

# Markets and operations

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

- *Short-term nominal sterling interest rates fell as market participants appeared to revise downwards their views on the likely future path of monetary policy. Longer-term sterling forward rates also fell. In effective terms, sterling depreciated.*
- *UK equity prices declined over the review period, perhaps reflecting a perception of a slightly weaker outlook for UK companies' earnings prospects, and/or a revision to investors' risk appetite.*
- *The Bank of England implemented interim reforms to its operations in the sterling money markets.*

Sterling short-term market interest rates fell over the period accompanied by weaker UK equity prices and a small depreciation in the sterling effective exchange rate (Table A). This pattern of asset price movements seemed to reflect both international influences and market participants perceiving a slightly weaker domestic outlook.

Activity data for the UK economy have been weaker than the market expected. In particular, the slowdown in consumer spending over recent months may have led market participants to give more weight to the downside risks to growth through the rest of the year, although

Consensus surveys of economists' forecasts did not show any significant downward revision to average expectations for UK GDP growth in 2005 (Chart 1).

A second factor influencing sterling asset markets has been global economic prospects. Early in the review period, weaker activity data were released in a number of overseas economies, particularly in the euro area. And subsequently, forecasts for GDP growth were revised down a little for the United States, the euro area and Japan.

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

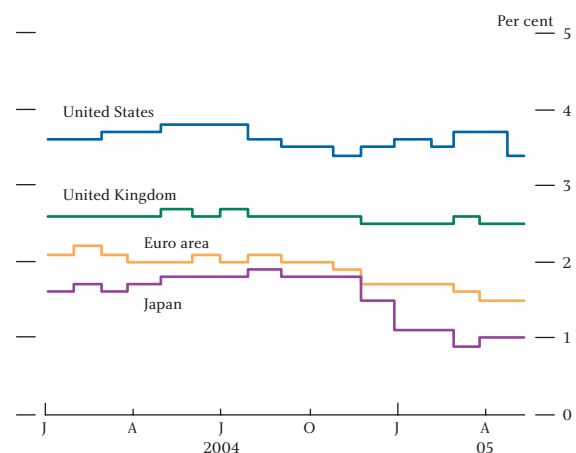
	18 Feb.	27 May	Change
<b>Three-month sterling Libor rate (per cent)</b>			
June 2005	4.98	4.86	-12 bp
December 2005	5.00	4.63	-37 bp
<b>Sterling nominal forward rates (per cent)<sup>(a)</sup></b>			
Three-year	4.59	4.27	-33 bp
Ten-year	4.57	4.46	-12 bp
<b>Equity indices</b>			
FTSE 100	5057	4986	-1.4%
FTSE All-Share	2555	2492	-1.7%
<b>Exchange rates</b>			
Sterling effective exchange rate	101.1	100.2	-0.9%
€/£ exchange rate	1.45	1.45	0.2%
\$/£ exchange rate	1.89	1.82	-3.7%

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/index.htm](http://www.bankofengland.co.uk/statistics/yieldcurve/index.htm).

**Chart 1**  
**Expected real GDP growth for 2005**



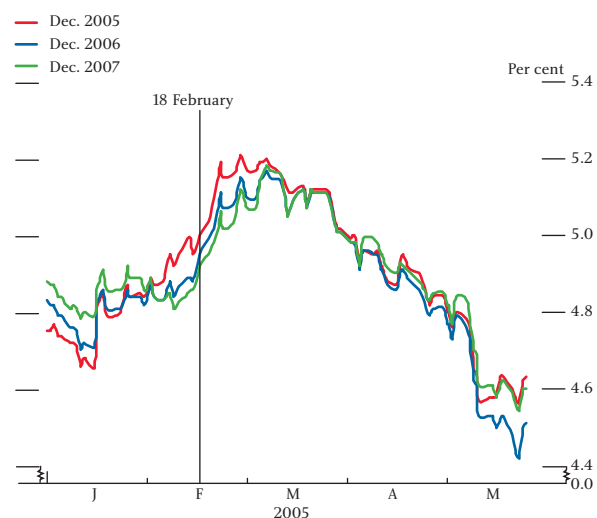
Source: Consensus Economics.

(1) This article focuses on sterling markets. The reader is referred to 'Risks in the international system', Chapter 2 of the Bank of England's forthcoming *Financial Stability Review* for a broader review of international financial markets. The period under review in this article is 18 February (the data cut-off for the previous *Quarterly Bulletin*) to 27 May.

## Short-term interest rates

Forward interest rates for end-2005 implied by short sterling futures contracts declined by nearly 40 basis points (Chart 2). Initially, forward rates rose a little following comments by members of the UK Monetary Policy Committee (MPC) and publication of the *Minutes* of the February MPC meeting. But rates declined following the release of a series of weaker-than-expected activity data, with a particularly marked fall following the publication of the *May Inflation Report*. Since their peak at the beginning of March, end-2005 implied rates fell by nearly 60 basis points.

**Chart 2**  
Implied sterling interest rates from short sterling futures contracts



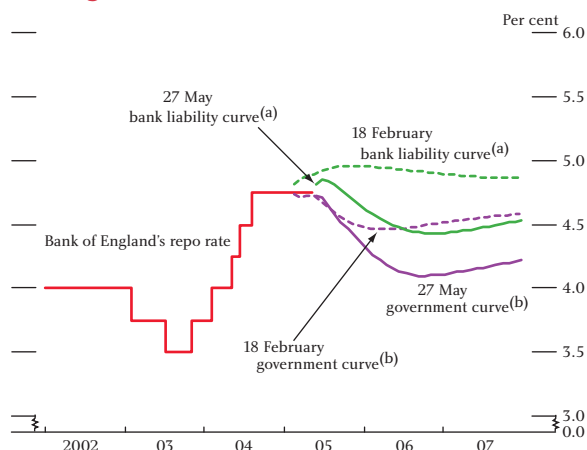
Source: Euronext.liffe.

At the end of the review period, the profile for sterling interest rates (derived from instruments that settle on Libor) implied a forward rate of around 4.6% for the end of 2005 (Chart 3). This was suggestive of some expectation of a 25 basis point reduction in the policy rate during 2005 H2, but many market contacts and economists continued to expect official rates to remain unchanged through 2005.

In line with the fall in near-term nominal interest rates, two-year real spot rates (derived using survey data of inflation expectations) have fallen slightly since the previous *Bulletin* (Chart 4).

As well as a slightly lower central expectation for the path of sterling interest rates, information from options prices suggested that the perceived risks to near-term sterling interest rates had moved to the downside, having been broadly balanced around the time of the previous *Bulletin* (Chart 5). Over the same period, uncertainty

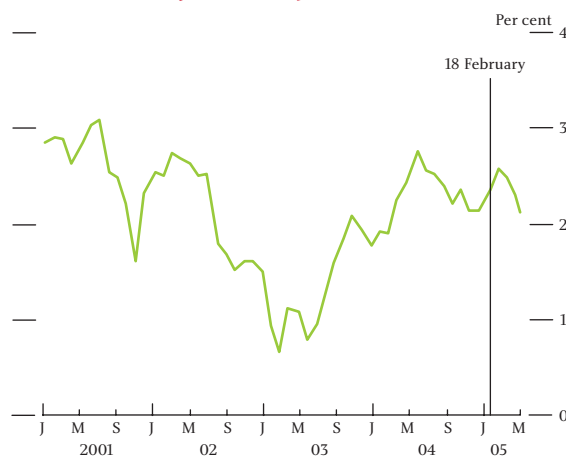
**Chart 3**  
Sterling official and forward market interest rates



Sources: Bank of England, Bloomberg and Euronext.liffe.

- (a) Two-week nominal forward rates implied by a curve fitted to a combination of instruments that settle on Libor (continuously compounded).
- (b) Two-week nominal forward rates implied by GC repo/gilt curve (continuously compounded).

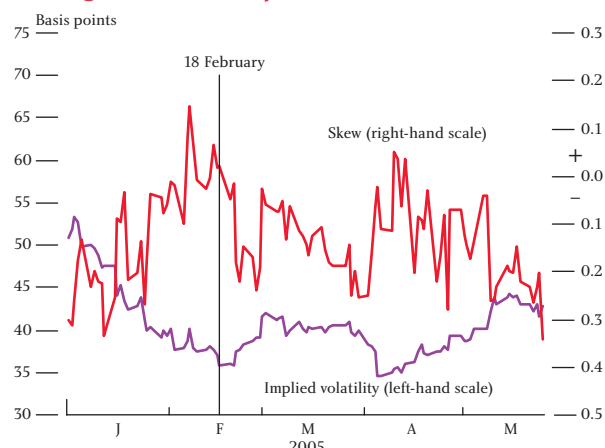
**Chart 4**  
Indicative two-year real spot rates (a)(b)



Sources: Consensus Economics and Bank of England calculations.

- (a) Two-year nominal spot rates (from Bank's government liability yield curve) 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) Inflation expectations refer to RPIX.

**Chart 5**  
Six-month implied volatility and skew from sterling interest rate options



Sources: Bank of England and Euronext.liffe.

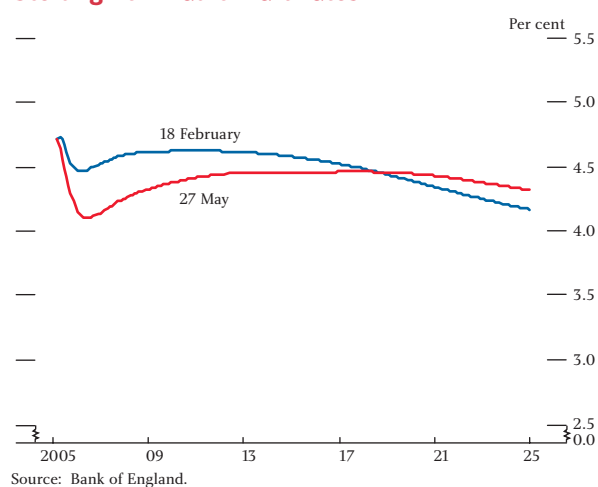
surrounding market participants' expectations for short-term rates, as measured by implied volatilities from options prices, rose slightly. However, implied volatilities on sterling interest rate options have remained low by historical standards, which in part might reflect structural developments in these markets (see box on pages 130–31).

### Long-term interest rates

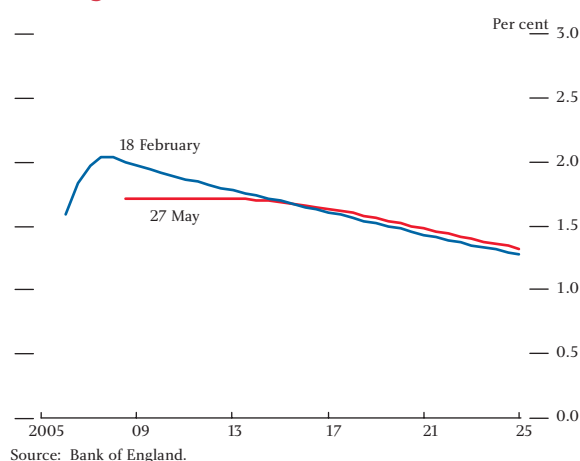
At maturities up to around 14 years ahead, sterling nominal forward rates fell, though there was a slight increase at very long horizons.

A broadly similar pattern was observed in real forward rates derived from index-linked gilts — they fell at maturities up to around ten years and rose slightly at longer horizons (Chart 7). At short-to-medium horizons (up to around five years) the falls in real forwards were consistent with a downward revision to the expected path of monetary policy. Beyond the ten-year horizon, real forwards remained close to the historically low levels discussed in the previous *Bulletin*.

**Chart 6**  
Sterling nominal forward rates



**Chart 7**  
Sterling real forward rates



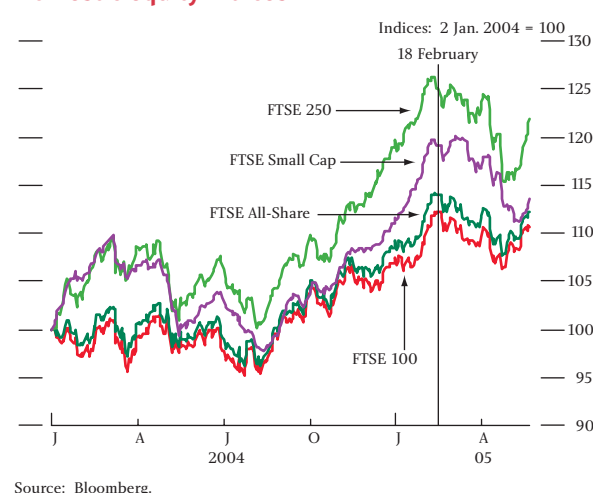
Yields on index-linked gilts may reflect more than just expected future short-term real interest rates. Investors may demand a risk premium to compensate them for uncertainty about future short-term real interest rates. In addition, changes in bond supply and demand can affect yields and move forward rates temporarily away from expectations of future short-term rates.

It is difficult to assess and quantify the relative importance of these influences on gilt prices. The box on pages 132–33 takes a statistical approach to evaluate the relative contribution of different factors in affecting gilt returns over the past two decades. The results of this method suggest that only a relatively small proportion of unexpected index-linked gilt returns in the past can be attributed to changes in expectations about future risk-free real rates — other factors, such as changes in risk premia, seem to have been more important.

### Equity markets

Other things being equal, lower real interest rates might be associated with higher equity prices. But UK equity indices fell over the period (Chart 8); the FTSE All-Share decreased by 1.7%. Despite these falls, most UK equity indices remained higher than at the start of the year, and the FTSE All-Share was 13.2% higher than at the time of the Summer 2004 *Bulletin*.

**Chart 8**  
Domestic equity indices



In principle, equity prices should reflect the discounted value of expected future corporate earnings streams. Against the background of lower real interest rates, and assuming no change in equity risk premia, this suggests that the fall in equity prices might have reflected a

## Structural developments in sterling volatility markets

### Short-term interest rate volatility

Trading volumes in sterling short-term interest rate (STIR) futures have grown rapidly in recent years. In 2000, around 22.5 million contracts were traded. By 2004, this had risen to 51 million or around £25 trillion in notional value terms. This trend seems to have continued in 2005 (Chart A).

**Chart A**  
Volumes traded on LIFFE of short sterling interest rate derivatives<sup>(a)</sup>



Source: Euronext.liffe.

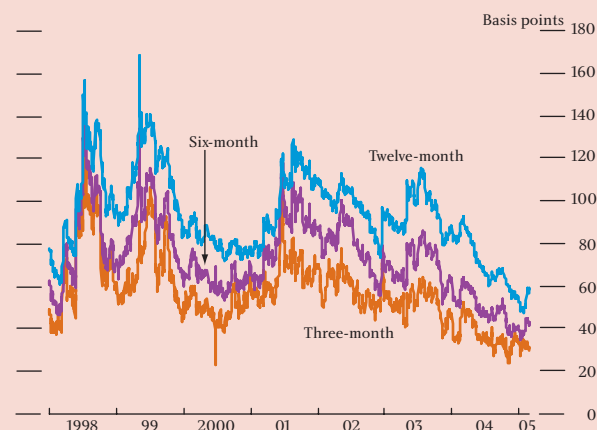
(a) 2005 figures are to the end of May.

Volumes in exchange-traded sterling STIR options have also increased, from just over 4 million contracts in 2000 to 16 million in 2004 or £8 trillion in notional value. According to market contacts, trading in over-the-counter STIR options has also increased in recent years.

Market contacts have suggested that much of the recent increase in sterling STIR futures and options volumes has been due to an increase in participation by hedge funds. In part, the rise in hedge fund activity may be linked to a decline in implied volatility in the sterling STIR option market (Chart B). Traders may have increased the size of their positions in order to maintain targeted returns in a less volatile market.

At the same time, increased hedge fund participation and greater market liquidity might

**Chart B**  
Short sterling implied volatility



Source: Bank of England.

have reduced the premia investors must pay for interest rate protection via options. This could have reinforced the falls in implied volatility.

### Longer-term interest rate volatility

Implied volatility of long-maturity sterling interest rates has also drifted down over recent years (Chart C). In the past, the implied volatility of long-dated interest rates derived from swaptions prices was typically higher in sterling than in euro. More recently, this differential has narrowed.

In principle, the decline in sterling interest rate volatility may have been associated with an increase in the perceived credibility of the United Kingdom's monetary regime. An increase in credibility should reduce uncertainty about long-term inflation rates, which in turn should lead to lower uncertainty surrounding long-term nominal interest rates. However, it is difficult to find reasons why policy credibility would have increased over the past year and so this is unlikely to account for the most recent fall in long-dated sterling volatility that began in mid-2004.

Another possible explanation for the fall in sterling interest rate volatility could be related to

**Chart C**  
Sterling and euro one-year into twenty-year swaption implied volatility



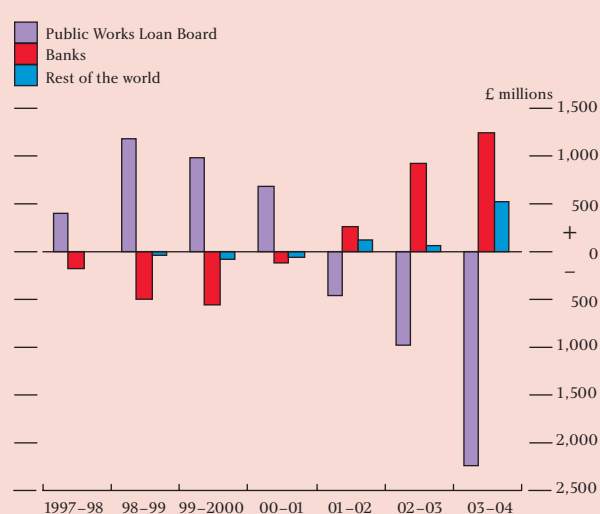
Source: JPMorgan Chase and Co.

the hedging of guaranteed annuity liabilities by UK life insurance companies. Guaranteed annuities offered investors a certain return on their annuity investments, but also gave them the option to buy annuities at prevailing market rates, if market rates were higher than the guaranteed rates. When market annuity rates fell in the 1990s, the option to take the guaranteed rate became more valuable to investors, and the insurers who had sold them needed to hedge their positions. One way of hedging guaranteed annuity liabilities has been by buying long-dated interest rate protection via swaptions. But many insurance companies are reputed to have completed much of the hedging of these liabilities, resulting in lower demand for swaptions. In turn, this could have reduced volatility implied from swaption prices.

A third explanation, offered by some market contacts, is that the recent fall in long-dated sterling implied volatility may have reflected banks hedging loans to local authorities, in particular instruments known as lender's option, borrower's option (LOBO) loans.

LOBOs are a form of long-term (for example, 30 years) bank debt to UK local authorities. Traditionally, local authorities have sought

**Chart D**  
Net changes in outstanding local authority long-term borrowing from various sources



Sources: ODPM borrowing and lending inquiries; Public Works Loan Board.

funding from the Public Works Loan Board (PWLB). But Chart D shows that in recent years the amount of long-term borrowing sourced from the PWLB has declined while alternative sources have become more popular. Though not all of these borrowings will be in the form of LOBOs, financial statements from local authorities indicate that they have remained popular recently.

The typical LOBO structure offers the borrower a long-term loan at a fixed rate that is normally below market rates at the time the loan is agreed. After an initial period, the lender has the option to reset the interest rate. But if the lender chooses to reset the rate, the borrower has the option to repay the loan.

Lenders can realise the value of the option to reset the rate by selling sterling swaptions — although they remain exposed to some risk that the terms of the swaptions do not mirror exactly those of the embedded option in the LOBO. Contacts say that the resulting increased supply of long-dated swaptions from this activity may have been one factor pushing down on long-dated sterling volatility.

## What factors affect UK government bond returns?

Over any given period, the expected return on a conventional (ie nominal) gilt incorporates market views about future risk-free real interest rates and inflation. In addition, the expected return may include risk premia to compensate investors for uncertainty about future real rates and inflation, which in turn are likely to be related to uncertainty about future macroeconomic conditions. The risk premia may also reflect other factors, such as the potential illiquidity of the bond.

During the life of the bond, new information may cause investors to revise their interest rate and inflation expectations and/or the required risk premium. Other factors, such as changes in regulation, may also influence supply and demand in bond markets at particular times. Gilt prices react to all of these developments, with the result that bond holders can realise (positive or negative) ‘unexpected’ returns.

Risk premia and expectations of inflation and risk-free interest rates are not directly observable. But using the approach first taken by Campbell and Ammer (CA) (1993),<sup>(1)</sup> it may be possible to model the expectations-formation process of bond market investors using a statistical forecasting model. Specifically, CA use a vector autoregression (VAR) model, which assumes that the information with which bond investors form expectations for the future can be adequately proxied by a small set of key financial variables.<sup>(2)</sup> Differences between forecasts made by the model and subsequent outturns can be used to calculate unexpected returns ( $\tilde{x}$ ). Then, using the CA framework, these unexpected returns can be decomposed into revisions to

expectations of future risk-free real rates, ( $\tilde{r}$ ), and revisions to expectations of future inflation, ( $\tilde{\pi}$ ), leaving a residual term that captures changes in required risk premia and/or other market factors, ( $\tilde{\rho}$ ). That is:

$$\tilde{x} \equiv \tilde{r} + \tilde{\pi} + \tilde{\rho}$$

CA show that the relative importance of each component can be assessed by decomposing the variance of unexpected returns. More specifically:

$$\begin{aligned} \text{Var}(\tilde{x}) &\equiv \text{Var}(\tilde{r}) + \text{Var}(\tilde{\pi}) + \text{Var}(\tilde{\rho}) + 2\text{Cov}(\tilde{r}, \tilde{\pi}) \\ &+ 2\text{Cov}(\tilde{r}, \tilde{\rho}) + 2\text{Cov}(\tilde{\pi}, \tilde{\rho}) \end{aligned}$$

The model was estimated using monthly data between May 1982 and March 2005, and also over two subsamples — before and after 1997 — in order to study the possible effect of the granting of operational independence to the Bank of England.<sup>(3)</sup>

Table A shows the share of the variance of unexpected returns on conventional gilts accounted for by the variance of expected inflation, real rates and risk premia/other market factors, and the covariances between them, for each of the stated periods.

The variance decomposition suggests that expectations of future inflation have been the dominant factor in driving unexpected conventional gilt returns over the entire sample. But the contribution of inflation has declined in recent years, perhaps reflecting a more stable inflationary environment. Since 1997, the

(1) ‘What moves the stock and bond markets? A variance decomposition for long-term asset returns’, *Journal of Finance*, Vol. 48, No. 1, pages 3–37.

(2) The model used in this box includes four variables that are needed to implement the CA methodology: the one-month real interest rate (the one-month nominal interest rate less RPI inflation); the change in the one-month nominal interest rate; the ten-year, one-month nominal yield curve slope; and the excess return on ten-year index-linked bonds. In addition, the model includes two forecasting variables as additional sources of information: the three-month, one-month nominal yield curve slope; and the relative bill rate (the one-month rate less its average over the past year), which helps to capture some of the longer-run changes in interest rates.

(3) The model is estimated using a generalised method of moments (GMM) technique to jointly determine the VAR coefficients and the covariance matrix of the residuals. The GMM method provides heteroscedasticity-consistent estimates of the covariance matrix.

**Table A**  
Variance decomposition of ‘unexpected’ returns:  
conventional gilts<sup>(a)(b)(c)</sup>

Share of $Var(\bar{x})$ attributable to:	1982–2005	1982–97	1997–2005
$Var(\bar{r})$	0.04 (0.03)	0.04 (0.04)	0.05 (0.05)
$Var(\bar{\pi})$	0.99 (0.31)	1.12 (0.4)	0.53 (0.30)
$Var(\bar{\rho})$	0.07 (0.16)	0.10 (0.25)	0.14 (0.06)
$2Cov(\bar{r}, \bar{\pi})$	-0.02 (0.12)	0.01 (0.15)	-0.17 (0.22)
$2Cov(\bar{r}, \bar{\rho})$	-0.09 (0.12)	-0.11 (0.16)	0.00 (0.12)
$2Cov(\bar{\pi}, \bar{\rho})$	0.02 (0.40)	-0.16 (0.59)	0.45 (0.23)

- (a) Heteroscedasticity-consistent standard errors shown in parentheses.  
(b) Reported variances and covariances are scaled by the variance of unexpected conventional gilt returns so that the columns sum to one.  
(c) Rows may not sum to one due to rounding.

variance of revisions to inflation expectations has accounted for only around half of the variance of unexpected nominal bond returns. In addition, revisions to expected inflation have been positively correlated with changes in required risk premia and/or market factors since 1997. This suggests that if investors have been revising down inflation expectations post-1997, they might also have revised downwards the required risk premia, possibly because they expected inflation and/or macroeconomic conditions to be less variable than in the past.

Table B shows the results of a similar decomposition exercise for unexpected returns on index-linked gilts. In this case, the effect of changes in inflation expectations on index-linked bonds has been very small. This is unsurprising, since the only inflation exposure in these bonds arises from an eight-month lag in indexation.<sup>(4)</sup>

Perhaps more interesting is that, according to the model, changes in expected risk-free real rates account for only a small share of the variance of unexpected returns for both

**Table B**  
Variance decomposition of ‘unexpected’ returns:  
index-linked gilts<sup>(a)(b)(c)</sup>

Share of $Var(\bar{x})$ attributable to:	1982–2005	1982–97	1997–2005
$Var(\bar{r})$	0.12 (0.10)	0.13 (0.13)	0.09 (0.10)
$Var(\bar{\pi})$	0.01 (0.12)	0.02 (0.01)	0.00 (0.00)
$Var(\bar{\rho})$	0.98 (0.12)	0.97 (0.15)	1.08 (0.15)
$2Cov(\bar{r}, \bar{\pi})$	0.00 (0.03)	0.00 (0.04)	-0.02 (0.02)
$2Cov(\bar{r}, \bar{\rho})$	-0.18 (0.20)	-0.18 (0.25)	-0.24 (0.24)
$2Cov(\bar{\pi}, \bar{\rho})$	0.07 (0.03)	0.07 (0.04)	0.08 (0.04)

- (a) Heteroscedasticity-consistent standard errors shown in parentheses.  
(b) Reported variances and covariances are scaled by the variance of unexpected index-linked gilt returns so that the columns sum to one.  
(c) Rows may not sum to one due to rounding.

conventional and index-linked bonds. This is in line with the findings of a similar study by Barr and Pesaran (1997),<sup>(5)</sup> who suggest that while the real interest rate may vary in the short run, investors expect it to revert to some normal level over the life of a ten-year bond.

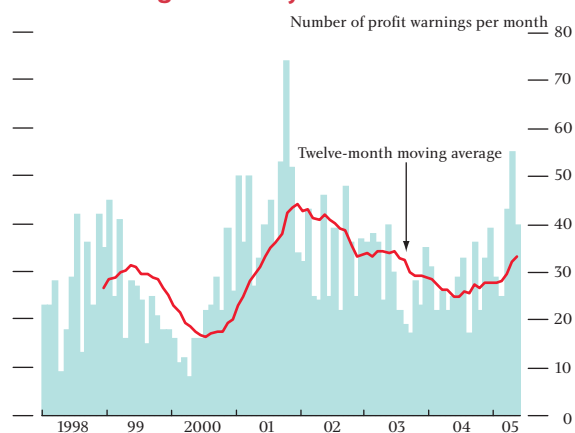
In contrast to the results for conventional bonds, changes in risk premia and/or market factors are by far the most important influence on unexpected index-linked gilt returns.

At face value, the results in Table B suggest that past unexpected variations in UK index-linked gilt returns have tended to be driven more by news about future risk premia and/or market factors than news about real risk-free rates and inflation. However, the decomposition results for both conventional and index-linked gilts are subject to important caveats. Most important, if the VAR models do not fully capture expectations of future inflation or real rates, the contribution of risk premia and/or other factors will be overstated. More generally, the results of the decomposition depend heavily on the way the models are set up and estimated.

(4) In the United Kingdom, interest payments and the principal repayment depend on the level of RPI around eight months before the payment is made. (See the box ‘Inflation-protected bonds and swaps’ in the Markets and operations article, *Bank of England Quarterly Bulletin*, Summer 2004, page 125.)  
(5) ‘An assessment of the relative importance of real interest rates, inflation and term premiums in determining the prices of real and nominal UK bonds’, *The Review of Economics and Statistics*, Vol. 79, No. 3, pages 362–66.

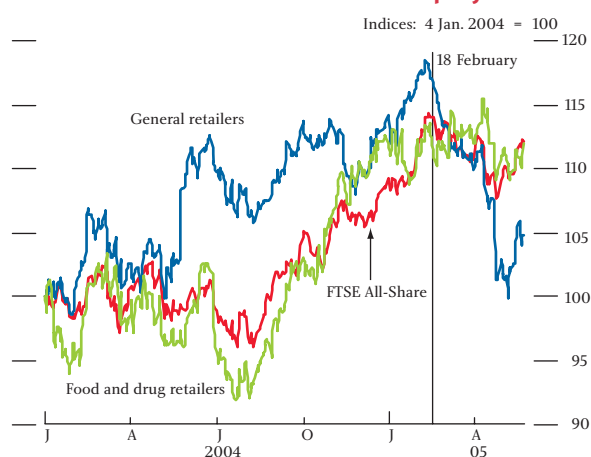
weaker outlook for expected future earnings. Although IBES long-term earnings forecasts were little changed over the period, UK profit warnings reached a three and a half year high in April (Chart 9). Within the total, profit warnings by retailers were particularly significant, and most likely reflected the slowdown in UK high street spending. Up to the end of the review period, 34 companies within the 'general retail' sector of the FTSE All-Share index had issued profit warnings in 2005; companies in the same sector had issued only 25 profit warnings during the whole of 2004. The 'general retailers' sector equity index fell by around 10% over the period (Chart 10).

**Chart 9**  
Profit warnings issued by UK firms



Source: Bank of England.

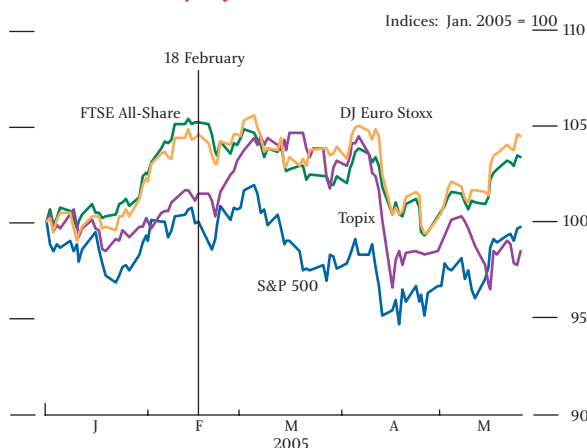
**Chart 10**  
UK retail sector and FTSE All-Share equity indices



Sources: Bloomberg and Bank calculations.

The fall in UK equity prices occurred against a backdrop of slightly weaker international equities. Stock markets in the United States, Japan and Europe all fell during the first half of the period (Chart 11). This international weakness could have been associated with concerns about global activity. However, with the publication of

**Chart 11**  
International equity indices

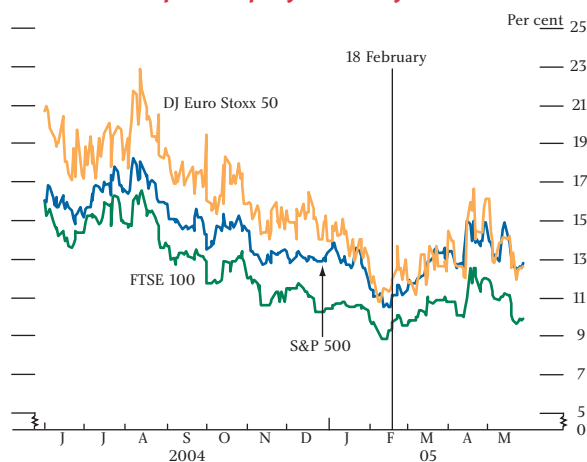


Source: Bank of England.

some stronger data later in the review period, especially in the United States, equity markets in a number of countries have recovered somewhat.

The fall in equity prices over the period might alternatively be related to an increase in risk premia. Information from options suggests that implied volatility rose sharply during March and April (Chart 12), although it fell towards the end of the period. The initial rise in implied volatility could have reflected a general increase in uncertainty about the global macroeconomic outlook following the release of weak activity data. There was also a significant widening of spreads in credit markets over the period (Chart 13). In part, this reflected concerns about some companies in the global auto sector — for example the debt securities of General Motors and Ford were downgraded during the period. This company-specific news may also have triggered some reassessment of investors' appetite for risk across asset markets.<sup>(1)</sup>

**Chart 12**  
Six-month implied equity volatility

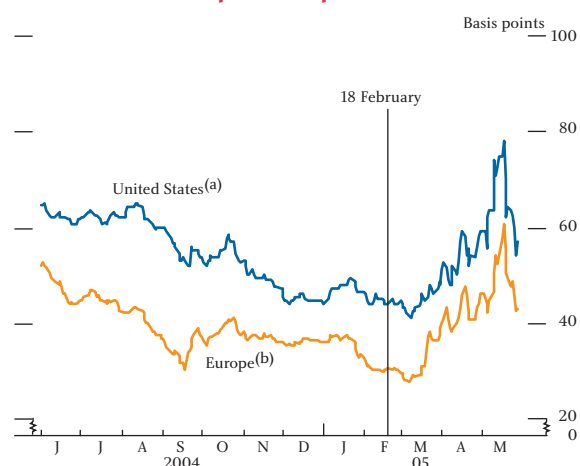


Sources: Bank of England, CME, Eurex and Euronext.liffe.

(1) This issue is discussed in more depth in 'Risks in the international financial system', Chapter 2 of the Bank of England's forthcoming *Financial Stability Review* (June 2005).



**Chart 13**  
Credit default swap index spreads



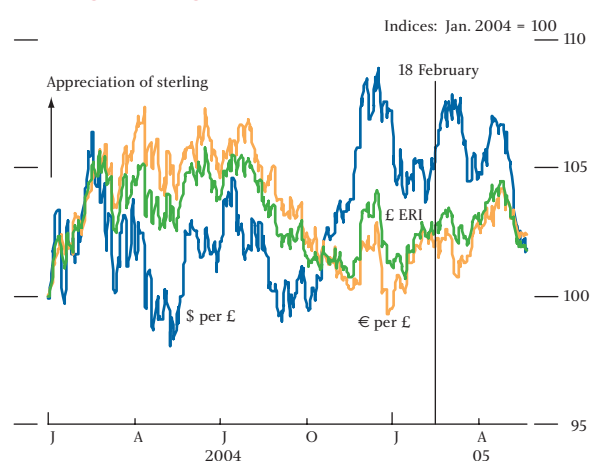
Source: JPMorgan Chase and Co.

- (a) Five-year on-the-run DJ.CDX.NA.IG.  
(b) Five-year on-the-run DJ iTraxx Europe.

## Exchange rates

The sterling exchange rate index (ERI) rose in the first two months of the review period to reach a level around 1.7% higher than at the time of the February *Bulletin*. But the sterling ERI fell in May to end the period 0.9% lower and close to its level at the turn of the year.<sup>(1)</sup> Comparing movements over a longer window, the sterling ERI has remained in a relatively narrow range (Chart 14).

**Chart 14**  
Sterling exchange rates



Source: Bank of England.

The recent depreciation in sterling was most significant against the US dollar — the sterling/US dollar exchange rate was 3.7% lower than at the time of the previous *Bulletin*. Some of this fall could have reflected relative

movements in international interest rates with sterling interest rates falling relative to US dollar rates.

## Developments in market structure

### Issuance of new UK 50-year gilt

On 26 May 2005, the United Kingdom's Debt Management Office issued an 'ultra-long' gilt. The bond, which matures in 2055 and has a coupon of 4.25%, was the first 50-year gilt issued since 1960. It provides a new instrument that UK pension funds and life insurers can use to match better the duration of their assets to their liabilities. According to market commentators, they were the biggest category of investors in the new gilt. The auction of £2.5 billion was covered 1.6 times.

### Changes in the Bank of England balance sheet

The size of the sterling components of the Bank's balance sheet increased in line with trend growth in banknotes in circulation and fluctuated with seasonal and weekly variation in demand for banknotes (Table B). The stock of lending via open market operations (OMOs) increased slightly over the quarter (Chart 15).

Gilt purchases were made in accordance with the published screen announcements; £16 million of 5% 2014 in February, £31.4 million of 4<sup>3</sup>/<sub>4</sub>% 2010 in March, £31.4 million of 5% 2012 in April, and £31.4 million of 5% 2014 in May. A screen announcement on 1 June 2005 detailed the purchases to be made over the following three months.

The sterling value of the foreign currency components of the Bank's balance sheet rose over the review period, in line with the slight depreciation of sterling. On 15 March 2005, the Bank auctioned €1,000 million of the 2008 note as part of its euro-denominated notes programme; as mentioned in the previous *Bulletin*, the first €1,000 million tranche had been auctioned on 18 January 2005. Cover in the auction of the second tranche was 2.1 times and the average accepted yield was 2.723%, approximately 9.7 basis points below the euro swaps curve. This was the second and final auction of the 2008 note and increased its outstanding value in the market to €2 billion. The total nominal value of Bank euro notes outstanding in the market rose to €6 billion.

(1) On 11 April 2005, the Bank of England released a new sterling effective exchange rate index. For more details of the new ERI see Lynch, B and Whitaker, S (2004), 'The new sterling ERI', *Bank of England Quarterly Bulletin*, Winter, pages 429–41.

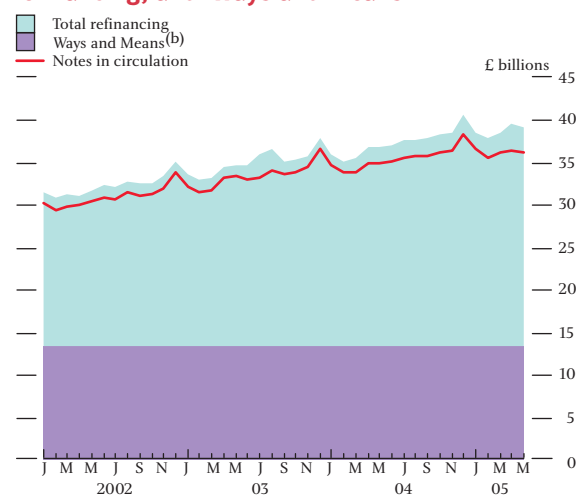
**Table B**  
Simplified version of Bank of England consolidated<sup>(a)</sup> balance sheet<sup>(b)</sup>

£ billions

Liabilities	27 May	18 Feb.	Assets	27 May	18 Feb.
Bank note issue	39	38	Stock of refinancing	28	27
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	9	8	Other sterling-denominated assets	4	3
Foreign currency denominated liabilities	15	15	Foreign currency denominated assets	18	15
<b>Total<sup>(c)</sup></b>	<b>63</b>	<b>59</b>	<b>Total<sup>(c)</sup></b>	<b>63</b>	<b>59</b>

- (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.

**Chart 15**  
Bank notes in circulation, the stock of OMO refinancing, and 'Ways and Means'<sup>(a)</sup>

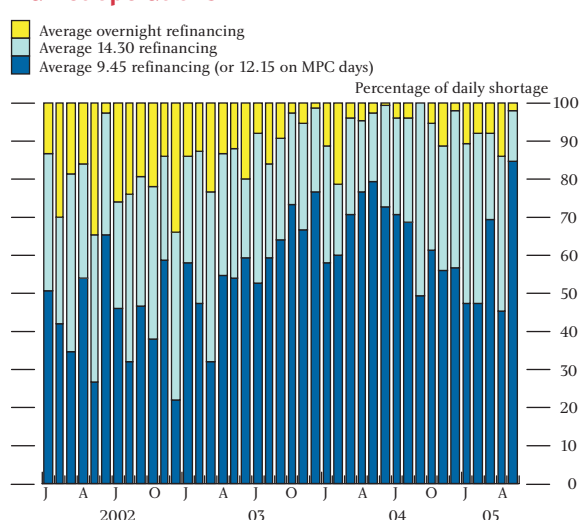


- (a) Monthly averages.
- (b) An illiquid advance to HM Government. This fluctuated prior to the transfer of responsibility for UK central government cash management to the UK Debt Management Office in April 2000. The Ways and Means is now usually constant.

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 narrowed slightly to 10.0 basis points below Euribor, compared with 10.2 basis points over the previous review period; for six-month bills, the average issuance spread widened slightly to 10.7 basis points below Euribor, from 10.6 basis points.

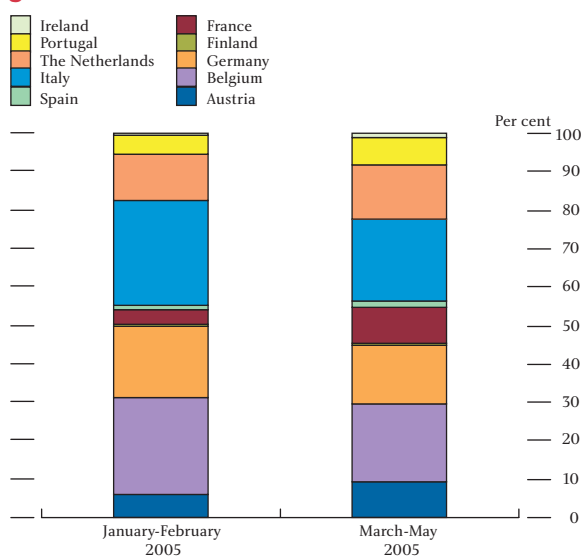
In the Bank's daily OMOs in the sterling money markets, the majority of financing continued to be provided at the Bank's official rate (at a two-week maturity) in the 9.45 and 14.30 rounds, although there was a slight increase in the amount being provided in the overnight facilities. Financing in the overnight facilities was at 25 basis points above the repo rate following the introduction of interim reforms to the Bank's operations in the sterling money market (see box on page 139) (Chart 16).

**Chart 16**  
Refinancing provided in the Bank's open market operations<sup>(a)</sup>



- (a) Monthly averages.

**Chart 17**  
Percentage of euro collateral taken in the Bank's open market operations provided by each issuing government

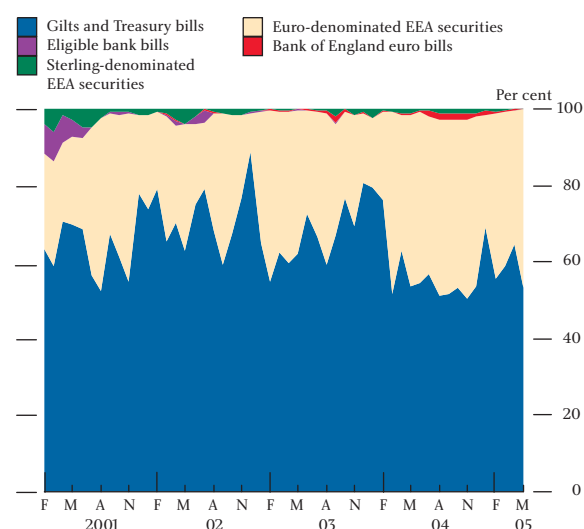


Concentration limits on the amount of collateral from a single issuer (excluding HM Government and the Bank of England) that a participant can hold with the Bank at

any one time took effect on 1 March 2005.<sup>(1)</sup> This has resulted in some change in the composition of euro collateral taken in operations and a more even distribution of collateral across issuers (Chart 17).

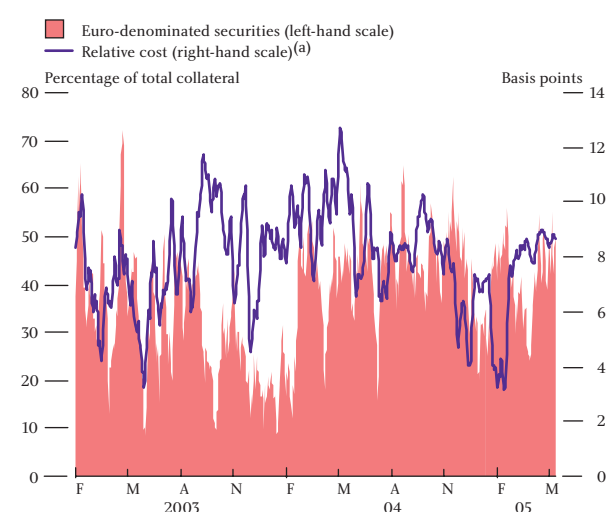
On average, use of euro-denominated collateral by counterparties participating in the Bank's OMOs increased slightly over the latest quarter (Chart 18), in line with a fall in its cost relative to gilt collateral (Chart 19).

**Chart 18**  
Instruments used as OMO collateral<sup>(a)</sup>



(a) Monthly averages.

**Chart 19**  
Relative cost and use in OMOs of euro-denominated EEA government securities

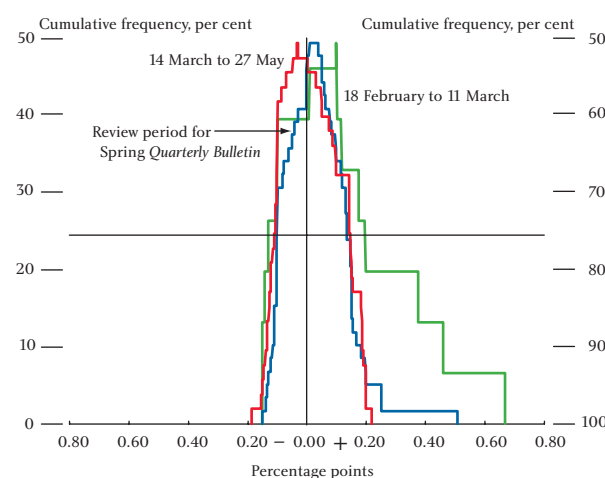


(a) Relative cost calculated as the difference between one-month BBA repo and Libor fixing spread and one-month European Banking Federation repo and Euribor spread. A wider spread indicates a lower cost of repoing euro-denominated debt relative to repoing gilts.

**Short-dated interest rates**

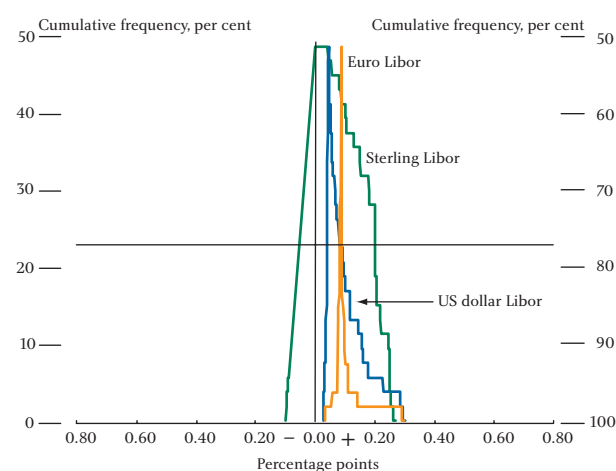
Chart 20 shows that the distribution of the spread between the sterling secured (gilt GC repo) overnight rate and the official Bank repo rate peaked at 0.67 percentage points during the review period. But the distribution narrowed following the introduction of the interim reforms, reflecting the reduction in rates on the Bank's overnight facilities to 25 basis points above the Bank's official rate.

**Chart 20**  
Cumulative folded distribution of sterling secured overnight rates<sup>(a)</sup>



(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 21**  
Cumulative folded distribution of international unsecured overnight rates since 14 March<sup>(a)</sup>



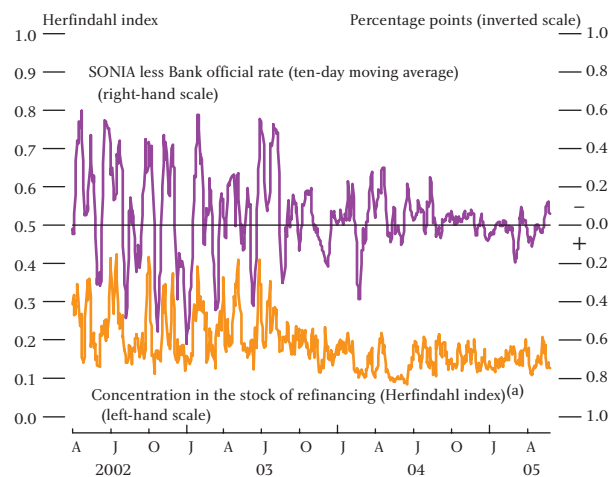
(a) Distribution of the spread between the Libor rate and the official policy rate. A negative spread indicates that the market rate is less than the official rate; if more than 50% of the spread distribution is below zero, it has a negative bias.

(1) The amendments to the Operational Notice that governs OMOs, which were published in November 2004 (and described in the Winter 2004 *Quarterly Bulletin*), took effect on 1 March 2005.

The ‘narrower’ corridor between the overnight lending and deposit facilities may also have contributed to the greater symmetry in the distribution of spreads between unsecured overnight (Libor) and the Bank’s official rate. But the spread between unsecured sterling overnight rates and the Bank’s official rate remained more variable than the comparable spread in US dollar and euro (Chart 21).

Over a longer period, the average spread of the sterling overnight indexed average rate (SONIA) below the Bank’s official rate has decreased (Chart 22). This may have encouraged wider participation in Bank OMOs, as evidenced by a decrease in the concentration in the stock of refinancing.

**Chart 22**  
SONIA relative to the Bank official rate and concentration in the stock of OMO refinancing



Source: Bank of England.

(a) The Herfindahl index is calculated by squaring the share of refinancing held by each counterparty and then summing the resulting numbers. An index of one implies a single counterparty accounted for the entire stock of refinancing ie high concentration. As the index approaches zero, concentration falls.

**Forecasting the liquidity shortage**

The accuracy of the Bank’s liquidity forecast remained broadly similar to previous quarters (Table C).

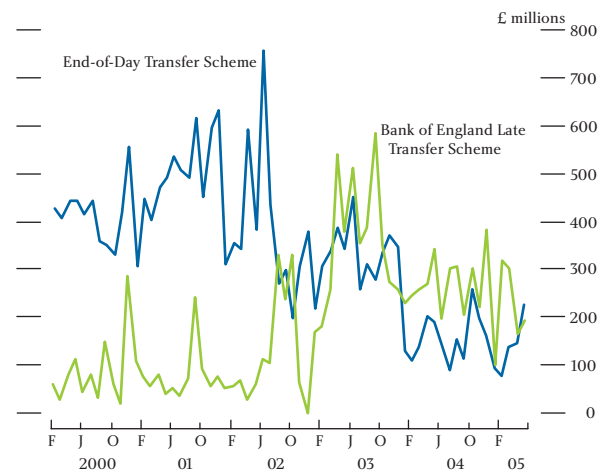
**Table C**  
Intraday forecasts versus actual liquidity shortages

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)
2004 Q1	120 (108)	79 (77)	55 (43)
2004 Q2	115 (125)	58 (78)	61 (74)
2004 Q3	89 (69)	62 (44)	52 (32)
2004 Q4	107 (114)	74 (86)	55 (63)
2005 Q1	117 (121)	87 (101)	63 (77)
April-May 2005	124 (94)	56 (68)	50 (66)

Average payments in the Bank of England Late Transfer Scheme (BELTS) for settlement banks decreased over the period, but there was a small rise in the End-of-Day Transfer Scheme (EoDTS) flows, from a low level in February (Chart 23). The volatility of daily flows rose in both the EoDTS and the BELTS, suggesting settlement banks continued to experience large but infrequent variability in their end-of-day positions.

**Chart 23**  
Bank of England Late Transfer Scheme and End-of-Day Transfer Scheme<sup>(a)</sup>



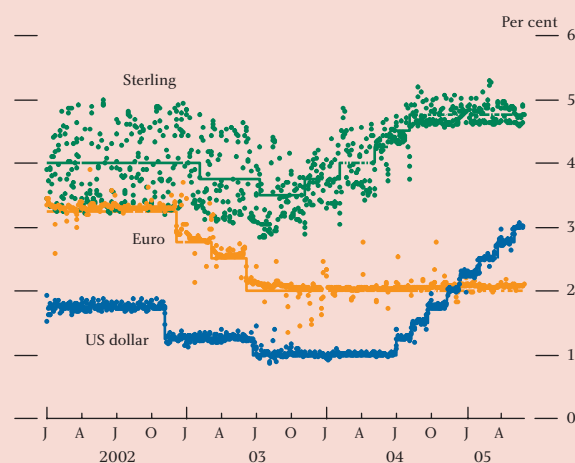
(a) Monthly averages.

## Money market developments since interim reform to the Bank's OMOs

As described in the Spring 2005 *Bulletin*, the Bank announced, in February, a package of interim measures with the aim of stabilising overnight interest rates further ahead of the launch of the Bank's fully reformed framework for operations in the sterling money markets. The measures, which took effect on 14 March, were 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 reverse repos undertaken as part of the Bank's daily open market operations to the Bank's official rate;
- no longer purchasing bills outright in the Bank's open market operations; and
- ceasing to accept newly issued bankers' acceptances as eligible collateral.

**Chart A**  
Overnight interest rates and policy rates



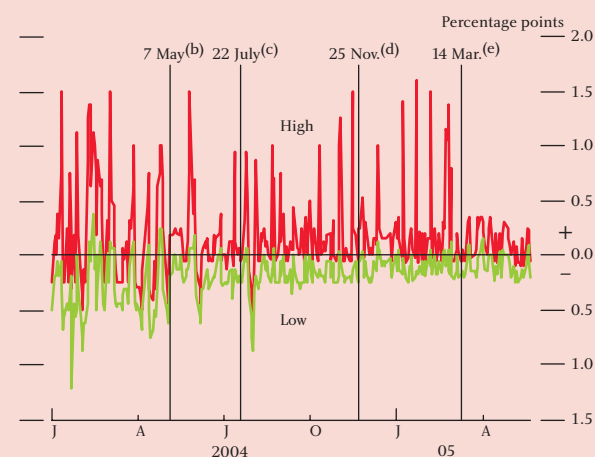
The indexing provisions have not yet been tested by an actual or expected change in the official interest

rate. But since the reforms, interest rates out to the next MPC meeting have been more stable around the official rate. The volatility of SONIA<sup>(1)</sup> has fallen (Chart A). Between 14 March and 27 May, the standard deviation of daily changes in SONIA was 13 basis points, compared with 27 basis points in the six weeks prior to interim reform.

The average spread between the highest and lowest sterling overnight market interest rate traded each day has narrowed, and peaks in the overnight rate have been lower (Chart B). Since 14 March 2005, the average spread between the daily high and low has been 20 basis points, compared with 34 basis points for the period from 25 November 2004 to 11 March 2005.

These changes are a welcome step towards the stability that full-scale reform is designed to produce.

**Chart B**  
Volatility of the sterling overnight interest rate<sup>(a)</sup>



- (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 2004, the Bank published a consultative paper on the reform of its operations in the sterling money markets.  
 (c) On 22 July 2004, the Bank announced the results of the review of its official operations in the sterling money markets.  
 (d) On 25 November 2004, the Bank published a second consultative paper on the reform of its operations in the sterling money markets.  
 (e) On 14 March 2005, the Bank implemented interim reforms to its operations in the sterling money markets.

(1) The Sterling Overnight Index Average is an average of the rates on sterling unsecured overnight cash transactions brokered in London, weighted by the size of trade (minimum size £25 million).