

# Markets and operations

*This article reviews developments since the Winter Quarterly Bulletin in sterling and global financial markets, UK market structure and the Bank's official operations.<sup>(1)</sup>*

- *The sterling ERI appreciated to the highest level since end-2002, and sterling reached an eleven-year high against the US dollar. In effective terms the dollar depreciated over the period.*
- *Short-term nominal interest rates fell internationally, as did sterling and dollar long-term rates. Credit spreads were little changed between November and February, but dollar high-yield spreads ticked up after the FOMC meeting in January.*
- *Equity markets continued to rise, with the Euro Stoxx 50 rising more than other international indices.*
- *In the sterling money market, use of gilt repo continued to expand, while the issuance of eligible bankers' acceptances fell sharply.*

Between 28 November and 27 February sterling rose by nearly 8% against the dollar and 4% against the euro, leaving the sterling ERI up just over 5% at 105.7 (Table A). International short-term forward interest rates fell over the period. Sterling and dollar long-term interest rates also fell, but euro long-term rates were broadly unchanged. The global equity market recovery continued, though the FTSE 100 rose less than other international indices in local-currency terms.

**Table A**  
Summary of changes in market prices

	28 Nov.	27 Feb.	Change
<b>June 2004 three-month interest rate</b> (per cent)			
United Kingdom	4.75	4.41	-34 bp
Euro area	2.59	1.97	-63 bp
United States	1.75	1.25	-52 bp
<b>Ten-year nominal government forward rate</b> (per cent) (a)			
United Kingdom	5.05	4.83	-22 bp
Euro area	5.45	5.45	0 bp
United States	6.59	6.21	-38 bp
<b>Equity indices</b> (domestic currency)			
FTSE 100 index	4343	4492	3.4%
Euro Stoxx 50 index	2630	2895	10.0%
S&P 500 index	1058	1145	8.2%
<b>Exchange rates</b>			
Sterling effective exchange rate	100.5	105.7	5.2%
\$/€ exchange rate	1.20	1.25	4.2%

Columns may not correspond exactly due to rounding.

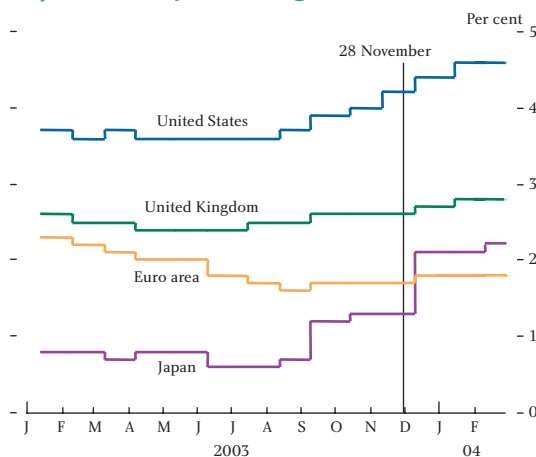
Sources: Bank of England and Bloomberg.

(a) Three-month forward rates, derived from the Bank's government liability curves.

## Short-term interest rates

Over the period, economists' forecasts for GDP growth in 2004 were revised upwards for the United States, the United Kingdom and the euro area (Chart 1). Expectations for Japanese GDP growth in 2004 were revised up sharply. According to these surveys, the outlook for global growth in 2004 is now considerably stronger than it was in the middle of 2003.

**Chart 1**  
Expected 2004 real GDP growth

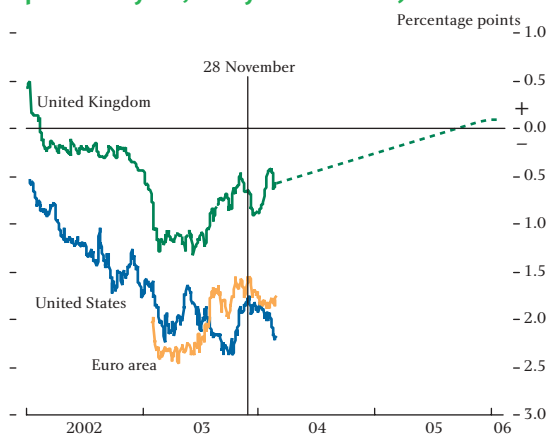


Source: Consensus Economics.

(1) The period under review is 28 November (the data cut-off for the previous *Quarterly Bulletin* article) to 27 February.

Chart 2 shows the gap between sterling, US dollar and euro three-year real spot interest rates and five-year real rates five years forward, derived from the respective inflation-indexed bonds (for sterling and US dollar) and inflation swaps (euro). That the UK real interest rate ‘gap’ was smaller than the US and euro-area gaps suggests that monetary conditions were perceived to be less accommodating in the United Kingdom than in the United States and the euro area.<sup>(1)</sup> The UK gap narrowed by around 40 basis points between 28 November and 27 February, while the US and euro-area gaps widened by around 20–35 basis points.

**Chart 2**  
Market-based real interest rate gap (three-year spot—five-year, five years forward)<sup>(a)</sup>



Sources: Bank of England, Bloomberg and Tradition.

(a) US real rates calculated from TIPS yields, maturities of which may vary. Euro real rates subtract inflation swap rates from nominal government yields, which are not directly comparable due to credit risk.

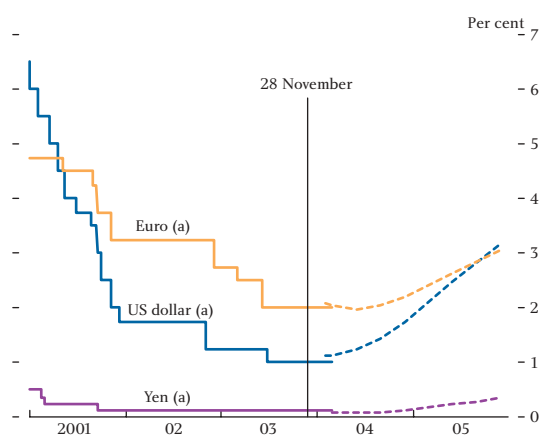
In the United Kingdom there are sufficient index-linked gilts to derive a term structure of sterling real interest rates, so it is possible to trace out the implied path—shown by the dashed line in Chart 2—for these short and longer-maturity real rates to converge again, implying a movement towards more neutral monetary conditions (the presence of term premia in the real yield curve makes it difficult to be precise).

The United Kingdom’s Monetary Policy Committee (MPC) raised the official repo rate by 25 basis points to 4.0% at its meeting on 5 February. US dollar, euro and yen official interest rates remained unchanged between 28 November and 27 February but the Federal Open Market Committee (FOMC) modified its accompanying statement on 28 January, with market contacts drawing attention to the replacement of the phrase ‘the Committee believes that policy accommodation can be

maintained for a considerable period’ with ‘the Committee believes it can be patient in removing its policy accommodation’.

Short-term nominal forward curves remained upward sloping (Charts 3 and 4) suggesting that markets expected policymakers to raise rates during 2005 as the amount of economic slack reduces. The US dollar forward curve was more upward sloping than the euro curve, reflecting relative cyclical positions and growth expectations (Chart 1), and US dollar forward rates were above euro-area rates beyond late 2005. However, these rates were still relatively low compared with historical experience. The US federal funds rate has averaged 5.8% during the post-war period, but US forward rates were below 5.0% out to 2009. This could reflect lower inflation expectations compared with the past, or it

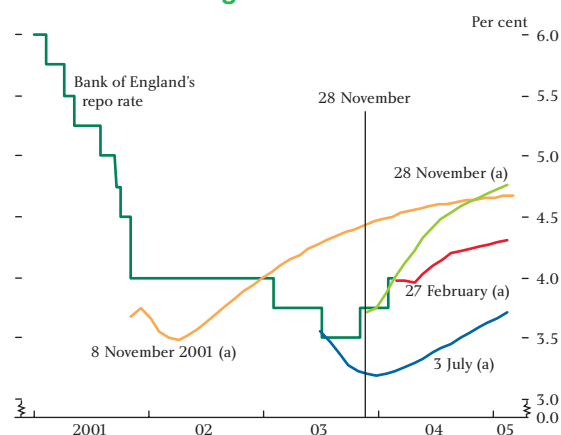
**Chart 3**  
Short-term international nominal forward rates



Sources: Bank of England and Bloomberg.

(a) Three-month nominal forward rates implied by futures contracts, at 27 February (shown by dashed lines).

**Chart 4**  
Short-term sterling nominal forward rates



Sources: Bank of England and Bloomberg.

(a) Two-week nominal forward rates implied by GC repo/gilt curve.

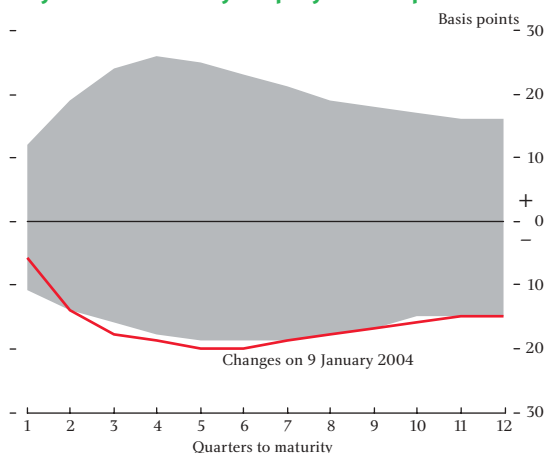
(1) Short-maturity real rates will be affected by the current outlook for economic growth, including the expected monetary policy response, whereas longer-maturity real rates are likely to be affected rather less by the cyclical position of the economy.

could reflect expectations of relatively low US dollar real interest rates for a considerable time to come, suggesting that monetary policy may remain loose for some time. Alternatively, it could reflect distortions to the shape of the US forward curve over the recent period.

Chart 4 shows the evolution of the sterling forward curve alongside the official repo rate since 2001. Forward rates rose from July 2003 when the MPC lowered the official repo rate from 3.75% to 3.5%. At that time, there was considerable discussion amongst market participants about the risks of deflation in some economies, and the minutes of the July 2003 MPC meeting noted that there had been some material international and domestic downside news since the *May Inflation Report*. But between July and the end of February some of these concerns receded, and the profile of forward rates at the end of February suggested that the outlook for the UK economy over the next couple of years was more positive than was expected in July. However, the profile of forward rates at the end of February suggested a more gradual sequence of rate rises than at the time of the *Winter Quarterly Bulletin*.

US data releases and short-term sterling interest rates have shown a surprising degree of comovement over the review period. For example, the release of the unexpectedly low December non-farm payrolls data on 9 January led to a sharp fall in implied sterling forward rates (Chart 5), compared with the range of responses to these data since January 2000 (the shaded area). One

**Chart 5**  
Range of changes in nominal forward rates implied by short sterling futures contracts on publication days of US monthly employment report<sup>(a)</sup>



Source: Bloomberg.

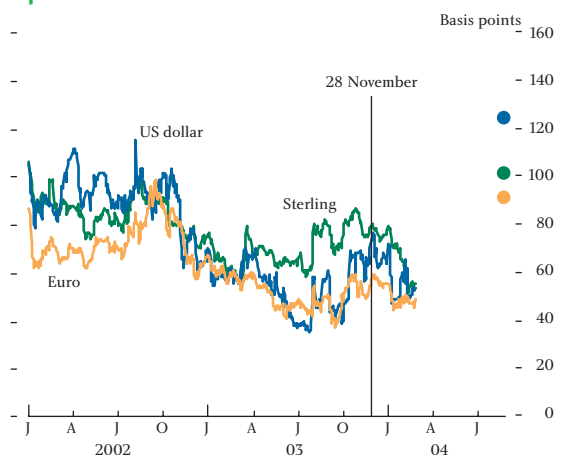
(a) Grey area shows range of changes in interest rates on US employment report publication days from January 2000 to December 2003.

rationale for these data having such a big impact on sterling interest rates is that the non-farm payrolls data are seen as being closely watched by the FOMC as an indicator of US activity and the output gap. Positive news about US activity, given the strength of US domestic demand, might in turn indicate news about demand for UK exports and activity, and hence for the inflation and interest rate outlook in the United Kingdom. But it is questionable that this should lead to such a large response.

### Uncertainty about interest rates

Since the start of 2004, uncertainty about short-term interest rates over the next six months, as measured by implied (basis point) volatilities from option prices, has fallen (with the exception of the immediate aftermath of the January FOMC meeting, and the revision of the accompanying statement). This fall in uncertainty suggests that views about the path of monetary policy over the first half of 2004 have become more settled (Chart 6). But six-month forward volatilities six months ahead, indicated by the dots in Chart 6, suggest that a high degree of uncertainty about short-term interest rates for the second half of 2004 remains, particularly in the United States. Over the past couple of years the US dollar forward term structure of implied volatility has been steeply upward sloping.

**Chart 6**  
Six-month implied volatility from interest rate options<sup>(a)</sup>



(a) The lines show historical six-month implied volatility in basis points. The dots indicate the six-month forward implied volatility six months ahead.

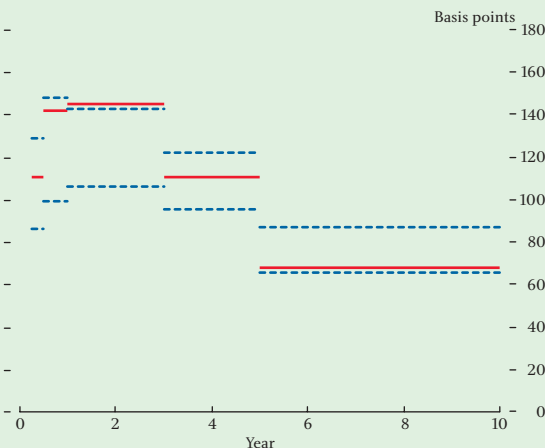
A measure of interest rate uncertainty at longer maturities is implied volatility derived from swaptions. The box on page 8 describes information about market perceptions of the path of monetary policy from swaption-implied volatilities.

## Swaptions and monetary policy stance

Swaptions<sup>(1)</sup> can be used to examine implied volatilities for different maturity (or tenor) swap rates over different horizons. A box in the Winter 2003 *Quarterly Bulletin*<sup>(2)</sup> showed how near-term volatility varied in line with the tenor of the swap rate. Another approach is to show how implied volatility for a particular interest rate varies for European options with different periods to expiry. By calculating *forward* volatility, it is also possible to isolate over which periods of time in the future volatility is expected to be high.

Chart A shows implied forward volatilities for the US dollar one-year swap rate. The thick red lines show data on 27 February, the start of the line corresponds to the maturity of the option, the line's length represents the amount of time over which that level of volatility is expected to prevail. The blue lines follow the same pattern but show the average forward volatilities observed since January 1998 plus or minus one standard deviation. The idea is to indicate to what extent short-term interest rate uncertainty at the end of February differed from the past. From the charts we can see that peak uncertainty usually occurs six months forward from the present time.

**Chart A**  
Forward implied volatility of US dollar one-year swaps derived from swaptions



Note: Red lines show most recent data, dashed blue lines show average since 1998 +/- 1 standard deviation.

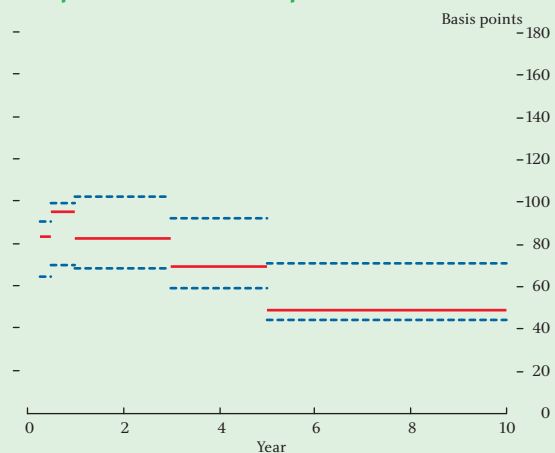
Sources: Bank of England and JPMorgan Chase.

At the end of February, implied forward volatility at the front end of the US dollar curve was unusually high. One reason for this might have been the low level of the policy rate in operation in the United States at the time. Other things being equal, the further away policy is from neutral<sup>(3)</sup>

the higher forward volatility is likely to be. This is because market participants not only have to factor in everyday uncertainties but may also be unsure as to how the central bank will return policy rates towards neutral.<sup>(4)</sup> Forward volatility at the short end of the euro curve was also high relative to the past, at a time when the euro-area official interest rate was also at a low level (Chart B).

In contrast, forward volatility at the short end of the sterling curve was relatively low at the end of February compared with the past (Chart C).<sup>(5)</sup>

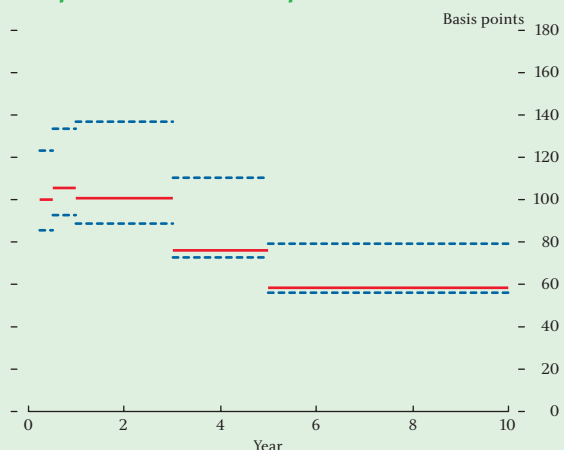
**Chart B**  
Forward implied volatility of euro one-year swaps derived from swaptions



Note: Red lines show most recent data, dashed blue lines show average since 1998 +/- 1 standard deviation.

Sources: Bank of England and JPMorgan Chase.

**Chart C**  
Forward implied volatility of sterling one-year swaps derived from swaptions



Note: Red lines show most recent data, dashed blue lines show average since 1998 +/- 1 standard deviation.

Sources: Bank of England and JPMorgan Chase.

(1) A swaption is an option on a swap. For more details see the box on page 24 of the June 2002 *Financial Stability Review*.

(2) *Bank of England Quarterly Bulletin*, Winter 2003, page 398.

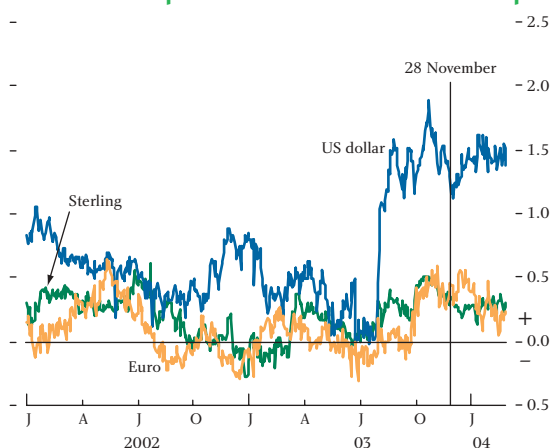
(3) A neutral policy rate can be thought of as the official interest rate consistent with output growing at potential and inflation neither rising nor falling.

(4) For more on this topic see Paul Tucker's speech to the UK Asset and Liability Management Association in Egham, Surrey on 29 January 2004, reprinted on pages 84-96 of this *Bulletin*.

(5) The standard deviation boundaries for the United Kingdom are wider than for the United States and the euro area. This is mostly due to a dramatic rise in implied volatilities during the 1999 bond bear market. The boundaries narrow markedly when the standard deviation is calculated using data since 2000.

By looking at the prices of a number of interest rate options over a range of strike prices, it is possible to derive measures of skew which describe the perceived balance of risks to short-term interest rates (Chart 7). This shows that at the end of February the risks around sterling and euro forward rates were perceived to be broadly balanced for the subsequent six months. But US dollar rate skews had spiked up around August 2003 and remained positive up to the end of February, indicating that the risk that the Federal Reserve would raise official US dollar rates sooner, or by more, than was suggested by forward rates heavily outweighed the risks to the downside.

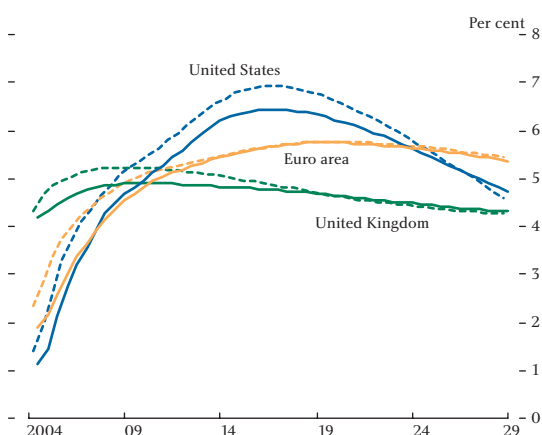
**Chart 7**  
Six-month implied skew from interest rate options



**Long-term interest rates**

Sterling and US dollar ten-year nominal forward rates fell between November and February, but euro-area rates were little changed (Chart 8). If long-term nominal forward rates reflect long-term inflation expectations, real interest rates and various risk premia, the level of

**Chart 8**  
International nominal forward rates<sup>(a)</sup>

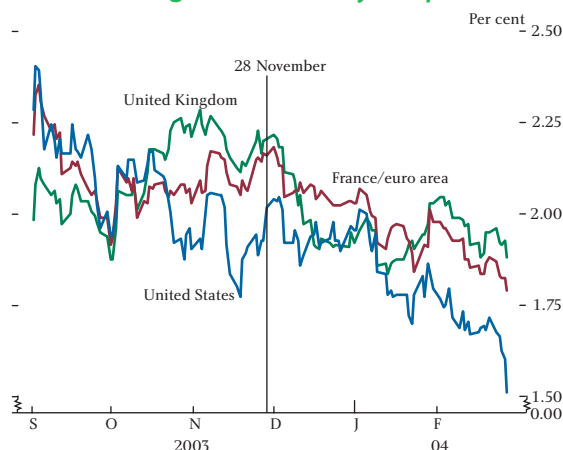


(a) Dashed lines indicate 28 November; solid lines indicate 27 February.

long-term sterling forward rates remains puzzlingly low. One explanation that continues to be offered by contacts is that the shape of the sterling forward curve is a result of the high level of demand for long-dated gilts by UK life insurers and particularly by UK pension funds for index-linked gilts, in part reflecting requirements to match assets to liabilities.

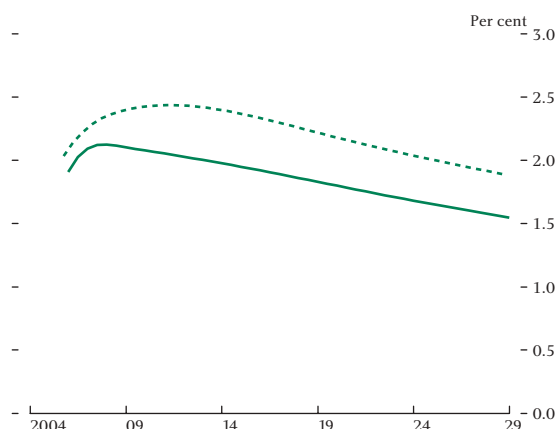
Ten-year spot real interest rates continued to decline between November and February (Chart 9). Sterling real rates declined at all maturities (Chart 10). At the short end, this could be interpreted as possible news about expectations of the path of monetary policy, but it is difficult to account for large changes in five-year rates five years forward in terms of fundamentals.

**Chart 9**  
International government ten-year spot real rates



Sources: Bank of England and Bloomberg.

**Chart 10**  
UK real forward rates<sup>(a)</sup>

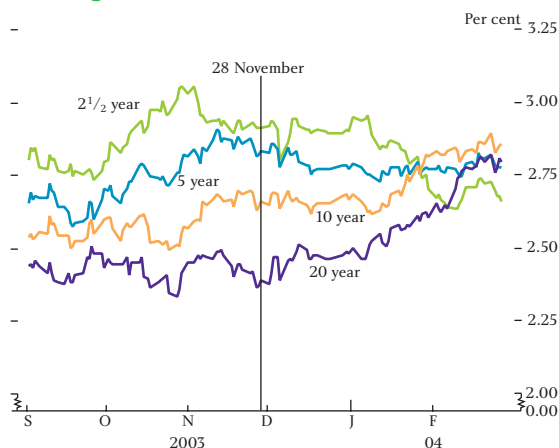


(a) Dashed line indicates 28 November; solid line indicates 27 February.

US dollar average implied ten-year inflation rates rose between November and February, while euro rates fell and sterling average ten-year implied inflation rates were

little changed. But for the United Kingdom this masked a decline in implied forward inflation rates at shorter maturities, and a rise at longer maturities (Chart 11). Since UK index-linked debt is indexed to the retail prices index (RPI), the change to the consumer prices index (CPI) target might have been expected to lead to a modest rise in long-term forward implied inflation rates. But the rise in long-term implied inflation rates occurred only in January, whereas the intention to change the target was announced in June, and the target rate of 2.0% was announced in December. Market contacts suggested that this might reflect limited liquidity in the UK index-linked market, leading to slow price adjustment.

**Chart 11**  
**Sterling inflation forward rates**

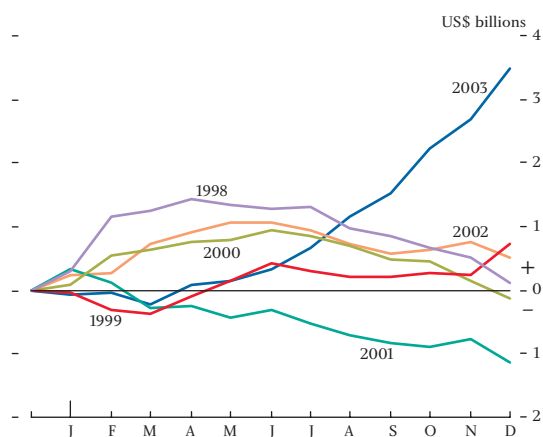


**Corporate credit conditions**

The low interest rate environment has been accompanied by, and possibly contributed to, a so-called ‘search for yield’, as discussed in the June and December 2003 *Financial Stability Reviews*.<sup>(1)</sup> For example, Chart 12 shows that US emerging market funds benefited from a further inflow of cash during the latter half of 2003. Alongside an improved outlook for the Asian economies, this may have contributed to a narrowing of emerging market economies (EME) credit spreads (Chart 13).

Continuing flows of cash during the latter half of 2003 into US high-yield mutual funds (Chart 14) were also consistent with a continued search for yield and between November and February, US dollar investment-grade corporate credit spreads narrowed (Chart 15). But credit spreads widened slightly over the latter half of the period, following the statement released

**Chart 12**  
**Cumulative asset flows into US emerging market mutual funds<sup>(a)</sup>**



Source: Investment Company Institute.

(a) Net new cash flow including net exchanges.

**Chart 13**  
**Emerging market and high-yield bond spreads**



Source: Merrill Lynch.

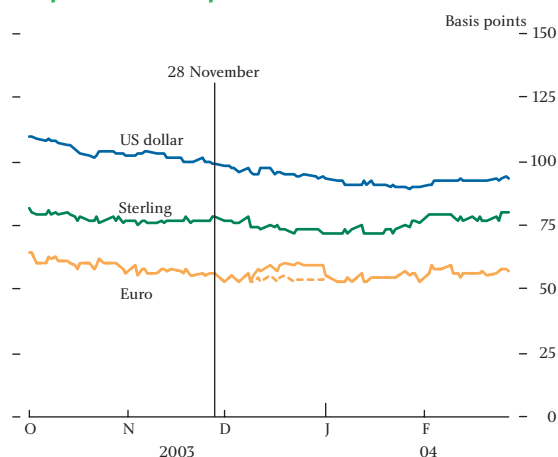
**Chart 14**  
**Total assets in US high-yield bond mutual funds**



Source: Investment Company Institute.

(1) See, for example, *Bank of England Financial Stability Review*, December 2003, page 13.

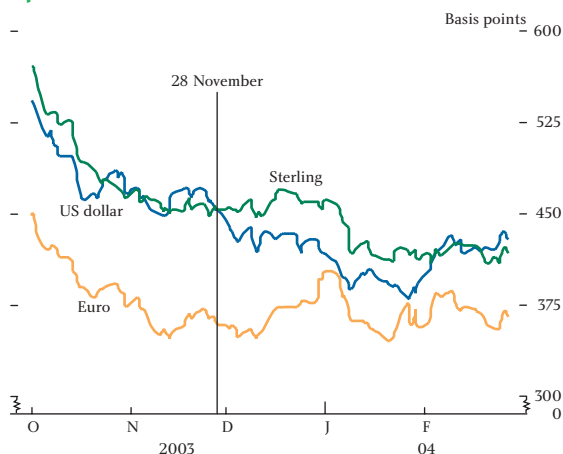
**Chart 15**  
International investment-grade option-adjusted corporate bond spreads



Source: Merrill Lynch.

by the FOMC after its meeting on 28 January, which appeared to prompt a relatively sharp widening of US dollar high-yield credit spreads (Chart 16).

**Chart 16**  
High-yield option-adjusted corporate bond spreads



Source: Merrill Lynch.

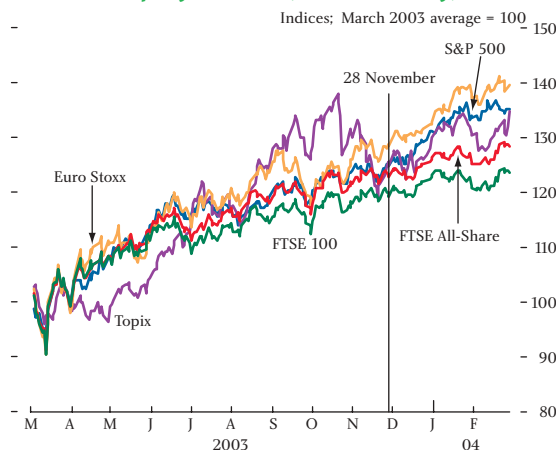
Spreads on high yield euro-denominated corporate bonds were virtually unchanged over the period (Chart 16) and remained lower than US dollar and sterling spreads. The Parmalat scandal did not have an effect on either other investment-grade or high-yield euro-denominated spreads (the dashed line in Chart 15 shows euro-denominated spreads excluding Parmalat).

**Equity markets**

International equity market indices continued to rise between November and February. Compared with their average for March 2003, during which equity markets reached a trough, the FTSE All-Share rose by 30%, the

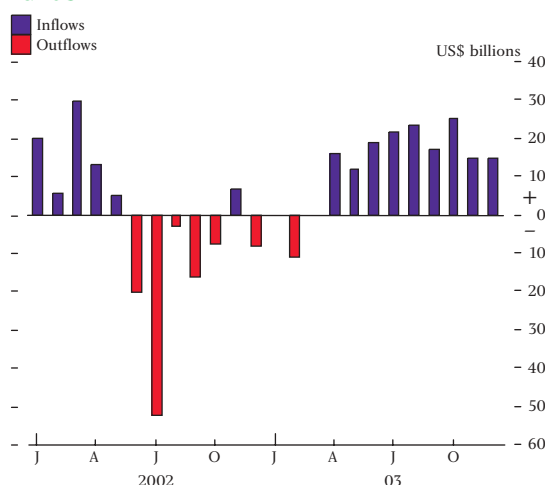
S&P 500 by about 35% and the Euro Stoxx rose by nearly 40% in domestic-currency terms (Chart 17). In the United States the equity recovery continued to be accompanied by a steady net positive inflow into US equity mutual funds (Chart 18).

**Chart 17**  
Selected equity indices (local currency)



Source: Thomson Financial Datastream.

**Chart 18**  
Monthly net asset flows into US equity mutual funds<sup>(a)</sup>



Source: Investment Company Institute.

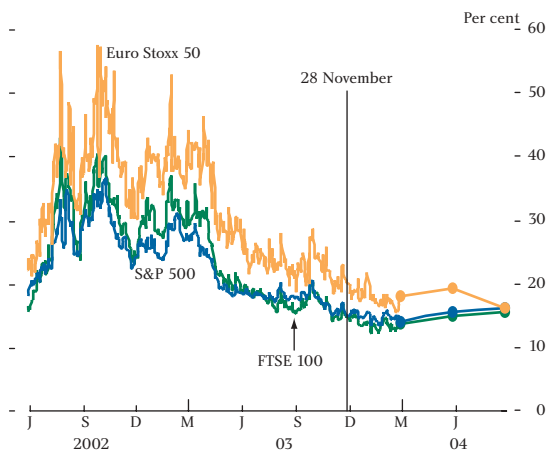
(a) Net new cash flow including net exchanges.

The Euro Stoxx rose by more than other international indices between March 2003 and February 2004 especially when the returns are considered in common-currency terms. Relative changes in euro-area growth expectations and interest rates were not sufficient to account for the recent strong performance of the Euro Stoxx. But in recent years the Euro Stoxx has generally been more volatile than the FTSE (the Euro Stoxx also fell further in the downturn). The strong performance since March 2003 may just have been a manifestation of this higher variability. One possible reason for this may be differences in index composition.

For example, the Euro Stoxx has a higher weighting of technology stocks than the FTSE All-Share. But it seems unlikely that composition alone can explain the extent of the divergence. An alternative explanation may be that many euro-area companies rely more heavily on debt financing. A higher debt to equity ratio may lead to more uncertainty about future cash flows to equity holders, since debt holders have a greater claim over future profits. But this line of reasoning suggests that there should be wider credit spreads on debt issued by euro-area companies, and there is little evidence of this in the data (Chart 15).

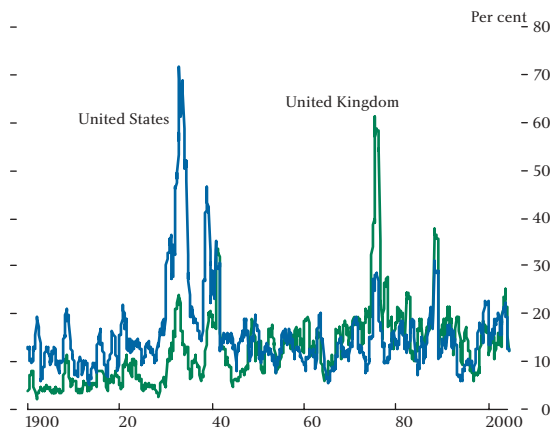
Implied volatilities, a measure of equity market uncertainty, remained low compared with the levels seen in 2002 and early 2003 (Chart 19), and suggested uncertainty was expected to stay low for some time. But Chart 20 provides a long-term view of actual (realised) equity market volatility, and in this context levels of

**Chart 19**  
Three-month implied volatilities of selected equity indices<sup>(a)</sup>



(a) The solid lines show three-month implied volatility in per cent. The dots indicate the three-month implied volatility three, six and nine months ahead respectively.

**Chart 20**  
Historical equity volatility

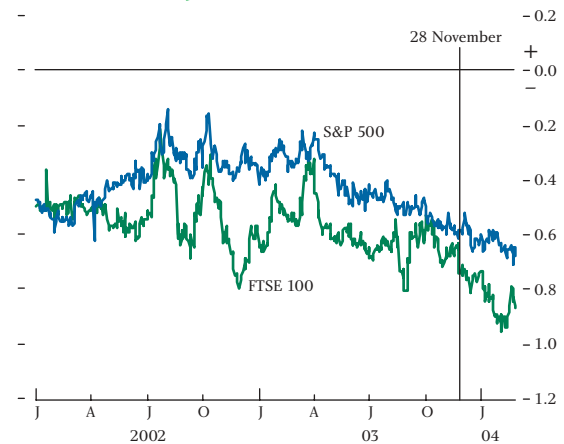


Sources: Global Financial Data and Thomson Financial Datastream.

volatility at the end of February do not look unusually low.

The rise in equity markets might reflect lower real interest rates, and stronger current profits (though longer-term forecasts have not risen), and perhaps also lower equity risk premia. As the equity market recovery has continued, the downside skew implied by equity options has increased in magnitude, especially for the FTSE 100 (Chart 21).

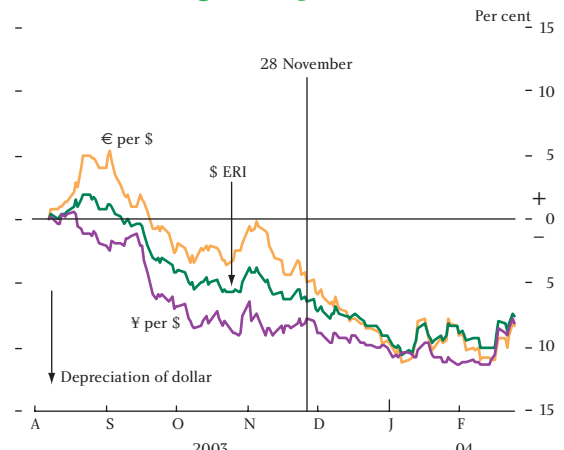
**Chart 21**  
Six-month skew of FTSE 100 and S&P 500 derived from options



**Exchange rates**

Chart 22 shows that the dollar rose slightly in February, following several months of depreciation. According to contacts, significant events included the comments by ECB officials (made from 12 January) about 'excessive volatility' of the euro, and Chairman Greenspan's remarks on 11 February that the dollar's decline 'has

**Chart 22**  
Cumulative changes in US dollar exchange rates since 1 August 2003



Source: Bloomberg.



been gradual, and no material adverse side effects have been visible in US capital markets'. The net effect was to leave both the IMF trade-weighted dollar ERI and the Federal Reserve's broad index down 1.2% since 28 November.

Chart 23 shows that by the end of February the sterling ERI was back up to the levels prevailing throughout 2000–02. Sterling appreciated by around 8% against the dollar between 28 November and 27 February, (reaching a peak of \$1.91 on 18 February, the highest level since 11 September 1992) and appreciated by 4% against the euro. Contacts suggested that the prospect of potential future rises in sterling official interest rates, set against the perception that US dollar official rates might remain unchanged for some time and that euro official rates might potentially be reduced, had been a factor in sterling's appreciation.

**Chart 23**  
Sterling exchange rates



Source: Bloomberg.

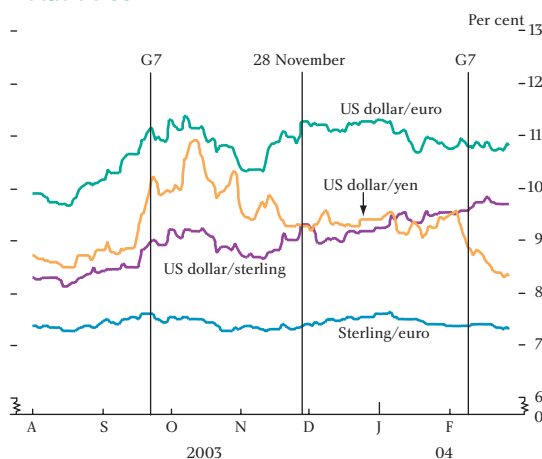
(a) Deutsche marks per pound before 1999.

Measures of exchange rate uncertainty derived from foreign-currency options remained relatively low given the market debate about global imbalances (though twelve-month US dollar/sterling implied volatility increased over the review period, Chart 24). Twelve-month dollar/yen implied volatilities fell back after the G7 meeting on 6–7 February. Chart 25 shows that short-maturity dollar/yen implied volatilities spiked up around the time of the September and February G7 meetings, and declined rapidly afterwards.

Foreign exchange risk reversals are instruments with a pay-off linked to large movements in the underlying bilateral exchange rate, and so their price should reflect market participants' views about the future balance of risks to bilateral rates. Dollar risk reversals versus euro

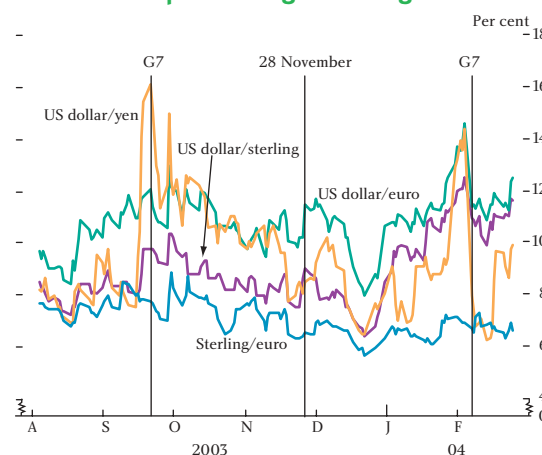
and sterling remained small, suggesting risks were broadly balanced (Chart 26). Twelve-month dollar/yen risk reversals were larger, indicating that the balance of

**Chart 24**  
Twelve-month implied foreign exchange volatilities



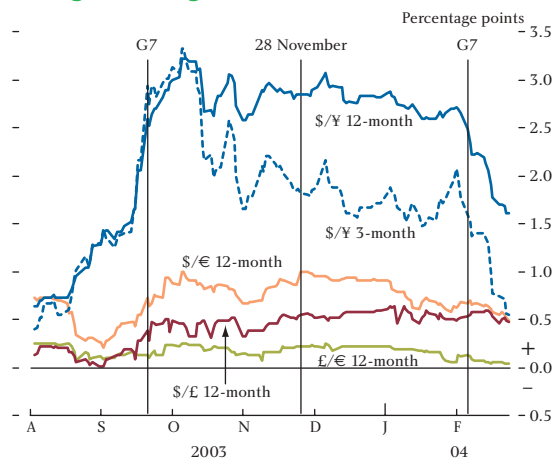
Source: British Bankers' Association.

**Chart 25**  
One-week implied foreign exchange volatilities



Source: British Bankers' Association.

**Chart 26**  
Foreign exchange risk reversals(a)



Sources: Bank of England and British Bankers' Association.

(a) A positive number indicates: a risk of euro appreciation versus sterling, a risk of euro appreciation versus dollar, a risk of sterling appreciation versus dollar, and a risk of yen appreciation versus dollar.

risks remained towards dollar depreciation, although less so than in the summer. Over the autumn a wedge opened up between three-month and twelve-month dollar/yen risk reversals. This may have indicated that the risk of a dollar depreciation against the yen had been pushed back; it was left broadly unchanged by the February G7 meeting.

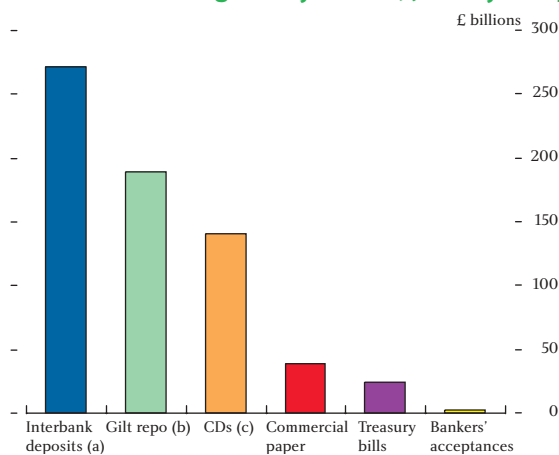
## Developments in market structure

This section provides an update on developments in sterling and foreign-currency market structure and trading practices.

### Sterling money market trends

The size of the sterling money markets can be estimated from a number of sources (Chart 27).

**Chart 27**  
Size of the sterling money market, January 2004



Sources: Bank of England and Debt Management Office.

- (a) Includes some intragroup deposits.  
(b) November 2003.  
(c) Issued by banks and building societies.

Interbank deposits appear, on these data, to account for the largest part of the money markets. However, reflecting the way they are collected, this item can include transfers *within* a single banking group—such as from a wholesale funding subsidiary to other parts of the group—as well as transfers *between* banking groups. In fact, transfers within banking groups—intragroup deposits—have increased sharply over recent years as banks have merged or restructured. Bank analysis, which has attempted to strip these out, suggests that ‘genuine’ interbank loans—between banking groups—are likely to account for only around a third of the published total (that is, less than £100 billion). A fairly large proportion of these loans is concentrated at short

maturities: recent Bank research based on an examination of wholesale payments flows estimates the size of the overnight interbank unsecured loan market in 2002–03 to have been around £22 billion on average.<sup>(1)</sup>

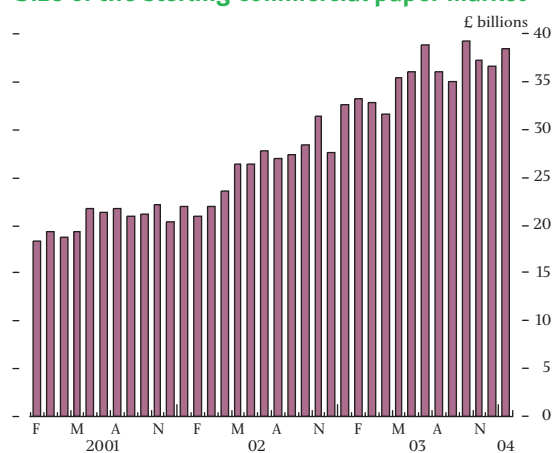
At end January 2004, there were £140 billion of sterling certificates of deposit (CDs) outstanding. UK-resident banks held around £65 billion of this total (direct unsecured interbank exposures). The CD market is likely to be of longer average maturity than the interbank market, with banks typically issuing CDs to raise short-term financing while using interbank deposits to manage day-to-day fluctuations in their liquidity.

While CDs and interbank deposits are bank liabilities, other money market instruments are partly or wholly non-bank liabilities, such as commercial paper (CP) and eligible bankers’ acceptances.

CP is issued by non-banks as well as by banks. CP is typically of maturities of less than twelve months and is used both as a short-term cash management tool and for bridging purposes ahead of bond issuance. According to iMoneyNet’s *Offshore Money Fund Report*, around 50% of sterling CP is purchased by AAA-rated institutional money market funds.

Though the sterling CP market remains small relative to its US dollar equivalent, it has grown rapidly over recent years (Chart 28). This has reflected various factors, including growth in asset-backed issuance and the development of money market funds since the late 1990s. To the extent that CP issuance is used as a

**Chart 28**  
Size of the sterling commercial paper market

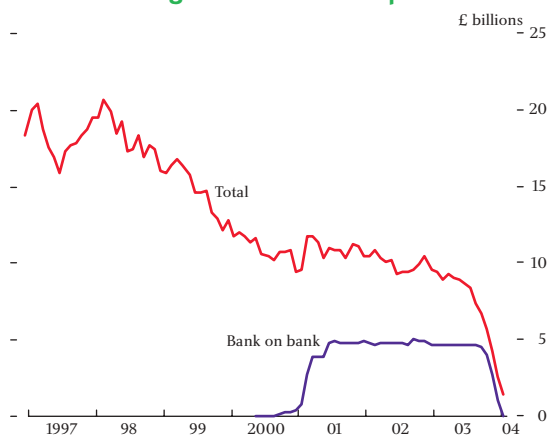


(1) See Millard, S and Polenghi, M (2004), ‘The relationship between the overnight interbank unsecured loan market and the CHAPS Sterling system’, in this *Quarterly Bulletin*, pages 42–47.

source of short-term funds for acquisitions, market participants suggest that the projected pickup in merger and acquisition activity may contribute to further growth.

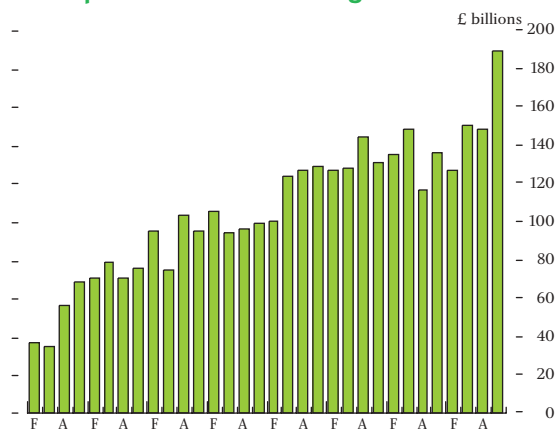
Bankers' acceptances are issued ('drawn') by an industrial or commercial borrower and are accepted by an eligible bank. 'Eligible' bills can be used as collateral by counterparties in the Bank's official operations in the sterling money market.<sup>(1)</sup> The Bank of England has for many years purchased outright or taken as collateral such bills in its sterling money market operations. However, the size of this market has fallen substantially since the late 1990s (Chart 29). The sharp decline since mid-2003 followed the Bank's decision to cease taking bankers' acceptances drawn on other banks (so-called 'bank-on-bank' bills) as collateral in its operations,<sup>(2)</sup> with drawing of such bills being wound down subsequently. Some drawers and acceptors may also have been discouraged from issuing bankers' acceptances by the additional legal documentation required before these instruments could be dematerialised and transferred from the Central Moneymarkets Office to CREST in October 2003.<sup>(3)</sup>

**Chart 29**  
Size of the eligible bankers' acceptances market



Gilt repo, by contrast, has grown to form a major part of the sterling money market, as measured by the Bank's quarterly voluntary repo and stock lending survey (Chart 30).

**Chart 30**  
Gilt repo amounts outstanding<sup>(a)</sup>

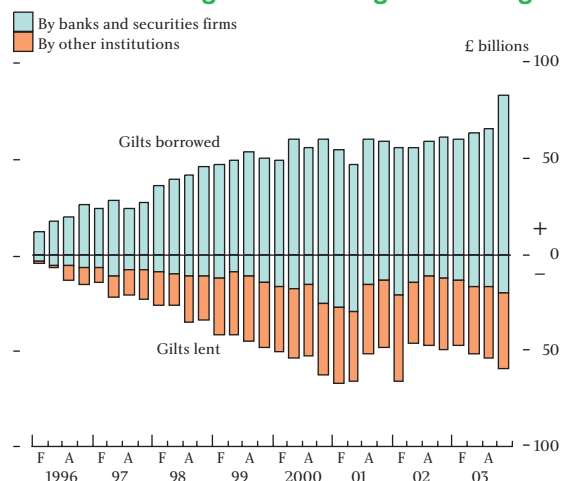


(a) Reported to the Bank in its quarterly repo and stock lending survey.

Responses to a recent Bank questionnaire addressed to firms that contribute to this survey revealed that the sterling repo market remains largely dominated by gilts, with use of other securities as collateral not yet widespread. A few banks reported growth in sterling repo against euro-denominated European government and supranational bonds. Sterling corporate bond repo trading was smaller and typically for the lending and borrowing of specific securities rather than as collateral for financing.

Banks and securities firms also borrow gilts from each other and from other institutions such as pension funds and life insurance companies (Chart 31).<sup>(4)</sup> Discussions

**Chart 31**  
Gilt stock lending and borrowing outstanding<sup>(a)</sup>



(a) Reported to the Bank in its quarterly repo and stock lending survey.

(1) See Bank Notice 'Bank of England operations in the sterling money markets: eligible banks and eligible bankers' acceptances', [www.bankofengland.co.uk/markets/money/eligbkopnot0003.pdf](http://www.bankofengland.co.uk/markets/money/eligbkopnot0003.pdf).  
 (2) Between March 2000 and early March 2004, bills drawn by banks were 'eligible' in the Bank's operations. Transition arrangements to end 'bank-on-bank' eligibility were put in place in September 2005. The Bank prefers to provide liquidity to the banking sector against the collateral of high-quality claims outside the banking sector.  
 (3) See recent *Quarterly Bulletin* 'Markets and operations' articles for details of the dematerialisation process.  
 (4) For a descriptive guide to the securities lending market, see Faulkner, M (2004), 'An introduction to securities lending', commissioned by the Association of Corporate Treasurers, British Bankers' Association, International Securities Lending Association, London Investment Banking Association, London Stock Exchange and Securities Lending and Repo Committee, available on the Bank's web site [www.bankofengland.co.uk/markets/securitieslending.pdf](http://www.bankofengland.co.uk/markets/securitieslending.pdf).

with market participants revealed a more extensive range of collateral provided against gilt securities lending. CDs had often been used to collateralise gilt borrowing in the past, but contacts reported increased use of euro-denominated European government bonds, supranational debt and corporate bonds amongst collateral now provided. In some cases, this had led market participants to make greater use of triparty agents to manage collateral pools—this was also reported by those active in sterling repo against euro-area government securities. This contrasts with gilt repo, where the delivery-by-value (DBV) facility in CREST may limit the need for triparty agents.<sup>(1)</sup>

Market contacts reported that the inclusion of HM Treasury bills in general collateral (GC) repo baskets had become commonplace, following their dematerialisation in September last year.

### Foreign exchange electronic broking systems

Spot foreign exchange trading in the interbank market is concentrated on the services provided by two electronic broking systems: the EBS Spot Dealing System and the Reuters Matching System. Prices determined in these systems are often used to supply automated feeds to other trading systems for end-users, including the internet-based systems which most large banks now offer their corporate customers and the multi-bank e-trading portals.<sup>(2)</sup> Hence the efficiency and effectiveness of the global foreign exchange market depends significantly on the smooth operation of these two systems, which operate continuously.

In early January 2004, the EBS systems suffered communication difficulties on three occasions (2, 6 and 7 January) on external links between the London and Tokyo hubs of its global network. Such problems with

the interbank systems are normally very rare—the most recent previous occurrence was an outage on Reuters in Autumn 2002. The EBS communication problems lasted under two minutes each as back-up systems came in as scheduled, but even such short disruptions caused problems with the market, for example prices being offered in London were briefly invisible in Tokyo. A further disruption on 9 January was caused by an unrelated communication malfunction between New York and London, leading to around four minutes of slow running during a period of high trading volume following the release of major economic data in the United States. These volumes would not themselves have caused any difficulty.

The record of reliability of EBS and Reuters has been very high in recent years and contingency arrangements worked as intended in these latest incidents. Nevertheless they did cause difficulties for market participants which, in some cases, knocked on to prices offered to end-users via the banks' own e-commerce systems. The growing dependency of the market on automation and electronic trading systems is explored further in the speech 'E-commerce and the foreign exchange market—have the promises been met?', also contained in this edition of the *Quarterly Bulletin* (pages 97–101).

## Bank of England official operations

### Changes in the Bank of England balance sheet

Table B summarises changes in the components of the Bank's balance sheet between 26 November 2003 and 25 February 2004.

Both the foreign currency and sterling components of the Bank's balance sheet were broadly stable between these two dates. On 29 January 2004, the first of the

**Table B**  
Simplified version of Bank of England consolidated balance sheet<sup>(a)</sup>

£ billions

Liabilities	25 Feb.	26 Nov.	Assets	25 Feb.	26 Nov.
Bank note issue	33	34	Stock of refinancing	21	23
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	6	6	Other sterling-denominated assets	4	5
Foreign currency denominated liabilities	9	11	Foreign currency denominated assets	10	12
<b>Total (b)</b>	<b>48</b>	<b>51</b>	<b>Total (b)</b>	<b>48</b>	<b>51</b>

(a) Based on published weekly Bank Returns. The Bank uses currency, foreign exchange and interest rate swaps to hedge and manage currency or interest rate exposures—see the Bank's 2003 *Annual Report*, pages 53 and 73–79 for a description. The Bank's full financial accounts for the year ended 29 February 2004 are due to be published in June.

(b) Figures may not sum to totals due to rounding.

(1) In DBV, CREST delivers to the cash lender a basket of securities to a specified current market value and meeting pre-defined criteria (eg gilts and HM Treasury bills).

(2) For more information see 'Foreign Exchange Joint Standing Committee e-commerce subgroup report' (2003), *Bank of England Quarterly Bulletin*, Summer, pages 235–39.

Bank's three-year euro-denominated notes, originally issued in 2001, matured. To maintain the nominal value of euro notes outstanding, the Bank created €2,200 million of notes maturing on 29 January 2007, €1,000 million nominal of which was auctioned on 20 January. Cover at auction was 3.2 times the amount on offer, and the average accepted yield was 2.867%, some 11 basis points below the three-year swap rate. A second auction of €1,000 million nominal of the 2007 note is scheduled for 16 March 2004.<sup>(1)</sup> 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.

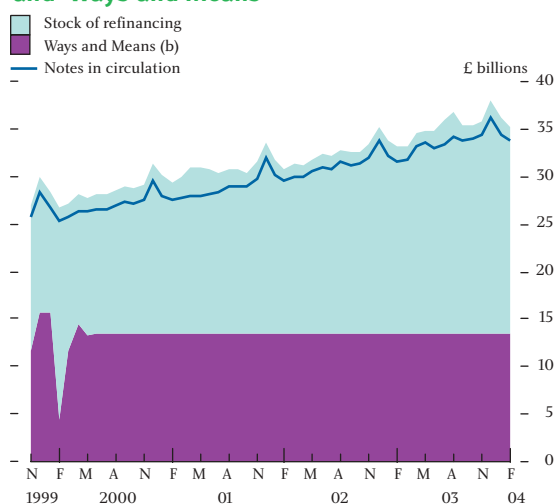
The Bank maintained the nominal value of its three-month and six-month euro-denominated bills outstanding at €3,600 million by rolling over bills at maturity. Average issuance spreads narrowed slightly—for three-month bills, they were 9.7 basis points below Euribor compared with 11.7 basis points in the previous period (September–November); and for six-month bills spreads were 11.7 basis points below euribor compared with 13.4 basis points previously.

Notes in circulation, the largest sterling liability on the Bank's balance sheet, increased to a peak of £40 billion on Christmas Eve before falling back in January following usual seasonal patterns.

The size of the stock of refinancing, which comprises the assets taken by the Bank of England in its open market operations (OMOs), moved in line with the notes in circulation, rising during December before falling back in January and February (Chart 32).

In the run-up to the MPC's 4–5 February meeting, at which the market broadly expected an increase in the Bank's repo rate to 4.0%, there was increased demand to borrow cash in the Bank's two-week repo operations at 3.75%: the bid to cover ratio (the amount of bids divided by the size of the shortage) in the Bank's OMOs in the week leading up to the MPC meeting averaged 3.7. As sometimes occurs, overnight rates fell some way below the policy rate for a short period ahead of the MPC decision. On 4 February, the overnight interbank rate fell to 2.875%, leading one counterparty to deposit £250 million in the overnight deposit facility (at a rate of 2.75%). This 'pivoting' in overnight rates around policy meetings is a feature of operating systems where

**Chart 32**  
Bank notes in circulation, the stock of refinancing and 'Ways and Means'<sup>(a)</sup>



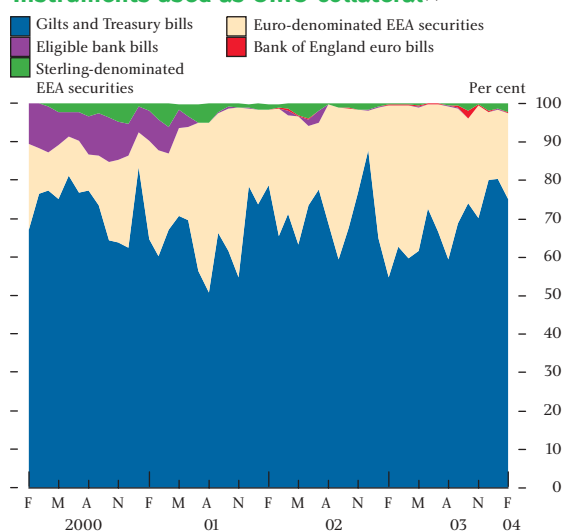
(a) Monthly averages.

(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, varying only very occasionally.

the maturity of the central bank's fixed-rate repo operations can span maintenance periods where different policy rates apply; the Bank's maintenance period is currently one day—settlement banks must end each day with a non-negative balance on their settlement account. This and other features of the Bank's operations in the sterling money markets are currently under review, as announced in October.<sup>(2)</sup>

Use of euro-denominated European Economic Area (EEA) government debt as OMO collateral was lower than average (Chart 33), consistent with greater

**Chart 33**  
Instruments used as OMO collateral<sup>(a)</sup>



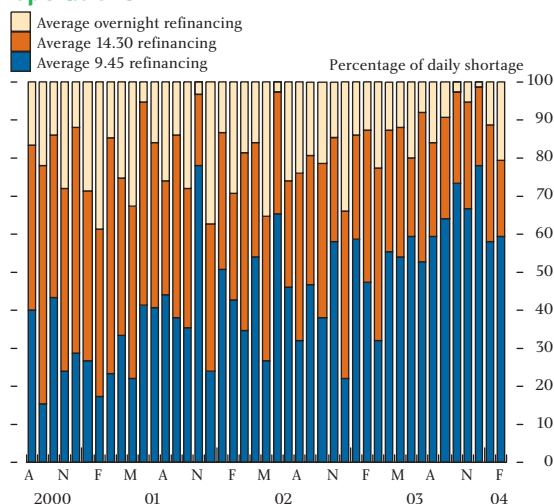
(a) Monthly averages.

(1) Shortly after this publication went to print.

(2) See Bank of England News Release, 15 October 2003, [www.bankofengland.co.uk/pressreleases/2003/110.pdf](http://www.bankofengland.co.uk/pressreleases/2003/110.pdf).

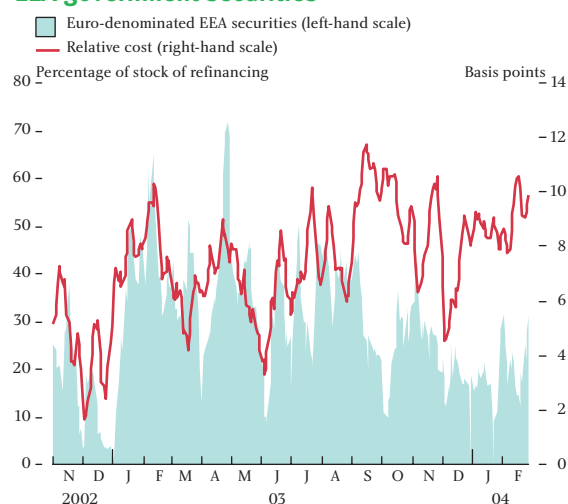
recourse to the overnight lending facilities than in the previous three months (Chart 34). These securities cannot be delivered in the 15.30 round, due to settlement timetable constraints, unless prepositioned by counterparties. The relative cost of gilts and euro-denominated EEA debt was very broadly stable over the period (Chart 35).

**Chart 34**  
Refinancing provided in the Bank's open market operations<sup>(a)</sup>



(a) Monthly averages.

**Chart 35**  
Relative cost and use in OMOs of euro-denominated EEA government securities<sup>(a)</sup>

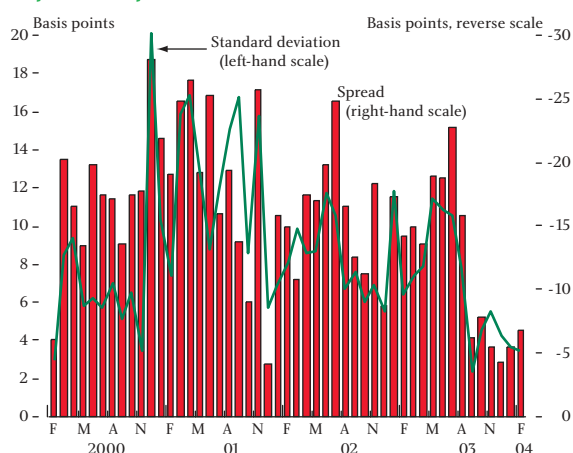


(a) Relative cost calculated as difference between one-month BBA repo and Libor fixing spread and one-month European Banking Federation repo and euribor spread. A larger spread indicates a lower cost of repoing euro-denominated debt relative to repoing gilts.

Spreads between short-dated sterling money market rates and the Bank's repo rate remained narrower than has been the case in many periods in the past: the two-week GC repo rate averaged 6 basis points below the Bank's repo rate from December to February (Chart 36), and variability in this spread also remained lower. The distribution of the sterling overnight indexed average

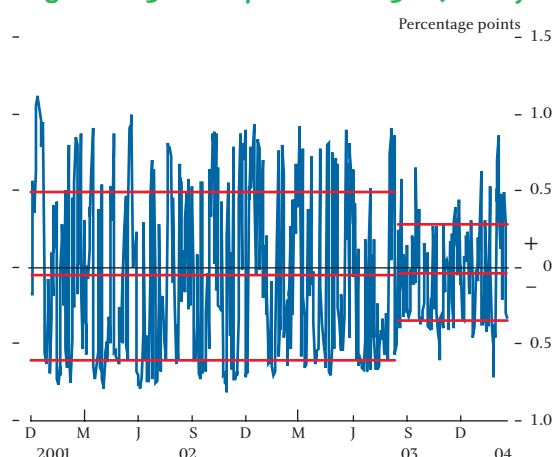
rate (SONIA) around the policy rate has also been narrower since the summer (Chart 37).

**Chart 36**  
Size and variability of two-week GC repo/Bank repo rate spread<sup>(a)</sup>



(a) Monthly averages.

**Chart 37**  
SONIA/Bank repo rate spread: daily outturns and mean +/- one standard deviation, December 2001 to August 2003 and September 2003 to January 2004



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

**Forecasting the liquidity shortage**

There was some deterioration in accuracy in the Bank's daily liquidity forecasts during the latest period (Table C). In part, this was seasonal, reflecting increased uncertainty about bank note demand. In response, the Bank increased the amount of the banking system's forecast liquidity need held over from the 9.45 to the 14.30 round from £200 million to £400 million around Christmas, in order to reduce the risk of oversupply. On 23 January, however, an error in the Bank's 9.45 forecast shortage left the banking system with a net surplus of liquidity by the 14.30 round. The Bank therefore invited counterparties to bid to place excess funds with the Bank overnight, collateralised by gilt DBV, via a variable-rate tender. This was the first 'mopping'

**Table C**  
**Intraday forecasts versus actual shortages**

Mean absolute difference (standard deviation), £ millions

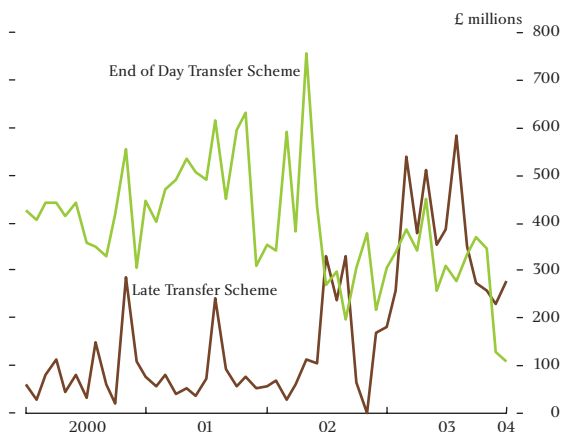
	9.45 forecast		14.30 forecast		16.20 forecast	
2000 (a)	121	(96)	99	(64)	103	(56)
2001	98	(205)	56	(51)	30	(73)
2002	83	(107)	43	(79)	30	(73)
2003	101	(123)	61	(96)	51	(85)
Oct. 2003	67	(50)	50	(40)	47	(29)
Nov. 2003	80	(124)	48	(65)	46	(49)
Dec. 2003	115	(86)	57	(66)	46	(30)
Jan. 2004	172	(146)	108	(112)	62	(64)
Feb. 2004	95	(74)	64	(45)	54	(31)

(a) From April 2000.

operation that the Bank had conducted since Summer 2002.

Use of both the End of Day Transfer Scheme (EoDTS) and the Late Transfer Scheme (LTS) declined (Chart 38).<sup>(1)</sup> This suggests settlement banks either improved the quality of their own liquidity forecasts over

**Chart 38**  
**Use of the Late Transfer Scheme and EoDTS<sup>(a)</sup>**



(a) Monthly averages.

the period or were more disciplined in the management of their sterling payments at the end of the day.

(1) For a description of the EoDTS, see page 163 of the Summer 2003 *Quarterly Bulletin*, or the APACS web site: [www.apacs.org.uk/downloads/EoDT.pdf](http://www.apacs.org.uk/downloads/EoDT.pdf). LTS is intended to be used in the event of technical errors, system or authorisation failures that have prevented customer payments from settling in normal sterling CHAPS hours, not as a facility for settling market transactions made late in the day.

## Influence of autonomous factors on the banking system's net liquidity need

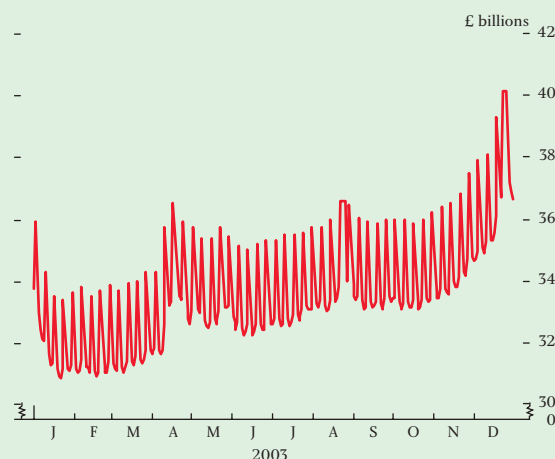
Under its current operational framework, the Bank seeks to keep the banking system in a net short liquidity position each day so that it can act as the provider of central bank money at the MPC's official rate. This is achieved by providing liquidity on a temporary basis in the Bank's open market operations (OMOs)—mainly reverse repos of government securities—at short maturities.<sup>(1)</sup> But the banking system's net liquidity need is also affected by some sizable elements of the Bank's balance sheet not under the Bank's direct control. For example, the Bank supplies bank notes to commercial banks daily on demand, and Bank customers, such as overseas central banks, may choose to vary their account balances. The Bank therefore needs to know, or predict, changes in these so-called 'autonomous factors' when determining the size and maturity of its OMOs.

Currently sterling settlement banks are required to hold non-negative balances on their Bank of England settlement accounts at the end of each day. In practice, the Bank provides for a positive level of aggregate balances within its forecast of the system's overall liquidity position, to reduce the risk of overdraft at any one settlement bank. But this amount is kept small, to avoid imposing large costs on settlement banks—these balances are unremunerated. The Bank therefore 'fine tunes' its OMOs in response to information about changes in autonomous factors by operating more than once per day and in amounts as small as £25 million.

The level of notes in circulation tends to increase over time with nominal GDP,<sup>(2)</sup> and exhibits seasonal patterns, for example, rising around Christmas/New Year and Easter.<sup>(3)</sup> There is also a significant weekend effect, with temporary increases in the Bank's note liabilities on Fridays.

These patterns in bank note liabilities can be forecast to a greater or lesser extent when the Bank plans its OMOs. Chart A shows the level of bank notes in circulation in 2003. The Bank forecasts the level of

**Chart A**  
Notes in circulation



long-run bank note demand, and forecasts the size of daily changes for the next six weeks. For example, the Bank accommodates the Friday/Monday change in note issue by avoiding Friday and targeting Monday maturity dates in its reverse repo transactions, the aim being to achieve a smooth profile of daily banking system liquidity shortages. But the exact level of bank note demand is not known until the afternoon of any given day, through information collected by the Bank from members of the Notes Circulation Scheme (NCS).<sup>(4)</sup>

Changes in the account balances of Bank of England customers are less easy to predict by contrast, and in many cases are not known until late in the day.

Table 1 shows the extent to which autonomous factors vary day by day.

**Table 1**  
Daily contribution of changes in autonomous factors to banking system's net liquidity need

January-December 2003, £ millions

	Average	Standard deviation
<b>Bank note issue (a)</b>		
Monday	-2,583	141
Tuesday	-162	138
Wednesday	+21	110
Thursday	+217	171
Friday	+2,549	209
<b>Customer transactions (b)</b>	<b>+44</b>	<b>314</b>

(a) Excludes days affected by Bank Holidays.

(b) Excludes some days where there were unusually large flows.

(1) See 'The Bank of England's Operations in the Sterling Money Markets', May 2002, available on the Bank's web site at: [www.bankofengland.co.uk/markets/money/stermm3.pdf](http://www.bankofengland.co.uk/markets/money/stermm3.pdf). Very occasionally, the banking system may have a net long liquidity position (a surplus). On these days, the Bank acts as the borrower of central bank money, via short-term repos with its counterparties in open market operations.

(2) The level of interest rates, inflation and financial innovation (such as ATM networks and the use of credit and debit cards) also affect bank note demand. See the *Bank of England Inflation Report*, November 2002, page 9.

(3) There were also large increases in bank note demand over the 1999/2000 date change and around the 2002 Golden Jubilee holiday.

(4) NCS relates to the processing and distribution of bank notes, and governs the custody of Bank of England bank notes not in issue.