollar forward curve suggested that market participants expected the FOMC to continue to tighten policy through 2005.

Chart 2
Short-term international official and nominal forward interest rates(a)



Sources: Bank of England, Bloomberg and LIFFE.

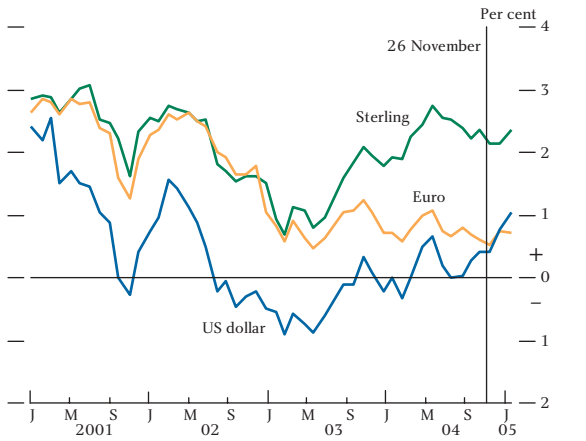
(a) Two-week nominal forward rates implied by a curve fitted to a combination of instruments that settle on Libor.

Reflecting the different positions in the economic cycle, measures of dollar short-term real interest rates rose slightly relative to euro and sterling real rates (Chart 3). Nonetheless, short-term dollar and euro real interest rates remained low by historical standards.

Short-term sterling real rates also rose slightly over the review period, although they remained around 40 basis points below the levels reached in mid-2004, despite the official nominal rate having risen over that same period. As discussed in the box on pages 8–9, market reactions to individual data releases have become smaller over the past couple of years. However, some stronger-than-expected UK data releases, such as the December CPI and the preliminary estimate of Q4 GDP, led sterling forward rates for end-2005 to increase over the review period (Chart 4). This suggested that market

(1) The 'search for yield' and possible downside risks to the international financial system were described in more detail in Chapter 2 of 'The financial stability conjuncture and outlook' (2004), *Bank of England Financial Stability Review*, December, pages 50–64.

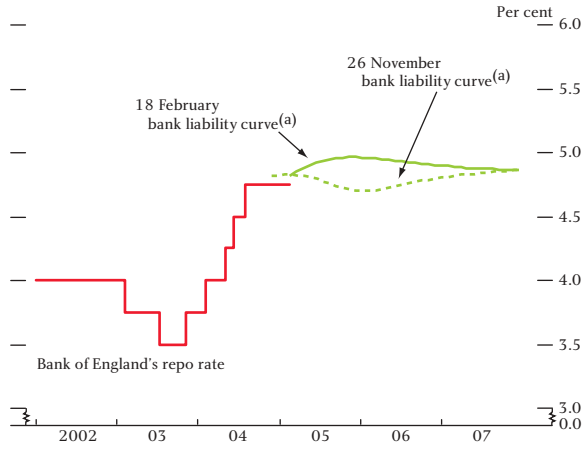
Chart 3
Indicative international two-year real spot rates(a)(b)



Sources: Consensus Economics and Bank calculations.

(a) Two-year nominal spot rates (from the Bank's government liability yield curves) less Consensus inflation expectations. Real rates shown are indicative: any inflation risk premia present in nominal spot rates will not be removed by subtracting a survey-based inflation expectation.
(b) UK inflation expectations refer to RPI.

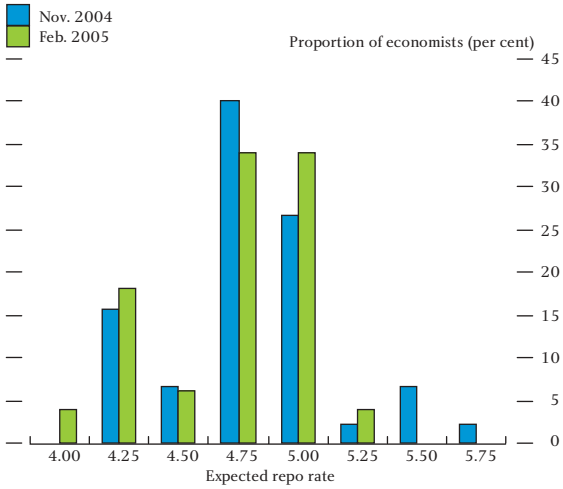
Chart 4
Sterling official and nominal forward interest rates



Sources: Bank of England, Bloomberg and LIFFE.

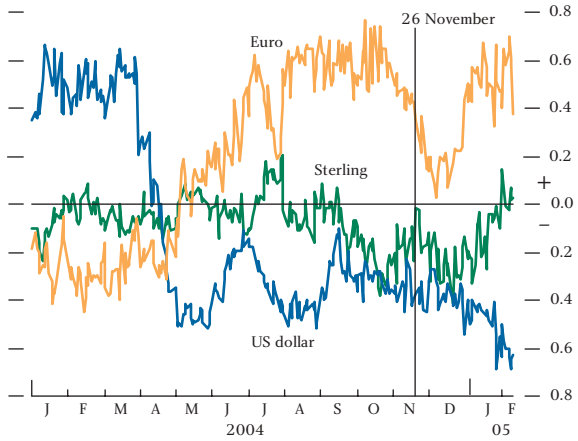
(a) Two-week nominal forward rates implied by a curve fitted to a combination of instruments that settle on Libor.

Chart 5
Economists' forecasts for the Bank of England repo rate at end-2005



Source: Reuters.

Chart 6
Six-month implied skew from interest rate options



Sources: Bank of England, CME and LIFFE.

participants perceived some chance of an interest rate rise during 2005, whereas at the time of the previous *Bulletin*, sterling implied rates were consistent with some probability of a reduction in official rates.

Market-based measures of implied interest rates have moved more into line with the average of economists' expectations, as suggested by survey data. Most economists expected official rates to remain unchanged or rise by a further 25 basis points through 2005 (Chart 5).

The balance of risks to sterling interest rates implied by options prices, which had been skewed to the downside through much of late 2004 and early 2005, ended the period largely symmetric. This suggests that market participants perceived little bias toward higher or lower rates in the near term (Chart 6). By contrast, risks to euro interest rates became more skewed to the upside, whereas the balance of risks to dollar rates moved more to the downside.

Measures of implied short-term interest rate uncertainty declined over the period, most markedly for dollar rates (Chart 7). Using swaption prices to examine measures of sterling interest rate uncertainty over longer periods suggested that the decline in implied uncertainty was not confined to short horizons (Chart 8). But there was a slight steepening in the term structure of volatility: implied volatility over a one-year horizon fell further than implied volatility over a five-year horizon.

What economic indicators move short-term sterling interest rates?

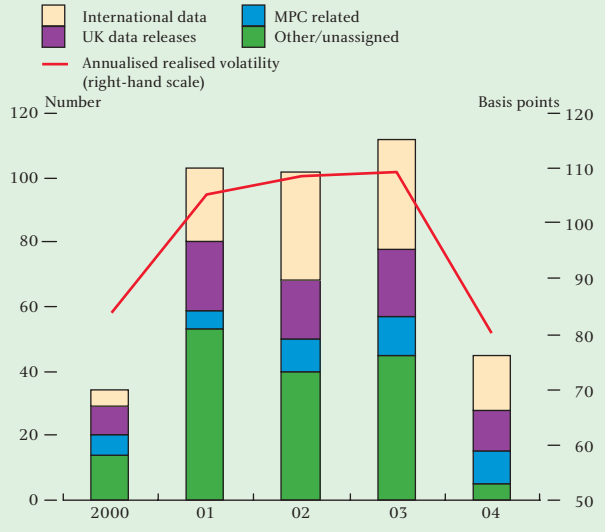
Sharp movements in short-term interest rates are likely to stem from surprises, either as a result of data releases being significantly different from expectations, or from an unanticipated news event.

The magnitude of reactions to specific data releases should also depend on market participants' views on the economic outlook. More specifically, the importance that market participants place on certain specific types of data releases may change over time, depending on how informative they are about the perceived profile of shocks hitting the economy.

This box aims to identify which news events and/or data releases had the greatest impact on short sterling implied interest rates during 2004, and whether similar data releases have consistently triggered a large market reaction over recent years.

Intraday data on short sterling futures contracts can be used to identify 'large' hourly moves in implied rates(1) — a large move is defined as one that changed implied interest rates by 5 basis points or more in an hour.(2) Chart A shows the number of 'large' movements in implied rates over the past five years.

Chart A
Large movements in short-term sterling implied interest rates and intraday volatility



Sources: Bank of England and LIFFE.

In 2004, the number of large reactions fell to its lowest level since 2000, consistent with a decline in realised intraday volatility.(3) This might be because there were fewer big 'news' items, or data releases were more in line with market expectations.

The time and date of each 'large' move was noted in order to attempt to identify the data release/news item that triggered the movement. The majority of these movements can be attributed to a specific event or data release.

US non-farm payrolls releases coincided with the four largest intraday movements in implied rates in 2004 (Table 1). In total, US non-farm payrolls appear to have been associated with nine out of the 45 'large' movements identified during 2004.

Table 1
Largest ten movements in sterling implied interest rates during 2004

Rank	Change	Data release/ news event	Date
1	-14.7	US non-farm payrolls	9 Jan. 2004
2	-13.6	US non-farm payrolls	5 Mar. 2004
3	-13.5	US non-farm payrolls	6 Aug. 2004
4	13.4	US non-farm payrolls	2 Apr. 2004
5	12.0	UK GDP/retail sales	23 Jan. 2004
6	-11.5	*Inflation Report*	10 Nov. 2004
7	-11.0	Madrid terrorist attacks	11 Mar. 2004
8	-11.0	Greenspan testimony(a)	11 Feb. 2004
9	9.6	*MPC Minutes*	19 May 2004
10	9.1	UK ITEM Club Report(b)	1 Mar. 2004

(a) Testimony by Fed Chairman Greenspan to Financial Services Committee.
(b) The UK-based ITEM Club economic forecasters were reported in the weekend press to have called for higher UK interest rates.

Indeed, the average absolute reaction of implied sterling rates to US non-farm payrolls data has increased markedly over recent years (Table 2).

Table 2
UK implied rate reaction to US non-farm payrolls data releases (2000–04)

	2000	2001	2002	2003	2004
Average absolute reaction (percentage points)	2.50	3.65	3.31	4.29	8.13
Standard deviation	1.61	2.48	2.99	2.74	4.59

Turning to domestic news, Table 3 shows the largest ten movements in implied rates that appeared to be linked to UK-specific events (including both MPC-related news and other UK data releases).

MPC-related news (including MPC decisions, *MPC Minutes*, *Inflation Report* publication, and speeches/interviews) was linked to several 'large' movements. However, the largest absolute reaction to a change in the repo interest rate was only 7 basis points, suggesting that interest rate decisions in 2004 were largely anticipated by market participants. Indeed, comparing the path of interest rates implied by market prices at the time of the Bank's November 2003 *Inflation Report* supports the

(1) Twelve-month constant maturity implied forward rates were derived from adjacent contracts.
(2) Approximately 2.5% of hourly intraday movements were greater than 5 basis points in this sample.
(3) Intraday realised volatility is measured as the annualised standard deviation of hourly changes during each calendar year.

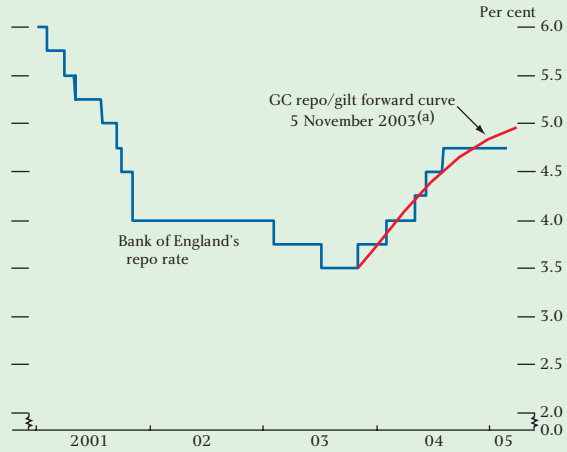
Table 3
Largest ten movements in sterling implied rate linked to UK-specific news in 2004

Rank	Change	Data release/ news event	Date
1	12.0	UK GDP/retail sales	23 Jan. 2004
2	-11.5	*Inflation Report*	10 Nov. 2004
3	9.6	*MPC Minutes*	19 May 2004
4	9.1	UK ITEM Club Report	1 Mar. 2004
5	-9.0	Kate Barker interview	29 Sep. 2004
6	9.0	*MPC Minutes*	17 Mar. 2004
7	8.6	Nationwide survey	29 Jan. 2004
8	-7.8	UK CPI/RPIX	12 Oct. 2004
9	7.6	UK CPI/RPIX	20 Jan. 2004
10	7.0	MPC decision (+25 bp)	6 May 2004

hypothesis that moves in official interest rates through 2004 were widely anticipated (Chart B).

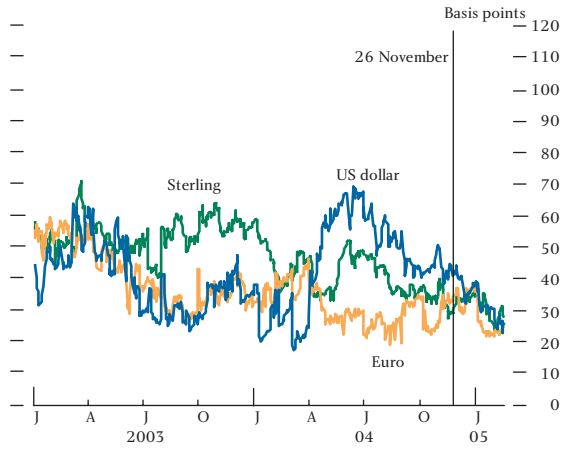
Several UK-specific data releases also had a large impact on implied rates, including a number of GDP and consumer price inflation releases — this was broadly similar to previous years. However, despite the fall in the absolute number of 'large' reactions to UK data releases, the number of reactions to house price data was slightly higher in 2004, compared to previous years (four in 2004 versus two in 2003), suggesting some increased focus by market participants on these data releases.

Chart B
Bank of England repo rate and two-week forward curve at time of November 2003 *Inflation Report*



(a) A general collateral (GC) repo rate is the rate that one financial institution pays to borrow money from another when it effectively offers any gilt as a security against default.

Chart 7
Three-month implied volatility from interest rate options



Sources: Bank of England, CME and LIFFE.

Chart 8
Sterling swaption implied volatility

Source: JPMorgan Chase and Co.

Foreign exchange markets

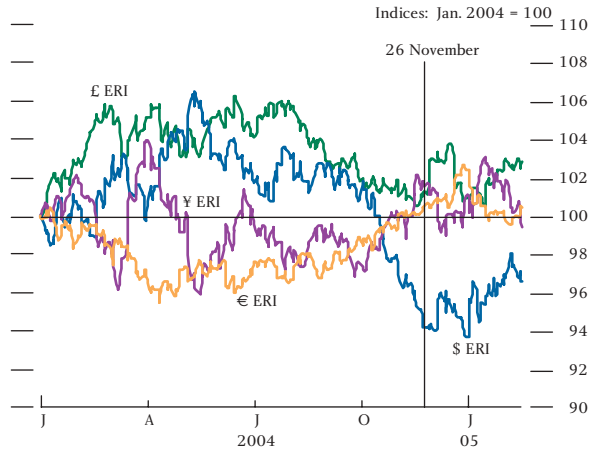
In mid-December, the sterling ERI reached a level 2.5% higher than at the time of the previous *Bulletin*. It then fell before strengthening again to end the period 1.6% higher.

In the United States, the further withdrawal of monetary accommodation, together with signs of stronger activity, provided some support for the dollar after it reached a local trough in January. Since the previous *Bulletin*, the dollar ERI(1) increased by around 2½% (Chart 9), driven largely by an appreciation against the euro and the yen (Chart 10).

Nonetheless, the US dollar remained well below levels reached in recent years. From its recent peak in February 2002, the dollar ERI has fallen by more than 25%. The fall was widely attributed by market participants and commentators to investor concerns about the sustainability of the US current account

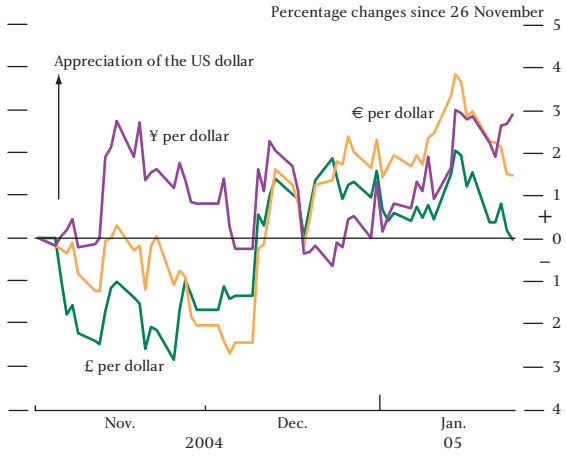
(1) This refers to the 'Major currency' index, including the Australian, Canadian, euro area, Japanese, Swedish, Swiss and UK currencies.

Chart 9
International effective exchange rate indices



Source: Bank of England.

Chart 10
Cumulative changes in dollar bilateral exchange rates



Source: Bank of England.

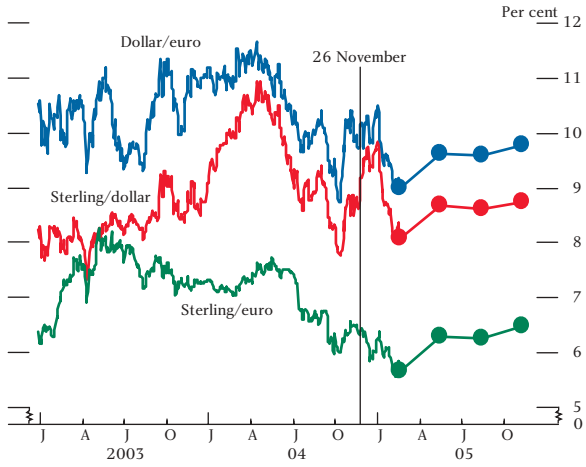
deficit, which was equivalent to around 5½% of GDP in 2004 Q3, and the risks associated with financing the stock of US external liabilities.

Most of the depreciation in the dollar since 2002 has occurred against the currencies of the major industrial countries; since February 2002 the dollar has depreciated by nearly 35% against the euro, by roughly 25% against sterling and around 20% against the Japanese yen.

Among emerging market currencies, the Indonesian rupiah and the Korean won have appreciated against the US dollar since the beginning of 2002, by over 10% and about 20% respectively. But most emerging Asian currencies have appreciated very little against the US dollar during the past three years, reflecting official exchange rate policies. As a result, Asian central bank holdings of overseas assets, particularly US dollar assets, have increased significantly. Collectively, at the end of 2004, Asian central banks held financial assets worth more than $2,300 billion, compared with US official reserves of $87 billion. The continued build-up of reserves by Asian central banks has given rise to market speculation that there could be currency revaluations in the region.

Information from option prices provided little evidence to suggest that market participants anticipated disorderly adjustments in foreign exchange markets. In fact, implied volatilities fell over the review period for all the major currency pairings (Chart 11).

Chart 11
Three-month implied foreign exchange volatilities



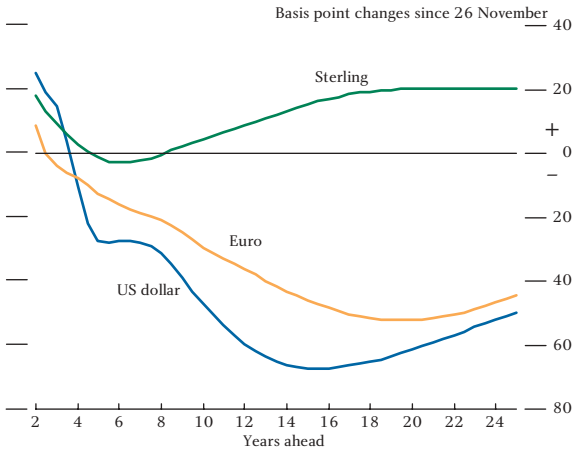
Long-term interest rates

Since the previous *Bulletin*, sterling long-term interest rates have risen a little — by around 20 basis points at very long horizons. In contrast, euro and US dollar long-term interest rates have fallen (Chart 12). At horizons of ten years and beyond, nominal dollar and euro-area forward rates fell by between 30–70 basis points.

However, decomposing the movements in nominal long forward rates into their real and inflation components suggests that long-horizon real forward rates have declined internationally (Chart 13). Sterling real forwards fell by around 5 basis points over the review period; euro real rates fell by around 25 basis points; while the decline in dollar real forwards was even more pronounced, at close to 40 basis points.

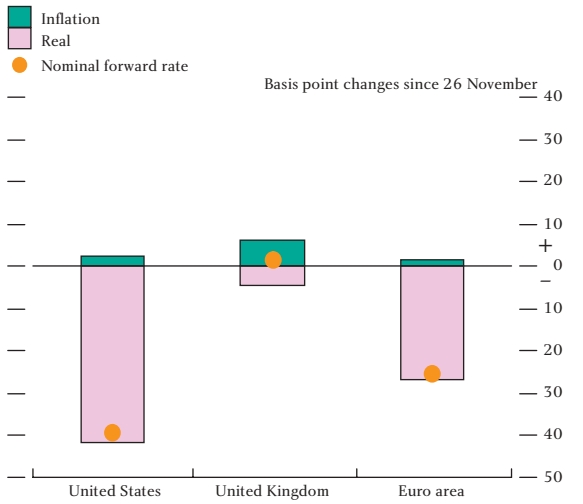
Chart 14 shows that real forward rates have been drifting down for some time in the United Kingdom and the euro

Chart 12
Changes in implied nominal forward rates(a)



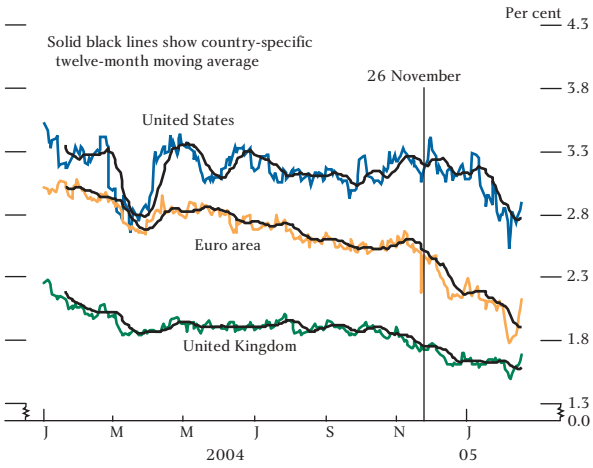
(a) Instantaneous forward rates derived from the Bank's government liability curve.

Chart 13
Changes in nine-year forward rates(a)



(a) Real component of euro rates implied by nominal government bond yields less inflation swap rates, which are not strictly comparable because of credit risk. Sterling and dollar real rates derived from the Bank's government liability curves.

Chart 14
Nine-year real forward rates(a)



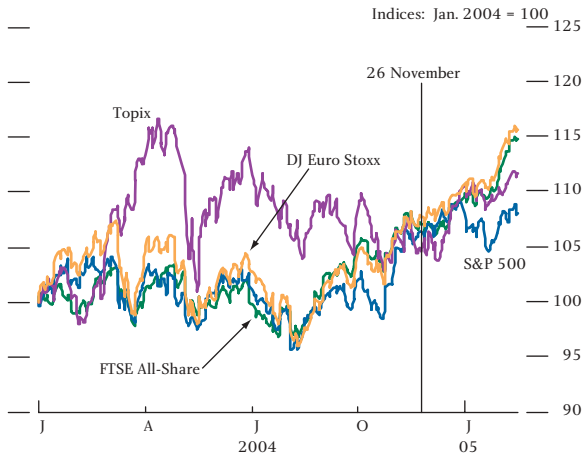
(a) Real components of euro rates implied by nominal government bond yields less inflation swap rates, which are not strictly comparable because of credit risk. Sterling and dollar real rates derived from the Bank's government liability curve.

area. There would also appear to have been a discernible fall in US real rates, at least since the autumn of last year. Survey-based measures also suggested that long-horizon real forward rates have fallen over the past year or so. Possible explanations for the recent falls are reviewed in the box on pages 12–13.

Equity markets

Perhaps consistent with the fall in long-term international real interest rates, which, other things equal, would tend to lead to higher stock market valuations via lower discount rates, global equity prices have increased over the review period (Chart 15). Between 26 November and 18 February, the S&P 500 rose by around 1.6%, and the Topix and Euro Stoxx indices rose by between 7% and 8%. The FTSE All-Share also rose by around 7%, despite the relatively small declines in long-term sterling real interest rates.

Chart 15
International equity indices (local currency)



The rise in equity prices could also have reflected developments in earnings. A number of market contacts attributed the rally in UK share prices over the second half of last year to better-than-expected earnings outturns, despite the impact of the US dollar depreciation on some large UK firms' dollar earnings. And the latest IBES survey data did point to a slight pickup in the growth of prospective earnings per share for large UK companies over 2005.

Equity market valuations may have been underpinned by the return of funds to investors via either higher dividends or share buy-backs. This could have boosted *aggregate* equity indices if, for example, the return of cash to investors represented a transfer of capital from mature industries with relatively low return prospects to growth sectors where the capital could be used to generate higher returns.

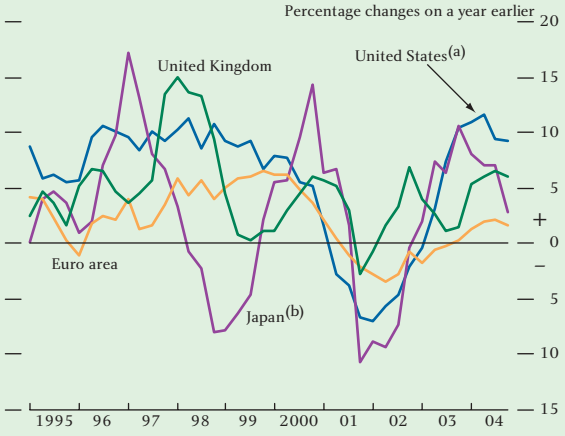
The fall in global long-term real interest rates

In principle, long-term real interest rates equate the desired level of saving to the planned level of investment and are largely determined by the balance of supply and demand for global funds. Possible explanations for the fall in long-term forward real interest rates are therefore likely to focus on developments in global investment and saving, as well as the role of financial institutions as intermediaries between savers and borrowers. In addition, specific market factors may have also played a role in reducing real forward rates.

Investment

Outside the United States, investment growth in major developed economies has been quite sluggish over the past year, given the recovery in profits and falls in the cost of capital (Chart A). If this reflected a fall in the *trend* rate of productivity growth in these countries, the decline in long-term real interest rates might indicate a fall in the long-run equilibrium rate of return on capital. However, it seems more likely to reflect temporary factors, perhaps associated with uncertainty about the strength and sustainability of the global recovery. Such cyclical influences on investment would not be expected to affect long-horizon real forward rates which are determined by the supply and demand for saving when all cyclical influences have been fully unwound.

Chart A
International real investment growth



Source: National accounts.

(a) US data refer to private investment.
(b) Japanese data refer to business investment.

Moreover, the impact of new information and communication technologies in the late 1990s may have boosted productivity growth, which, other things equal, would argue for higher long-term equilibrium real interest rates.(1) So weak investment does not appear to have been the reason for the recent falls in long-term interest rates.

Saving

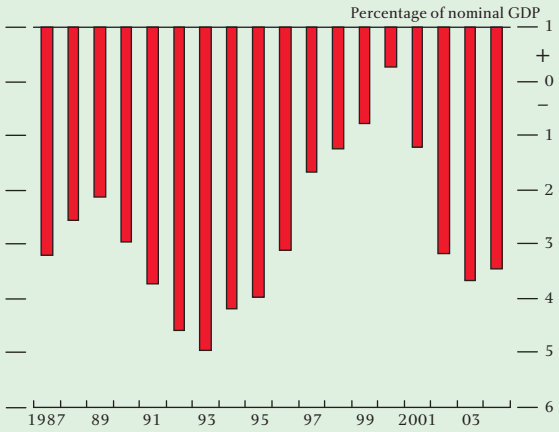
Saving rates in developing countries, especially in Asia, have continued to increase in recent years. And many Asian central banks have been investing their foreign reserves in overseas government debt, particularly US bonds.

Private sector saving rates in some European countries, such as Germany and Italy, have risen recently. This could reflect demographic factors — the generation that was born in the 'baby boom' after the Second World War have reached the age in their life cycle when they may be saving most actively. But in other countries, such as the United States, household saving rates have been falling. Furthermore, fiscal positions in a number of developed economies have deteriorated over the past few years, which would act to reduce national saving rates in those countries(2) (Chart B). On balance, therefore, the evidence on *current* saving behaviour is mixed.

However, financial market prices may have responded to the prospect of increased saving in the future. That is, the recent falls in long-term real interest rates might have reflected higher *expected* global saving.(3) As life expectancies rise, households and companies

(1) The impact of new technology on economic growth is discussed in greater detail in Berry, S and England, D (2001), 'Has there been a structural improvement in US productivity?', *Bank of England Quarterly Bulletin*, Summer, pages 203–09.
(2) A study for the Ministers and Governors by the Group of Deputies, October 1995, 'Saving, investment and real interest rates', concluded that the decline in public saving was the most important single cause of the decline in national saving over the period 1965 to 1995.
(3) In fact, the available empirical evidence investigating the link between demographic changes and asset price developments is weak. This could reflect the limited amount of time-series data on returns and demographic variation, and the difficulty of controlling for all of the other factors that may affect asset values and asset returns. See discussion in Poterba, J, 'The impact of population aging on financial markets', a paper presented at the Federal Reserve Bank of Kansas City's symposium, Global Demographic Change: Economic Impacts and Policy Challenges, in Jackson Hole, Wyoming, 26–28 August 2004.

Chart B
General government financial balances — total of OECD countries(a)



Source: OECD.

(a) Some data points refer to OECD projections.

will typically need to save more to fund retirement costs. And institutional demand for long-dated fixed income securities may have increased in anticipation of the effects of ageing populations on funds' future liabilities. Indeed, insurance companies, and to a lesser extent pension funds, in the United Kingdom and other major economies have been switching their investments towards greater holdings of bonds and away from equities to match better their assets with liabilities.

But given that such demographic changes are slow-moving and largely predictable, why should the switch from equities to bonds have become more pronounced recently? It is possible that life insurance companies or pension fund sponsors have become less willing to bear the risks of mismatches in their assets and liabilities. The weakness in stock markets between 2000 and 2003 and lower long-term interest rates increased institutions' awareness of potential shortfalls in asset valuations. At the same time, changes to regulation may have prompted institutions to accelerate the adjustment towards fixed-income securities. For example, in the United Kingdom, the FSA recently published details of capital regulations for life insurance companies.(4) Similarly, in a number of European countries, regulatory changes have recently been introduced that aim to improve the solvency positions of pension funds and insurance companies, and these could have boosted demand for bonds.

Market factors

The precise extent to which institutional investors have been re-balancing their portfolios is unclear. But market contacts reported that some speculative traders had been buying long-dated government bonds with the aim of profiting from expected future institutional flows, and this activity may have contributed to the falls in long-term yields.

At the same time, the fall in long-term interest rates might have reflected the broader effects on asset prices of continued monetary accommodation, reflected in robust broad money growth. Annual M4 growth in the United Kingdom was 8.6% in December 2004. Euro-area M3 rose by 6.4% in the year to December 2004, up from 5.5% in August 2004, and US broad money rose by 5.9% in the year to January 2005. To the extent that the build-up in money balances has led to 'excess' liquidity, it could have prompted investors to move into other asset classes, including long-term government bonds. In turn, such a process of portfolio adjustment could have helped to bid up asset prices and drive down term premia on credit-risk-free bonds, and risk premia on other asset classes.

Another factor could be that the continuing development in the markets for index-linked securities in a number of countries (greater issuance, new products, etc) may have made such instruments more attractive to investors. In particular, the increased supply and trading of such instruments may have reduced the liquidity premia that investors demand. Some market contacts estimate that trading volume in US inflation-linked derivatives in 2004 totalled over $12 billion, an eight-fold increase on 2003, with a particular increase in the second half of 2004.

(4) The underlying principles of the new regulatory regime were outlined in 'Markets and operations' (2004), *Bank of England Quarterly Bulletin*, Autumn, page 276.

Income distributed by UK private non-financial companies, the bulk of which are dividend payments, was broadly flat during 2004 after picking up in 2003 (Chart 16). But UK financial companies did distribute more income during 2004. Furthermore, anecdotal evidence suggests that the use of share purchase schemes has increased in a number of economies over the past year.

A fall in the equity risk premium might also have contributed to the continued strength in equity prices. Over short horizons, information from options prices suggests that equity price uncertainty, as measured by implied volatility, fell over the review period (Chart 17). Both realised and implied equity volatility was low, having reached levels last seen in the early 1990s.

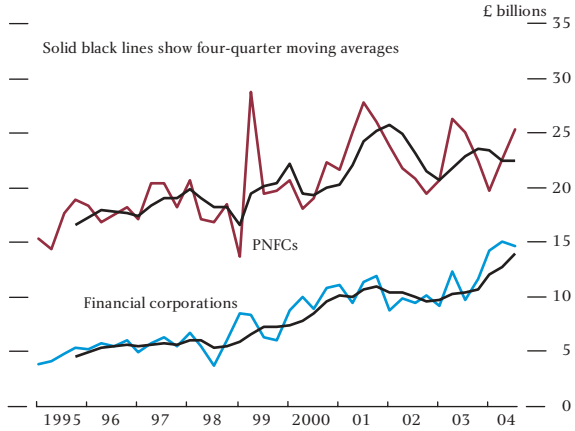
There is evidence that merger and acquisition activity has picked up recently, which may also have boosted equity prices (Chart 18). This could partly explain why equity prices of medium-sized companies have outperformed those of larger companies in the United Kingdom, United States, France and Germany (Chart 19). Many of these bids have been by private equity funds which have benefited from the freely available credit in the high-yield bond and leveraged loan markets. In this way, credit market conditions may have helped to underpin the rise in equity valuations and brought about some re-leveraging of the corporate sector.

Corporate credit markets

Accompanying the rise in equity prices, spreads on investment grade corporate bonds narrowed slightly over the period and remained low by historical standards (Chart 20). Similarly, spreads on high-yield and emerging market bonds narrowed, suggesting conditions for lower-rated issuers also remained favourable (Chart 21). Indeed, the Merrill Lynch high-yield euro-denominated credit spread index narrowed to the lowest level since the series began in December 1997 (Chart 22).

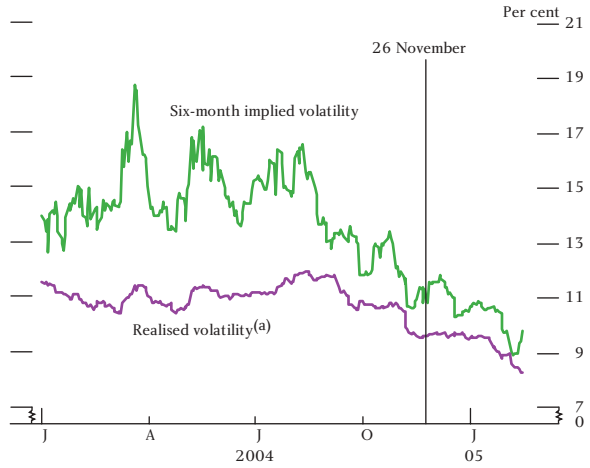
Against the background of a continued benign macroeconomic environment and with company balance sheets having been strengthened over recent years in a number of the major economies, corporate defaults remained low. Moodys' speculative-grade annual default rate fell to 2.3% in 2004, and defaults were forecast to remain relatively low through 2005. Ratings agencies also reported that there were no investment-grade

Chart 16
Income distributed by UK corporations



Sources: ONS and Bank calculations.

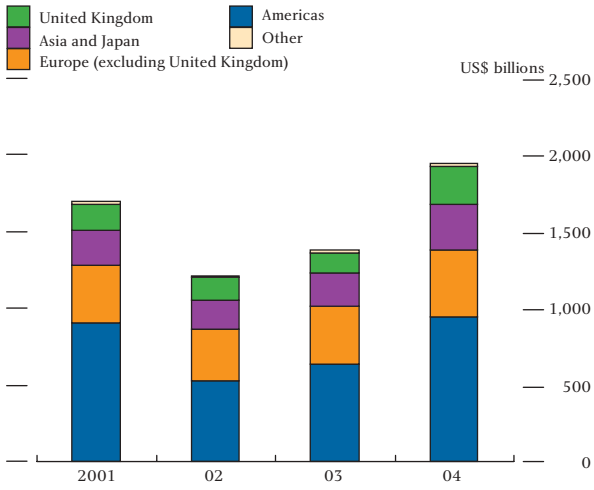
Chart 17
FTSE 100 realised and implied volatility



Sources: Bloomberg, LIFFE and Bank calculations.

(a) Annualised rolling standard deviation of log returns estimated over a six-month window.

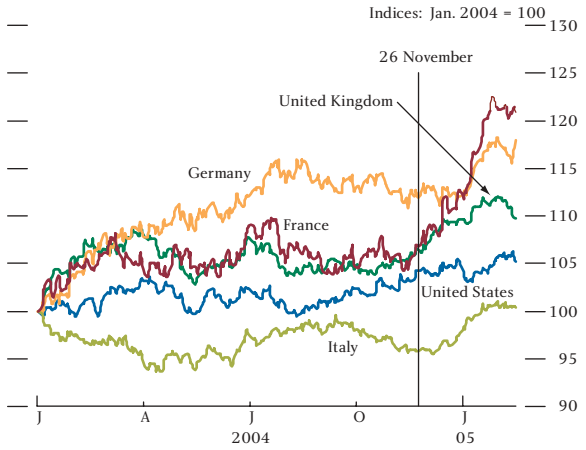
Chart 18
Global merger and acquisitions(a)



Source: Thomson Financial.

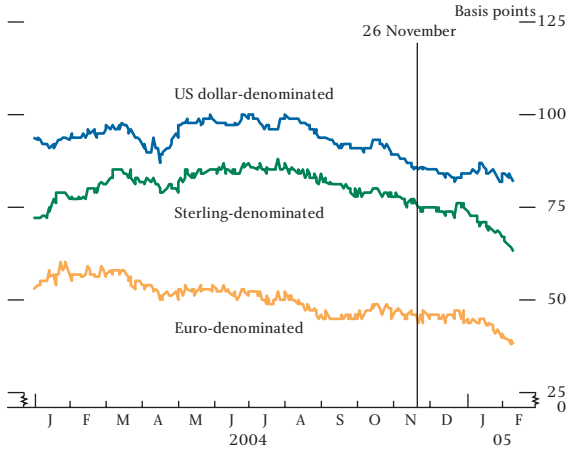
(a) Data represent the value of announced mergers and acquisitions, where the merger value is based on the target company alone.

Chart 19
Mid-cap equity indices relative to large-cap indices



Sources: Bloomberg and Bank calculations.

Chart 20
Option-adjusted corporate bond spreads



Source: Merrill Lynch.

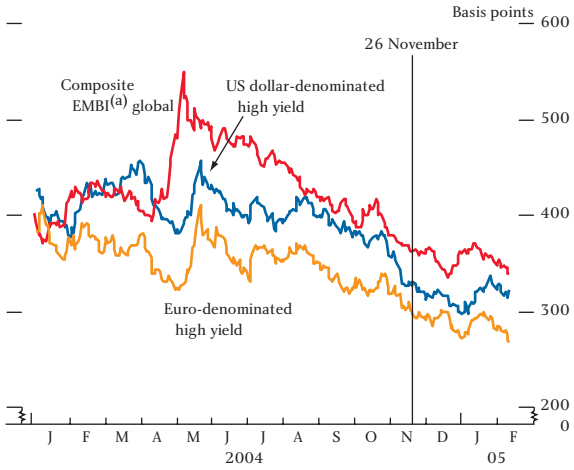
defaults during 2004 and ratings upgrades exceeded downgrades by 89% in 2004 Q4, compared with 36% in 2004 Q3.

Chart 22 shows a marked correlation between realised default rates and credit spreads. The recent trend of narrowing credit spreads could therefore be consistent with a fall in underlying default risk. But this is not the only explanation. For example, a fall in liquidity premia could have contributed to the continued narrowing in spreads; as with risk-free instruments, any 'excess' liquidity among investors could have spilled over into corporate credit markets boosting bond prices and lowering yields. A more durable effect on spreads might have arisen from structural changes in credit markets. The rapid growth in credit markets over recent years — for example, in tradable credit indices — might mean that investors can more easily diversify their credit portfolios, which could have reduced required risk premia on credit instruments.

Narrow spreads in corporate credit markets may have prompted some investors to move into other credit products (for example more complex/leveraged products such as collateralised debt obligations (CDOs)) in search of higher returns.

CDO issuance was high during 2004 Q4 and, despite a significant fall in January (Chart 23), market commentators expected issuance to remain high through 2005. Furthermore, the market has continued to find innovative ways of structuring products that generate higher yields. For example, December saw the launch of the first collateralised commodity obligation (CCO), a vehicle that repackages the risk on a pool of commodity price derivatives. And demand reportedly remained high

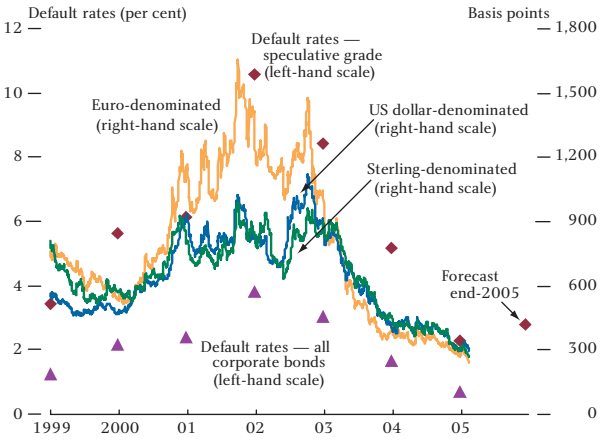
Chart 21
Emerging market and high-yield corporate bond spreads



Sources: JPMorgan Chase and Co. and Merrill Lynch.

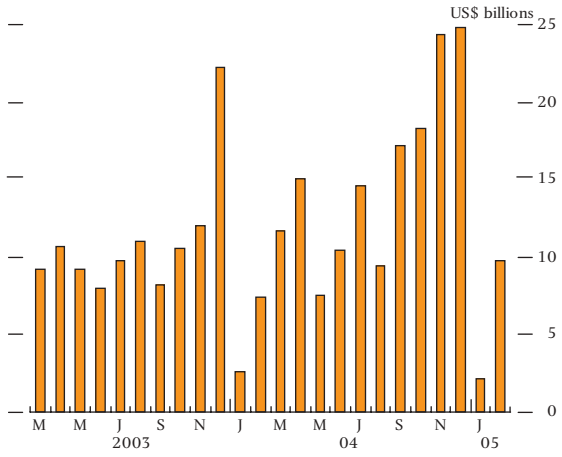
(a) Emerging markets bond index.

Chart 22
High-yield option-adjusted corporate bond spreads and global default rates



Sources: Merrill Lynch and Moody's.

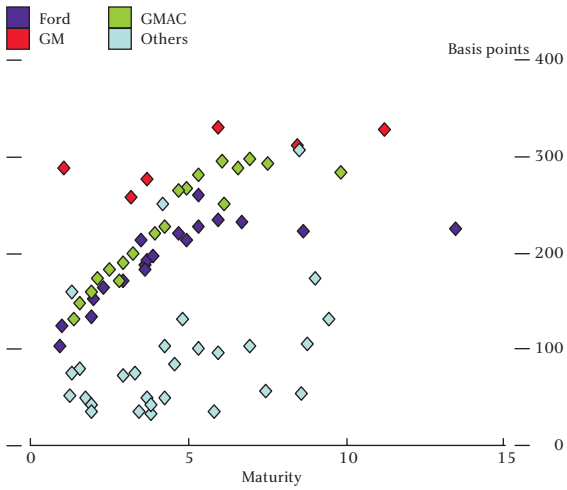
Chart 23
Funded CDO issuance(a)



Source: JPMorgan Chase and Co.

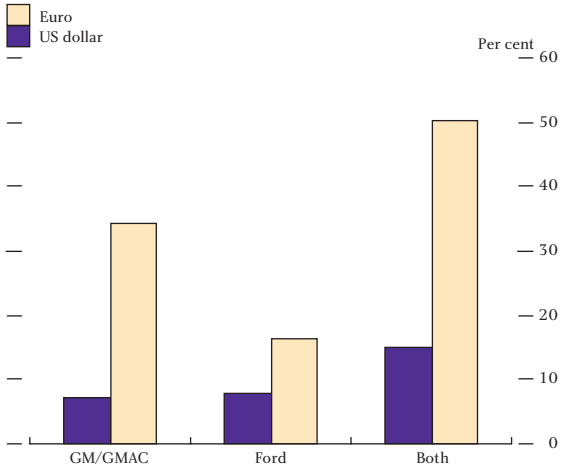
(a) February 2005 data refer to issuance up to 18 February.

Chart 24
US dollar-denominated auto sector bond spreads



Sources: Merrill Lynch and Bank calculations.

Chart 25
GM and Ford debt outstanding relative to total high-yield debt



Sources: Merrill Lynch and Bank calculations.

for credit products that offer higher leverage, in particular for both standardised tranches on credit indices and bespoke single-tranche CDOs, including CDOs that reference other CDOs (so-called CDO-squared products).(1)

One specific uncertainty facing credit markets is the potential impact of ratings downgrades in the US automobiles sector. Since 2002, tradable debt of both General Motors (GM) and Ford has been rated close to the bottom of the investment-grade spectrum by S&P. In January, S&P announced that it would review the appropriateness of GM's stable outlook (although it did not anticipate taking any action in the near future). Should GM be downgraded those fund managers who lack the mandate to hold speculative-grade credits could sell their holdings of GM bonds.

Of course, any future downgrade would have been well signalled — GM and Ford debt already traded apart from other auto sector credits (Chart 24). And over recent months, spreads on GM and Ford credit default swaps (CDS) were trading at levels closer to those of high-yield rather than investment-grade CDS indices. But any future downgrade of GM and Ford debt could have a potentially disruptive effect on the high-yield market: combined, the two companies have outstanding euro-denominated debt equivalent to around half the outstanding total euro high-yield debt market (Chart 25).

Risk appetite and market volatility

Taken together, the narrowing of credit spreads, rises in equity prices and generally low levels of realised and expected volatility across financial markets might have suggested a broad-based fall in risk premia. This could have reflected a fall in the perceived riskiness of financial assets. For example, particularly in credit markets, developments in derivative markets may have made it possible for investors to diversify their portfolios more effectively. It could also suggest a more general increase in investors' risk appetite as the so-called 'search for yield' continued, as evidenced by the increased demand for leveraged products that offer a yield pickup.(2)

(1) Recent developments in structured credit markets were described in more detail in Chapter 2 of 'The financial stability conjuncture and outlook' (2004), *Bank of England Financial Stability Review*, December, pages 50–64.
(2) The term 'risk appetite' is used here to mean the general willingness to hold any given quantity of asset risk, which may vary over time, for example as macroeconomic conditions change. For more details, see Gai, P and Vause, N (2004), 'Risk appetite: concept and measurement', *Bank of England Financial Stability Review*, December, pages 127–36.

But why might investors' risk appetite have increased? Simple textbook asset pricing models assume that investors seek to smooth their consumption through time. Lower consumption volatility (ie a generally less risky macroeconomic environment) means investors require lower compensation for taking risk. Given that asset prices reflect claims on future consumption, the broad-based fall in market volatility observed since 2002 may have been caused by a fall in expected consumption volatility. In the context of a simple asset pricing framework, this could be consistent with an increase in investors' risk appetite and, in turn, a reduction in the required risk premia across asset classes.

Moreover, lower volatility may have encouraged some investors to use greater leverage or hold riskier assets. This in turn may have increased liquidity in markets for risky assets, which may have further reduced apparent risks.

Against this backdrop, it is possible that the recent low levels of volatility will prove temporary. A sudden rise in asset volatility could prompt a more generalised fall in risk appetite and, in turn, a broad-based asset price correction, possibly fuelled by an unwinding of leveraged positions or an abrupt unwinding of market liquidity.

Developments in market structure

This section notes three risk-reducing developments in global financial markets. It also notes the issuance of the first 50-year euro-denominated government bonds, and reviews activity in the sterling money markets and gilt repo market since the Bank announced reforms to its operations in the sterling money markets.

Continuous Linked Settlement (CLS) and foreign exchange settlement risk

CLS is the international foreign exchange settlement system owned by 69 of the world's largest financial organisations and overseen on a co-operative basis by the central banks that issue the currencies settled in the system.(1) Following the resolution of outstanding regulatory and legal issues, transactions involving four new currencies — the Hong Kong dollar, the Korean won, the New Zealand dollar and the South African rand — started settling in CLS on 7 December 2004. This brought the total number of currencies settled in the system to 15.

BMA guidelines on repo delivery

The Bond Market Association (BMA) recently issued guidelines for so-called 'prompt delivery' of interdealer repo trades. Repo transactions undertaken on this basis will require the delivery of the underlying security to take place within 15 minutes of the trade, after which point the trade will be cancelled if the security has not been delivered.

The guidelines are part of BMA initiatives to address the problem of settlement 'fails' in US Treasury bond repo markets. In particular, the guidelines aim to ensure that there is a mechanism whereby firms that are holding a particular Government Security have adequate incentives for making such securities available to dealers and other participants that require these securities to cover a short position or otherwise make delivery to a third party.

Early termination of credit default swaps

The rapid growth in credit derivatives markets over recent years has prompted market initiatives to introduce early termination (or 'tear-up') facilities into the credit default swap (CDS) market. During November 2004, CDS positions with a notional value of around $38 billion referencing US and European credit indices were terminated early. The termination was facilitated by TriOptima, a private company who have previously been involved in similar 'tear ups' in interest rate swap markets.(2) From a systemic standpoint, the extension of this facility to credit markets should contribute to reducing counterparty risk.

Issuance of long-dated government securities

The Agence France Trésor (AFT) issued the first ever 50-year euro-denominated bond — the OAT 4% 25 April 2055 — on 23 February 2005. The issue of €6 billion was covered more than three times, confirming earlier survey evidence, compiled for the AFT, which suggested that there was significant investor interest in such long-dated securities. In the United Kingdom, the Debt Management Office has consulted the market about issuing ultra-long gilts, as reported in the previous *Bulletin*.

(1) For more details about CLS see Sawyer, D (2004), 'Continuous Linked Settlement (CLS) and foreign exchange settlement risk', *Bank of England Financial Stability Review*, December, pages 86–92.
(2) See 'Markets and operations' (2003), *Bank of England Quarterly Bulletin*, Summer, page 160.

Sterling money markets over the past year

As discussed in this and previous *Bulletins*, since the Bank announced its objectives for reforming its operations in the sterling money markets in May 2004, the spread between very short-dated interest rates and the Bank's repo rate has narrowed and become more stable.

There is some evidence that the reduction in uncertainty has encouraged a pickup in wider market activity. In particular, more stable short-dated interest rates have reportedly encouraged growth in over-the-counter (OTC) derivatives markets that reference these rates. For example, the sterling overnight index average (SONIA), published by the Wholesale Markets Brokers' Association (WMBA), is used as the reference rate for the floating leg of sterling overnight index swaps (OIS). Market participants have suggested that the OIS market has grown rapidly during the past year.

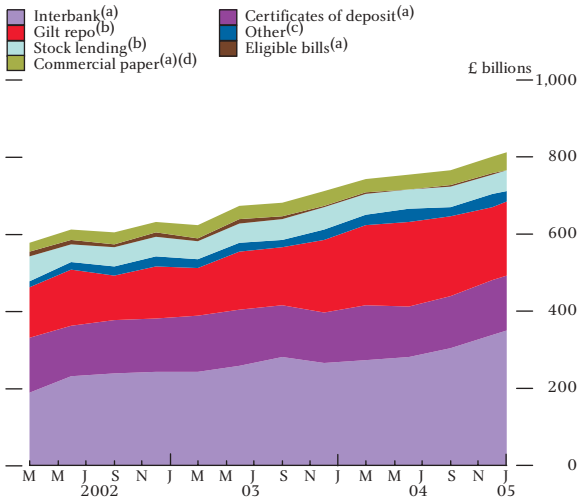
In the cash markets, there has been high growth in amounts outstanding for both the interbank and certificates of deposit markets since 2004 Q2 (Chart 26). Market contacts suggested that reduced uncertainty surrounding short-term funding costs, and greater liquidity in the markets for hedging the risks in these instruments, has encouraged lending and borrowing at longer maturities.

Quoted bid-offer spreads in the sterling unsecured market have also narrowed. This may reflect not only more stable short-dated interest rates but also the recent move from quoting short-dated unsecured rates in fractions to decimals.

Turnover in the gilt repo market

The steady growth in amounts outstanding in the gilt repo market experienced over recent years reversed slightly in 2004 H2 (Chart 26). The fall in repo activity in the second half of 2004 was said to reflect both the flat shape of the money market curve and banks' efforts to reduce balance sheet size ahead of the year-end. Turnover, however, has continued to rise and, during the past few years, an increased proportion of trading in gilt repo, particularly at overnight maturities, has been conducted on BrokerTec's electronic trading platform with turnover data suggesting it accounted for just under one half of aggregate market turnover by November 2004 (Chart 27). One of the benefits of the system is the ability to settle repo transactions through the London Clearing House, enabling banks to reduce their credit risk both by netting exposures and by dealing with a high quality central counterparty.

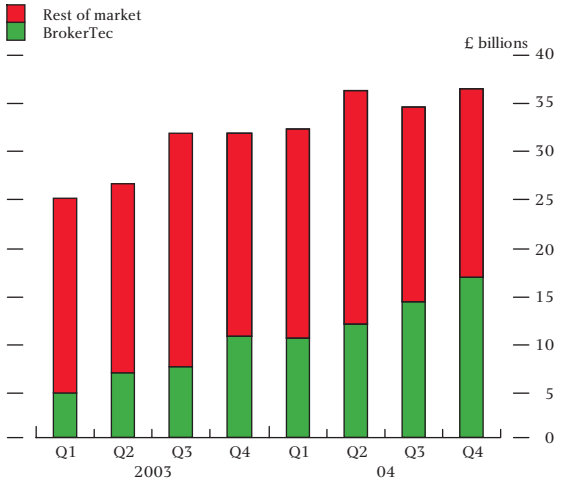
Chart 26
Size of the sterling money market



Source: Bank of England.

(a) Reporting dates are end-quarter.
(b) Reporting dates are end-February for Q1, end-May for Q2, end-August for Q3 and end-November for Q4.
(c) Includes Treasury bills, sell/buy-backs and local authority bills.
(d) Bank of England data series discontinued after 2004 Q2. Euroclear data used thereafter.

Chart 27
Average daily turnover in gilt repo(a)



Sources: BrokerTec and Bank of England quarterly survey of repo market.

(a) Quarters refer to three months ending February, May, August and November.

Bank of England official operations

Changes in the Bank of England balance sheet

There was little change in the sterling value of the foreign-currency components of the Bank's balance sheet over the review period (Table B). On 28 January 2005, the 2005 euro note, one of the Bank's three-year euro-denominated notes, matured. To maintain the

Table B
Simplified version of Bank of England consolidated[a] balance sheet[b]

£ billions

Liabilities	18 Feb.	26 Nov.	Assets	18 Feb.	26 Nov.
Bank note issue	38	40	Stock of refinancing	27	28
Settlement bank balances	<0.1	<0.1	Ways and Means advance	13	13
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	8	8	Other sterling-denominated assets	3	5
Foreign currency denominated liabilities	13	13	Foreign currency denominated assets	15	14
Total[c]	**59**	**61**	**Total**[c]	**59**	**61**

(a) For accounting purposes the Bank of England's balance sheet is divided into two accounting entities: Issue Department and Banking Department. See 'Components of the Bank of England's balance sheet' (2003), *Bank of England Quarterly Bulletin*, Spring, page 18.
(b) Based on published weekly Bank Returns. The Bank also uses currency, foreign exchange and interest rate swaps to hedge and manage currency and non-sterling interest rate exposures — see the Bank's 2003 *Annual Report*, pages 53 and 73–79 for a description.
(c) Figures may not sum to totals due to rounding.

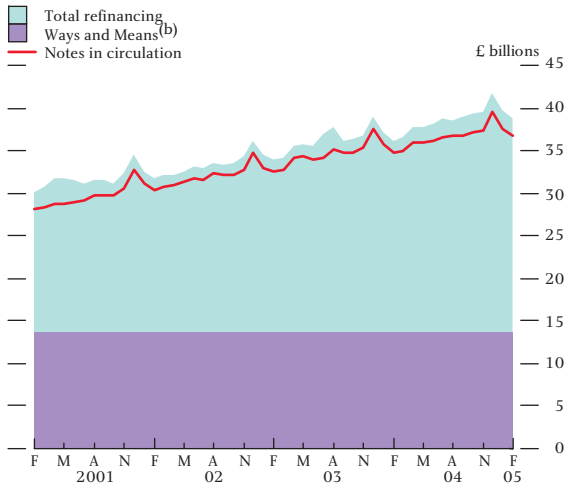
nominal value of euro notes outstanding, the Bank created €2,200 million of notes maturing on 28 January 2008. A €1,000 million first tranche of this 2008 euro note was auctioned on 18 January 2005 for issue on the 28 January. Cover at auction was 3.2 times the amount on offer, and the average accepted yield was 2.648%, 11.3 basis points below the three-year euro swaps curve. A second auction of €1,000 million nominal of the 2008 note is scheduled for 15 March 2005. The remaining €200 million nominal of notes will be retained by the Bank and may be made available for sale and repurchase operations with market-makers for the note programme.

The Bank maintained the value of its three and six-month euro-denominated bills outstanding at €3.6 billion, issuing new bills on a monthly basis as old bills matured. The average indicative spread to Euribor of three-month issuance widened to 10.2 basis points below Euribor, compared with 9.8 basis points over the previous review period (September-November); for six-month bills, the average issuance spread widened to 10.6 basis points below Euribor from 10.1 basis points.

The size of the sterling components of the Bank's balance sheet fluctuated with seasonal and weekly variation in demand for banknotes (Table B). Notes in circulation rose over the Christmas and New Year period, with a corresponding rise in the stock of refinancing via open market operations (OMOs) (Chart 28).

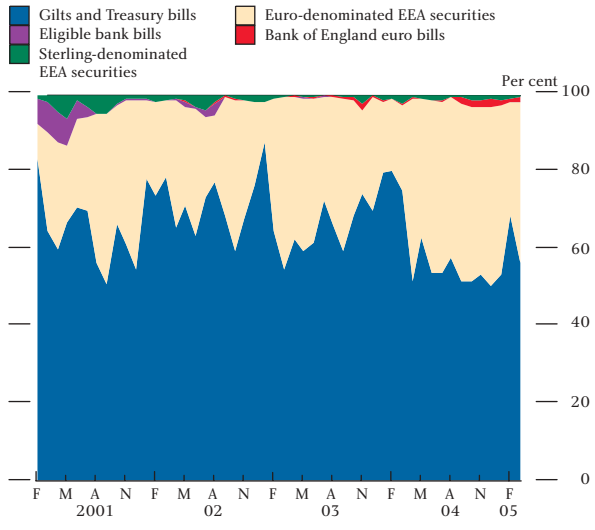
As described in the Autumn 2004 *Quarterly Bulletin*, the Bank has changed the way it manages its sterling bond portfolio. Gilt purchases were made in accordance with the screen announcement of 2 December 2004; no purchases in December, £16 million of 4¾% Treasury 2015 in January and £16 million of 5% Treasury 2014 in

Chart 28
Bank notes in circulation, the stock of OMO refinancing, and 'Ways and Means'[a]



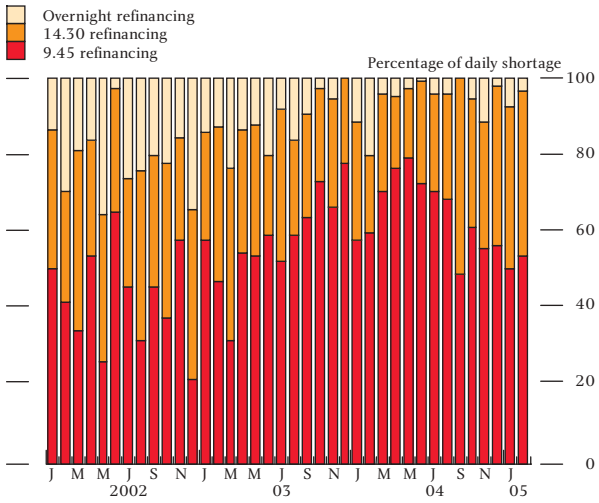
(a) Monthly averages.
(b) An illiquid advance to HM Government. This fluctuated prior to the transfer of responsibility for UK central government cash management to the UK Debt Management Office in April 2000. The Ways and Means is now usually constant.

Chart 29
Instruments used as OMO collateral[a]



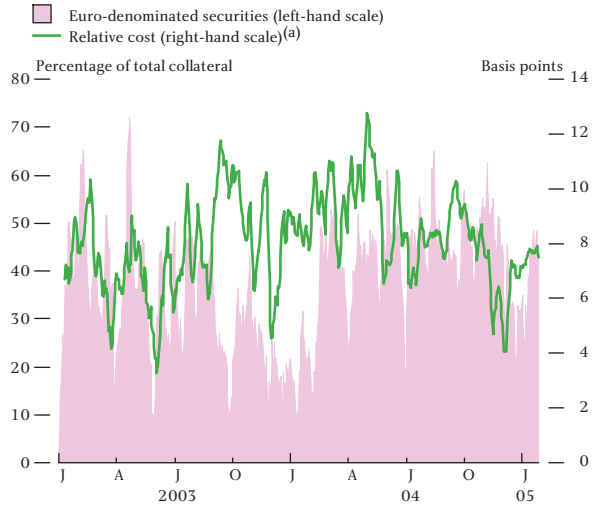
(a) Monthly averages.

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



(a) Monthly averages.

Chart 31
Relative cost and use in OMOs of euro-denominated EEA government securities



(a) Relative cost calculated as the difference between one-month BBA repo and Libor fixing spread and one-month European Banking Federation repo and Euribor spread. A wider spread indicates a lower cost of repoing euro-denominated debt relative to repoing gilts.

February 2005. A screen announcement on 1 March 2005 detailed the purchases to be made over the following three months.

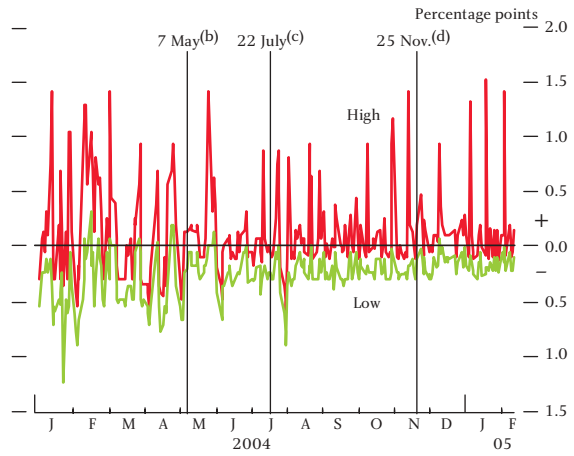
Counterparties participating in the Bank's OMOs reduced their use of euro-denominated collateral, especially during January (Chart 29), despite a fall in its relative cost (Chart 30). The majority of OMO financing continued to be provided at the Bank's repo rate (at a two-week maturity) in the 9.45 and 14.30 rounds, rather than at a penalty interest rate in the overnight lending facilities (Chart 31).

Short-dated interest rates

The size of the spread between daily highs and lows in sterling overnight interest rates has narrowed compared with the recent past. Since the release of the second consultative paper on money market reform on 25 November, volatility in overnight interest rates has remained at the lower level prevailing since the Bank first announced in May its objectives for reform of its operations in the sterling money markets in May (Chart 32). There have been a number of 'tight' days when overnight rates have risen because the Bank's penal overnight bank lending facilities have been used. But these peaks should be reduced following the interim reforms announced by the Bank on 11 February 2005, and to be implemented from 14 March 2005 — see the box on page 22.

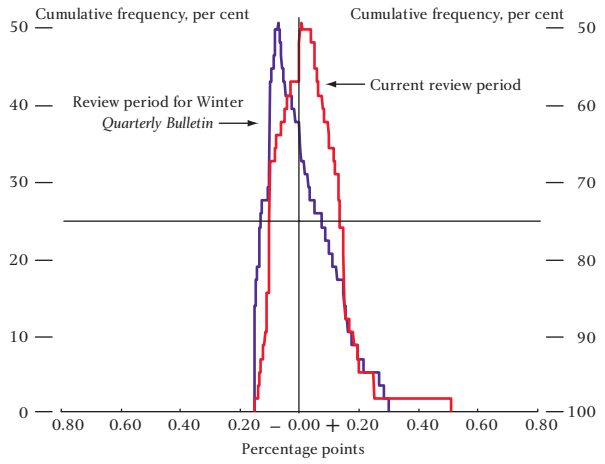
Chart 33 shows that the distribution of the spread between the sterling secured (gilt GC repo) overnight rate and the official Bank repo rate became skewed towards tighter overnight rates. In part, this reflected the absence of rate pivoting ahead of meetings of the MPC in the current quarter. Given that OMOs span MPC dates, pivoting occurs when market participants perceive a significant likelihood that the MPC will change official rates; speculation about rate increases causes overnight market rates to decline in the run up to the MPC meeting date, and *vice versa*. Pivoting was previously observed ahead of the June and August 2004 meetings (Chart 32). It should be eliminated by the interim money market reforms.

Chart 32
Volatility of sterling overnight interest rate(a)



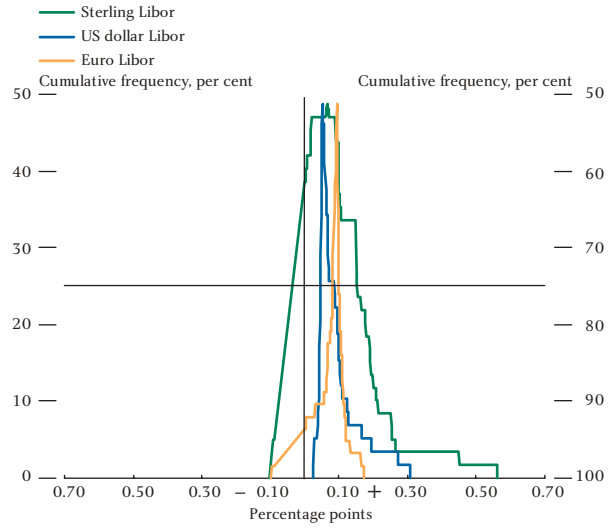
(a) High and low of the day observed by the Bank's dealing desk as a spread to the policy rate.
(b) On 7 May, the Bank published a consultative paper on the reform of its operations in the sterling money markets.
(c) On 22 July, the Bank announced the results of the review of its official operations in the sterling money markets.
(d) On 25 November, the Bank published a second consultative paper on the reform of its operations in the sterling money markets.

Chart 33
Cumulative folded distribution of sterling secured overnight rates(a)



(a) Distribution of the spread between the GC repo rate and the MPC's repo rate. A negative spread indicates that the market rate is less than the official rate; if more than 50% of the spread distribution is below zero, it has a negative bias.

Chart 34
Cumulative folded distribution of international unsecured overnight rates(a)



(a) Distribution of the spread between the Libor rate and the official policy rate. A negative spread indicates that the market rate is less than the official rate; if more than 50% of the spread distribution is below zero, it has a negative bias.

Comparing overnight sterling, euro and dollar Libor rates to their respective policy rates shows that sterling unsecured rates remained more volatile than dollar and euro rates (Chart 34). The Bank's reforms are intended to reduce sterling overnight rate volatility further.

Forecasting the liquidity shortage

Relative to the previous review period, there was a decline in the accuracy of the Bank's liquidity forecast, in part owing to seasonal volatility in demand for banknotes over the Christmas and New Year period (Table C). This volatility persisted into late January as banknotes in circulation declined more gradually than

Table C
Intraday forecasts versus actual liquidity shortages

Mean absolute difference (standard deviation), £ millions

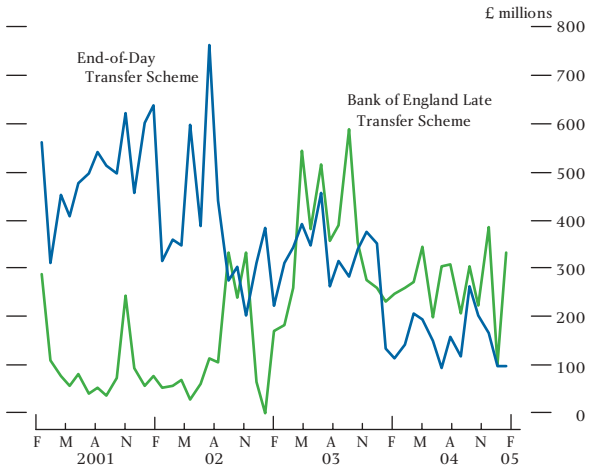
	9.45 forecast	14.30 forecast	16.20 forecast
2002	83 (107)	43 (79)	30 (73)
2003	101 (123)	61 (96)	51 (85)
2003 Q2	119 (131)	54 (76)	38 (43)
2003 Q3	118 (170)	92 (154)	85 (150)
2003 Q4	87 (91)	52 (57)	46 (36)
2004 Q1	120 (108)	79 (77)	55 (43)
2004 Q2	115 (123)	58 (78)	61 (74)
2004 Q3	89 (69)	62 (44)	52 (32)
2004 Q4	107 (114)	74 (86)	57 (63)
Jan.-Feb. 2005	150 (145)	100 (121)	71 (99)

expected after the Christmas and New Year peak. But after allowing for seasonality, there was little deterioration in accuracy: forecast errors were of a similar magnitude to those made in the equivalent period twelve months ago.

Flows in the end-of-day schemes for settlement banks fell, possibly suggesting an improvement in settlement banks' forecasting accuracy. Average payments in the Bank of England Late Transfer Scheme (BELTS) rose moderately over the period, but these were more than offset by a fall in the End-of-Day Transfer Scheme (EoDTS) payments. The volatility of daily flows also fell in the EoDTS but rose in the BELTS, suggesting settlement banks continued to experience large but infrequent variability in their end-of-day balances. The fall in the level of payments in the end-of-day facilities over the past year has been welcome (Chart 35).

Following the Bank's announced reforms, in particular the move to a period-average maintenance requirement and remunerated reserves, settlement banks will not need to square up every day. On most days, they will be able to vary their reserves balances instead.

Chart 35
Bank of England Late Transfer Scheme and End-of-Day Transfer Scheme(a)



(a) Monthly averages.

Responses to the second consultation paper on money market reform, and interim reforms

As described in the Winter 2004 *Quarterly Bulletin*, the Bank issued a second consultative paper in November 2004 on the planned reforms to its official operations in the sterling money markets.(1) It set out the proposed new framework in detail and invited comments from interested parties on a number of detailed design features. It also asked for indications of interest in participating in the new facilities.

The responses to the consultative paper indicated widespread support for the planned new framework, and many banks and building societies expressed an interest in participating. The responses also provided some important feedback, for example on how potential participants would expect to manage their reserve accounts. In light of these comments, and continuing dialogue with market participants, the Bank will issue a further paper outlining its final plans.

In the November consultative paper, the Bank suggested that it might be possible to sequence changes to the operational framework, since the Bank currently envisages that the necessary preparations for the fully reformed system are unlikely to be completed before the end of 2005. On 11 February, the Bank announced a package of interim measures with the aim of stabilising overnight interest rates further ahead of the launch of the fully reformed system.(2) The measures, which will apply from 14 March, are as follows:

- narrowing the interest rate 'corridor' formed by the Bank's current overnight lending and deposit facilities to +/- 25 basis points from +/- 100 basis points;
- indexing the rate charged on the two-week repos undertaken as part of the Bank's daily open market operations to the MPC repo rate;
- no longer purchasing bills outright in the Bank's open market operations (OMOs); and
- removing bankers' acceptances from the Bank's list of eligible collateral.

Allowing access to the Bank's overnight facilities at less penal rates is expected to contain volatility in short-term market interest rates directly.

Indexing the Bank's two-week repos to the MPC repo rate will eliminate a specific source of volatility known as 'pivoting'. As discussed in the Summer 2004 *Quarterly Bulletin*, pivoting occurs when fixed-rate repos span an MPC meeting at which the MPC is expected to change its repo rate. Indexed repos will not form part of the final framework and so will be used only in the interim period until the launch of the fully reformed system. Thereafter, the new structure for open market operations will ensure that repos do not span scheduled MPC meetings.

The Bank for many years has conducted its OMOs not only via repos, but also via outright purchases of Treasury bills and eligible bankers' acceptances. However, it is not possible to index the rate applying to outright bill purchases, which is delivered through a discount on the purchase price, and so such purchases will cease with the introduction of indexed repos. Outright purchases form only a small proportion of the Bank's OMOs and would in any case have been discontinued with the launch of the fully reformed scheme.

Bankers' acceptances are two-name paper that is the primary obligation of the issuing bank and the secondary obligation of the firm that borrows money from the bank under the acceptance facility. The Bank has maintained a list of banks whose acceptances will be eligible as collateral in the Bank's OMOs and for intraday liquidity in the RTGS payments system.(3) The decision to remove bankers' acceptances from the Bank's list of eligible collateral reflected their declining use, to the point where they form a tiny part of the overall pool of eligible collateral. As reported in previous *Quarterly Bulletins*, the stock of eligible bankers' acceptances has fallen from around £18 billion in 1998 to less than £1 billion by the end of 2004. That compares with around £340 billion of gilts and £2$^{3}/_{4}$ trillion of eligible EEA government collateral.

Transitional arrangements for eligible bankers' acceptances were also announced on 11 February to allow market participants to adapt to the change.

(1) See 'Reform of the Bank of England's Operations in the Sterling Money Markets, a second consultative paper', available at www.bankofengland.co.uk/markets/money/smmreform041125.pdf.
(2) The news release announcing these measures is available at www.bankofengland.co.uk/pressreleases/2005/014.htm.
(3) More information on eligible banks and eligible bankers' acceptances is available at www.bankofengland.co.uk/markets/money/eligiblebanks.htm.