Markets and operations

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

- *Sterling short-term interest rates rose on changing perceptions about the outlook for UK monetary policy.*
- *Equity indices were relatively stable; credit spreads continued to narrow.*
- *The US dollar effective exchange rate index fell to a seven-year low.*
- *Remaining sterling money market instruments were successfully dematerialised and migrated to CREST; CMO was closed on 16 October.*
- *The Bank announced a review of its operations in the sterling money markets.*

Compared with recent quarters, major global interest rate, credit and equity markets have been fairly stable over the past three months (Table A). Market participants expect the steady pace of global economic recovery to continue and policy rates in the euro area and the United States to remain unchanged for some months to come. However, sterling market interest rates have risen as perceptions about the outlook for UK monetary policy have changed; on 6 November, the Monetary Policy Committee (MPC) increased the Bank's repo rate by one quarter of a percentage point to 3.75%. In the foreign exchange market, there was some increase in volatility and the US dollar depreciated. The sterling exchange rate index has remained within a range of 97 to 102.

Table A
Summary of changes in market prices

	5 Sept.	28 Nov.	*Change*
March 2004 three-month interest rate future (per cent)			
United Kingdom	4.08	4.43	*35 bp*
Euro area	2.29	2.33	*4 bp*
United States	1.32	1.38	*6 bp*
Ten-year nominal government forward rate (per cent) (a)			
United Kingdom	4.96	5.05	*9 bp*
Euro area	5.40	5.45	*5 bp*
United States	6.91	6.59	*-32 bp*
Equity indices			
FTSE 100 index	4257	4343	*2.0%*
Euro Stoxx 50 index	2615	2630	*0.6%*
S&P 500 index	1021	1058	*3.6%*
Effective exchange rates			
Sterling effective exchange rate	99.1	100.5	*1.4%*
Euro	88.4	90.7	*2.6%*
US dollar	104.5	97.4	*-6.8%*

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 daily on the Bank of England's web site at www.bankofengland.co.uk/statistics/yieldcurve/main.htm.

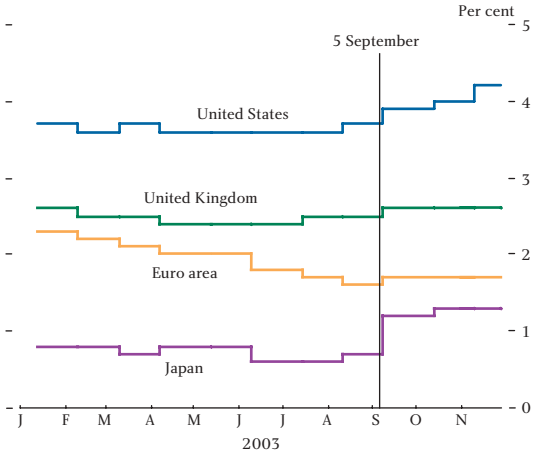
Short-term interest rates

Over the period, there was mixed news about the pace of global economic recovery, and economists' forecasts for GDP growth in 2004 were not revised significantly (Chart 1). US growth in 2004 is expected to be the most rapid of the economies shown, and the average forecast rose slightly, but the US economy is thought to have sufficient capacity to expand without inflationary pressures.

Readings of short-term and long-term real interest rates early in the period implied little change in perceived monetary policy conditions in the United States and the euro area. In the United Kingdom, by contrast, a tightening of monetary conditions was expected, as short-term real rate forecasts rose towards long-run expectations (Chart 2).(2)

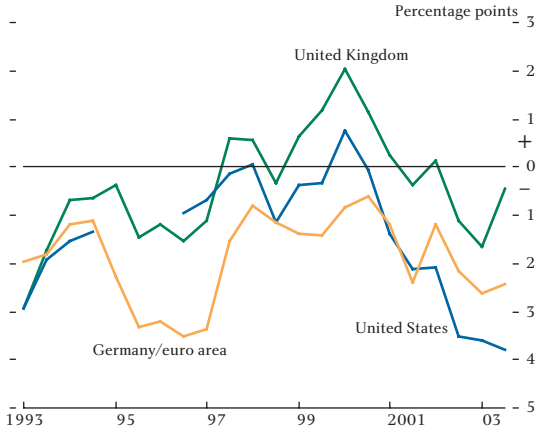
(1) The period under review is 5 September (the data cut-off for the previous *Quarterly Bulletin*) to 28 November.
(2) The change in, rather than the size of, the gap should be the focus. This gap is calculated by subtracting survey-based inflation expectations from nominal yields at two maturities. If the nominal yield curve is upward sloping, due to term premia, the gap between short and long rates may be persistently biased downwards.

Chart 1
Expected 2004 real GDP growth



Source: Consensus Economics.

Chart 2
Survey-based difference between short and long-maturity forward real interest rates(a)



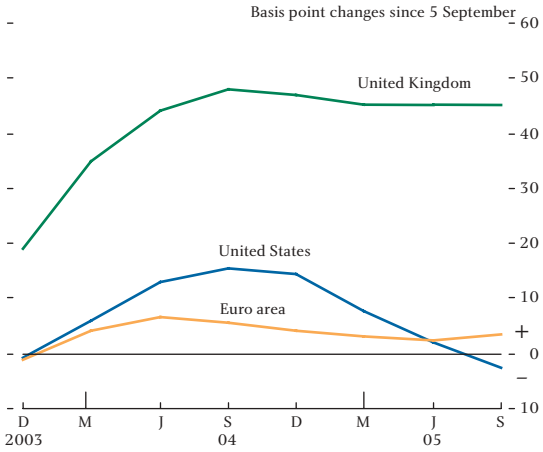
Sources: Bank of England and Consensus Economics.

(a) Derived from the Bank's government liability nominal forward curves and Consensus Economics semi-annual surveys of inflation expectations (for the next calendar year and five to ten calendar years ahead) conducted in April and October.

Sterling short-term nominal forward rates rose by 20 to 50 basis points over the period, compared with more modest increases in US dollar and euro rates (Chart 3). Central banks in the United States and euro area are expected to leave interest rates unchanged in the near term. Fed funds futures contracts do not imply a significant probability of a US rate increase until March, when around a 75% chance of a 25 basis point increase is priced in. Euribor futures suggest changes in interest rates by the European Central Bank are not expected until dates beyond March.

In the United Kingdom, there was little reaction in market interest rates to the November MPC announcement, suggesting such a move had been widely anticipated. Ahead of the announcement, UK

Chart 3
Changes in short-term nominal forward rates(a)



Source: Bloomberg.

(a) As implied by short-term interest rate futures contracts.

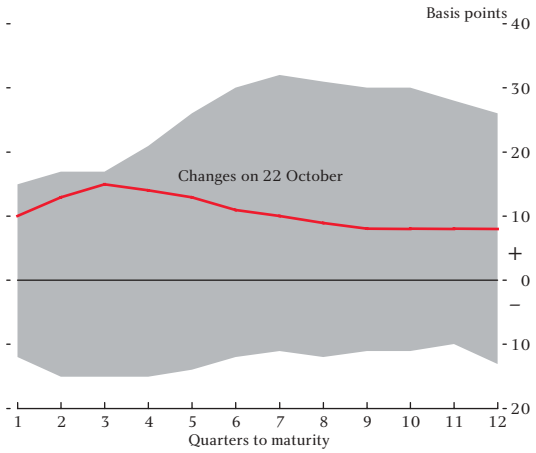
data releases—including, for example, revisions to second-quarter 2003 GDP and measures of housing market activity—were stronger than the market had expected. Market interest rates had also risen following publication of the minutes of the October MPC meeting, which reported that four of the nine Committee members had voted for a rate increase—a higher number than the market had anticipated.

Chart 4 shows the range of previous reactions in short sterling implied three-month forward interest rates to releases of the MPC minutes since 1997. The red line shows that the reaction to the October minutes was amongst the largest at horizons of less than one year, but was not particularly unusual at longer horizons, suggesting the impact of the minutes was to bring forward expectations of monetary policy tightening. This continued the pattern of previous months, with expectations of the timing of the turning point in sterling interest rates gradually brought forward (Chart 5).

Three-year spot sterling *real* rates continued to rise over the period. Chart 6 shows the difference between this rate (r_S) and implied five-year real rates five years forward (r_L). 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.(1) It is possible to trace out the path implied by the yield curve (except at short horizons, denoted by dotted lines in Chart 6) for these short and longer-maturity real rates to

(1) See Haldane, A and Read, V (1999), 'Monetary policy and the yield curve', *Bank of England Quarterly Bulletin*, May, pages 171–76.

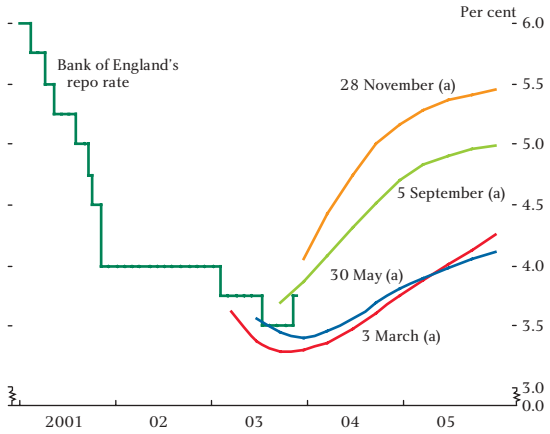
Chart 4
Range of changes in nominal forward rates implied by short sterling futures contracts on MPC minutes days(a)



Source: Bloomberg.

(a) Grey area shows range of changes in interest rates on publication days of all previous MPC minutes.

Chart 5
Short-term nominal forward rates



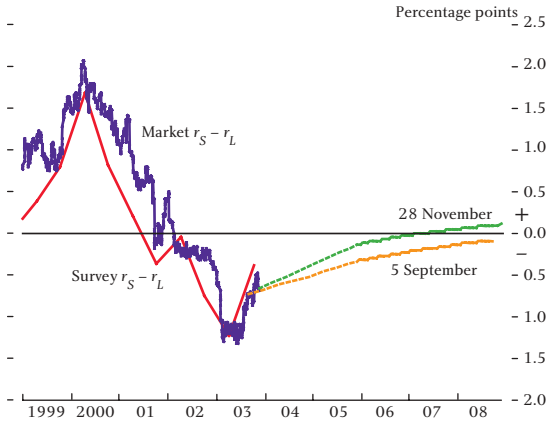
Source: Bloomberg.

(a) Three-month nominal forward rates implied by short sterling futures contracts. Dates relate to data cut-off points for previous *Quarterly Bulletin* 'Markets and operations' articles.

converge again, implying more neutral monetary conditions. This implied path has moved higher over recent months.

Chart 7 shows that, at short to medium-term maturities, some of the rise in nominal forward rates over the period may be explained by a rise in inflation expectations or inflation risk premia, in addition to the tightening of monetary conditions in the United Kingdom. While expectations for inflation derived from the UK gilt market remained anchored around 2.5% at the ten-year horizon, inflation expectations at $2^1/_2$ years rose. This might in part have reflected an unwinding of concerns about possible global deflation, but market contacts also

Chart 6
Difference between short and long-maturity sterling real forward rates(a)



Sources: Bank of England and Consensus Economics.

(a) Constructed both from index-linked gilts and by subtracting survey-based inflation expectations from nominal forward rates derived from conventional gilts.

Chart 7
Sterling inflation forward rates(a)

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

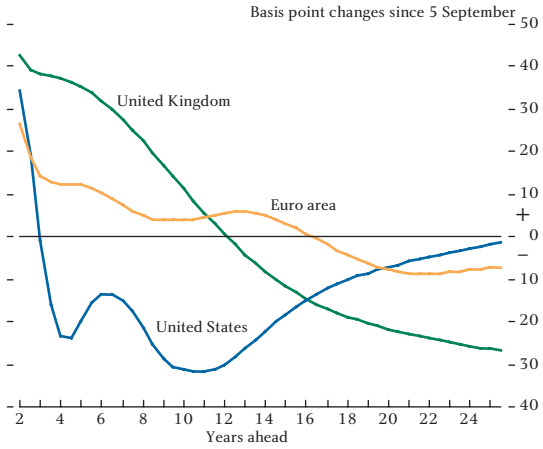
reported some increase in short-run inflation expectations or risk premia relating to (uncertainty about) the implications of a change in the Government's inflation target from an RPIX measure.(1) On 10 December, the Government announced a new operational inflation target for monetary policy of 2%, as measured by the twelve-month increase in the harmonised Consumer Prices Index.

Long-term interest rates

The pattern of changes in euro, sterling and US dollar implied forward rates varied (Chart 8). In the euro area, forward rates were relatively stable. In the United States, there were large declines in forward rates towards the end of the period, despite stronger-than-expected data releases. Contacts reported that this was largely due to

(1) This might also reflect expected future differences between the RPI (retail prices index) inflation measure, to which inflation-linked gilts are indexed, and the RPIX inflation measure.

Chart 8
Changes in implied nominal forward rates(a)

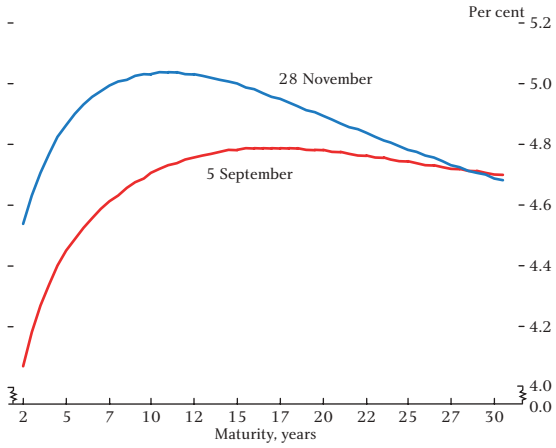


(a) Three-month forward rates derived from the Bank's government liability curves.

market repositioning, as dealers and speculators covered short positions they had established in anticipation of a rise in US dollar yields.

In sterling, yields rose across the curve (Chart 9); but this rise was far less pronounced at the long end, so that long-term forward rates fell.

Chart 9
Sterling spot yield curve(a)



(a) Derived from the Bank's government liability curves.

These forward rates can be thought of as the rates of interest at which it is possible to agree today to lend (for three months) at some specified points in the future. In theory, each forward rate can be explained as the sum of three terms—the expected future (three-month) interest rate, a risk premium and a convexity adjustment. The risk premium compensates the lender for the risk that the future short-term interest rate might be higher than expected. The convexity adjustment is related to uncertainty about the future interest rate and has a negative impact on the forward rate. It adjusts for the fact that—if the forward contract were traded—it would be valued in terms of the future one-period bond price, which is a convex function of the future interest rate.(1)

So a decline in forward rates could, in theory, be due to lower expectations of, or higher uncertainty about, future interest rates, or a fall in the risk premium. At long horizons, it is difficult to rationalise a fall in expectations that is greater at, say, 25 years than it is at 15 years. There is also little evidence to suggest that there has been a marked increase in uncertainty over future sterling interest rates. From a theoretical point of view, this suggests that the profile of sterling long-term forward rate changes in Chart 8 is more likely to be explained by a fall in the risk premium, perhaps on the basis that the long end of the curve is now perceived to be more closely anchored to long-run prospects for growth and inflation. But again, it is difficult to explain why this might have been particularly the case over recent months.

An alternative explanation relies on institutional factors, with the fall in sterling forward rates related to a rise in demand for long-dated gilts. The rise in sterling short-term interest rates noted in the previous section meant that yields at medium to long maturities also rose (Chart 9) and the duration of these assets fell.(2) Contacts reported that this prompted some investors—such as pension funds—to switch into longer-duration securities in order to match the interest rate risk of their liabilities. This additional demand may have put downward pressure on longer-term interest rates. There were also reports of UK pension funds reallocating assets from equities to long-dated bonds.

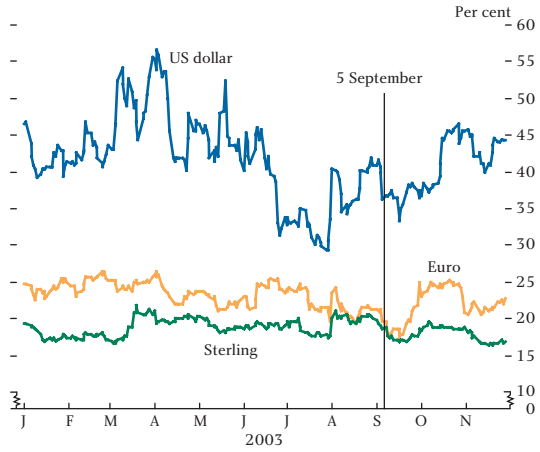
Interest rate uncertainty

The degree of market uncertainty about the future path of short-term interest rates may be reflected in measures of implied volatility from short-term interest rate options contracts. Quoted implied volatility, which is expressed as a percentage of the underlying interest rate, remained higher for US dollars than for sterling and euro (Chart 10). But this is largely an artefact of the low level

(1) The time t price of a forward contract to lend at time $t+n$, for example, can be written as $\exp\{-f_{t+n}\}$, where f_{t+n} is the contracted forward rate. In the absence of risk premia, this should equal the expected price of a one-period bond at time $t+n$ ie $E[\exp\{-r_{t+n}\}]$, where r_{t+n} is the future short-term interest rate. Taking a second-order approximation, it follows that the forward rate is equal to: $f_{t+n} \approx E[r_{t+n}]-0.5V[r_{t+n}]$ where the second term is the convexity adjustment and is determined by the expected variance of the future short rate, $V[r_{t+n}]$.

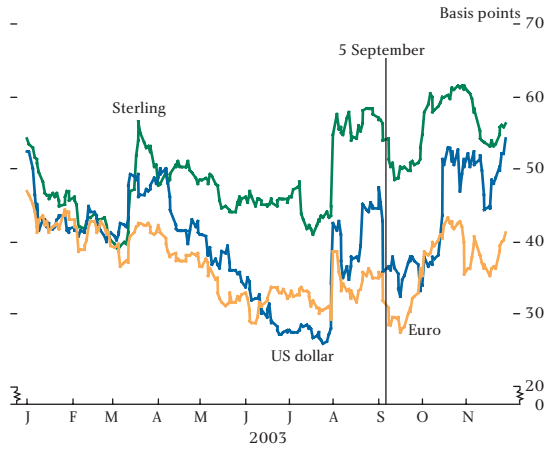
(2) The duration of a bond is the average time remaining to future coupon and principal payments weighted by their present value.

Chart 10
Six-month quoted implied volatility of short-term interest rates



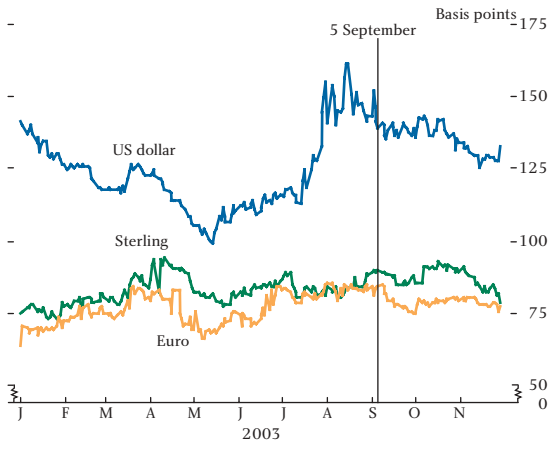
Sources: Bank of England, CME and LIFFE.

Chart 11
Six-month implied basis point volatility of short-term interest rates



Sources: Bank of England, CME and LIFFE.

Chart 12
Three-month implied basis point volatility of ten-year swap rates



Source: Bloomberg.

of current US dollar interest rates, combined with a perception that the US Federal Reserve would still make any changes to its target interest rate in units of 25 basis points. Measured in basis points, uncertainty about short-term US dollar rates over a six-month horizon remained lower than in sterling (Chart 11). Implied basis point volatility across currencies has edged higher in recent months and the gap between them narrowed, but levels are not historically high.

Measures of near-term uncertainty about interest rates at longer maturities derived from the swaption market remained within the range seen earlier in the year, edging down slightly, including in US dollars, where there had been a pickup in volatility in July and August (Chart 12). The profile of three-month swaption-implied volatility at different swap tenors, or the 'term structure' of implied volatility, is discussed in the box on page 398.

Credit spreads and equities

US dollar investment-grade corporate yields fell over the period, unwinding some of the increases seen in the summer. Sterling and euro investment-grade corporate yields rose, but not by as much as government bond yields, and sub investment-grade bond yields fell across currencies. Credit spreads in all currencies narrowed therefore, suggesting a decline in perceived credit risk and a continued 'search for yield' by investors (Charts 13 and 14).(1) Declines were broad-based, across industry groups.

Chart 15 shows the implied volatilities from equity options over a long time period, and illustrates that equity-implied volatilities have fallen since spring to their lowest levels in a number of years.

Most major equity indices rose only slightly over the period, in contrast to the larger increases over the previous six months (Chart 16). With small changes in real interest rates, the continued rise in equity prices might have reflected upward revisions to expected corporate earnings or lower risk premia. US third-quarter earnings were strong and upward revisions to US GDP growth consistent with stronger-than-expected earnings. However, the Nikkei fell over the period, in part on concerns about the possible impact on Japanese economic recovery of the yen's appreciation.

(1) See also section 1.1 of the *Bank of England Financial Stability Review*, December 2003, pages 17–18.

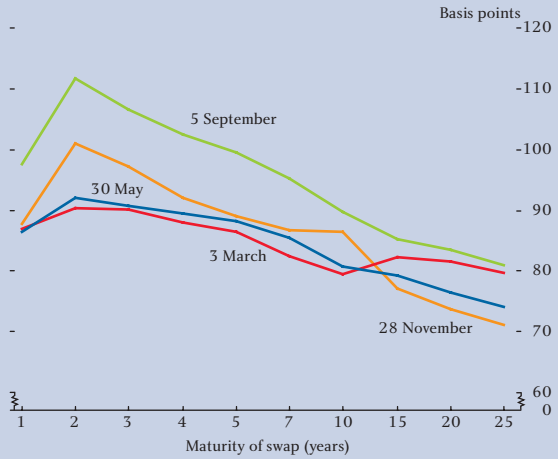
Term structure of implied volatility

Using the prices of short-term options to lend at different maturities, it is possible to back out a term structure of implied volatility. Options on swaps—swaptions—are generally more frequently traded, and so provide a clearer read on the term structure of implied volatility, than options on, for example, government bond futures contracts. A swaption gives the buyer the right, but not the obligation, to enter into an interest rate swap at a specified date in the future for a specified term. Chart A shows implied basis point volatility from three-month options on swaps with tenors ranging from one to 25 years.

Two points are worth noting in particular. First, the implied volatility curve is generally upward sloping at short maturities but downward sloping beyond two years. This suggests that, in the near term, the greatest uncertainty is typically about changes in the cyclical path of the economy and, so, in the expected stance of monetary policy, over the next couple of years. The lower longer-term uncertainty might reflect credibility of the UK monetary policy framework and expected stability in the determinants of long-term real rates of interest, at least in the near term. Second, and following on from that, the shape of the front end of the curve can vary over time, depending on the degree of monetary policy uncertainty, which may be greatest around perceived turning points. For example, there was a flatter profile of sterling swaption volatility in the early part of the year.

Chart B shows the term structure of volatility across currencies. While the shape of the curve is broadly similar, the level of US dollar implied basis point volatility is higher, and has been for some time, and there is a noticeable hump in its term structure around the two to ten-year tenor. This may reflect a different pattern to the sterling and euro markets of relative demand for and supply of swaptions in the US dollar markets, as US dollar swaptions are used to hedge prepayment risk on US mortgage assets.(1)

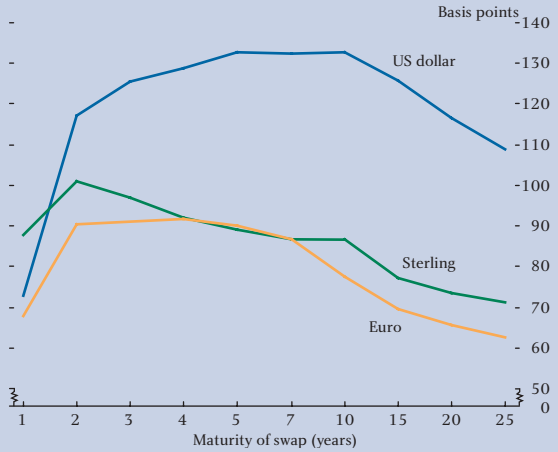
Chart A
Term structure of three-month option-implied basis point volatility of sterling fixed/floating interest rate swaps(a)



Source: Bloomberg.

(a) Dates shown relate to data cut-off points for previous *Quarterly Bulletin* 'Markets and operations' articles.

Chart B
Term structure of three-month option-implied basis point volatility of euro, sterling and US dollar fixed/floating interest rate swaps(a)



Source: Bloomberg.

(a) As at 28 November 2003.

(1) For a discussion of recent US mortgage hedging activity, see 'Markets and operations', *Bank of England Quarterly Bulletin*, Autumn 2003, pages 258–59.

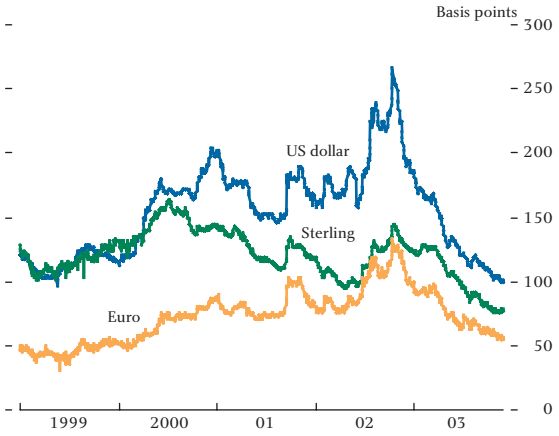
Exchange rates

The Japanese yen trade-weighted exchange rate index (ERI) appreciated by 2.6% (Chart 17); this was largely accounted for by an appreciation against the US dollar, of 6.6%. The US dollar ERI declined by 6.8% to its lowest level in nearly seven years.

The US dollar depreciation occurred despite a slight pickup in US GDP growth forecasts relative to other regions (Chart 1), which might, other things being equal, have been expected to increase demand for US dollar assets or exposure to the US economic recovery. Table B decomposes exchange rate movements according to the uncovered interest parity (UIP) condition, which seeks to assess the impact of interest rate news on the exchange rate.(1) Interest rate news here is measured as the change in relative ten-year government bond yields. Movements in euro, US dollar and yen interest rates only

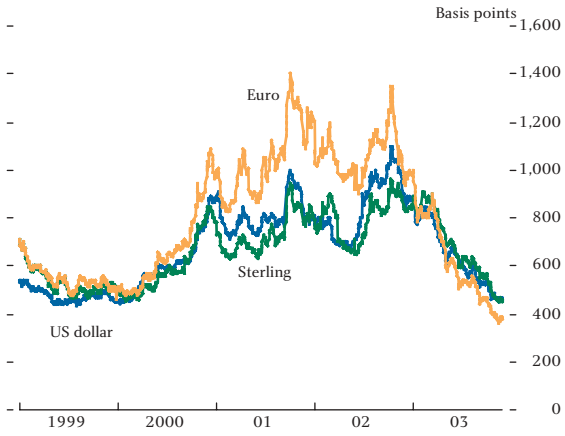
(1) See Brigden, A, Martin, B and Salmon, C (1997), 'Decomposing exchange rate movements according to the uncovered interest parity condition', *Bank of England Quarterly Bulletin*, November, pages 377–89.

Chart 13
Investment-grade option-adjusted corporate bond spreads



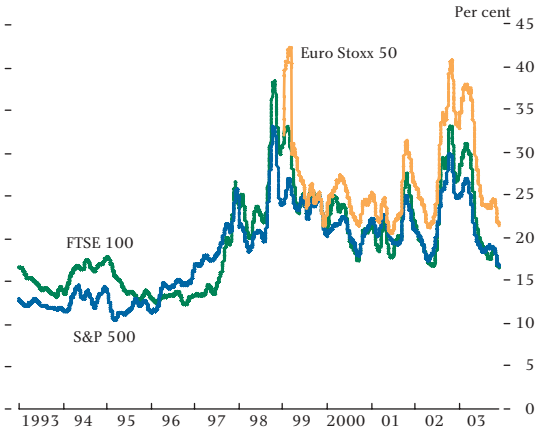
Source: Merrill Lynch.

Chart 14
Sub investment-grade option-adjusted corporate bond spreads



Source: Merrill Lynch.

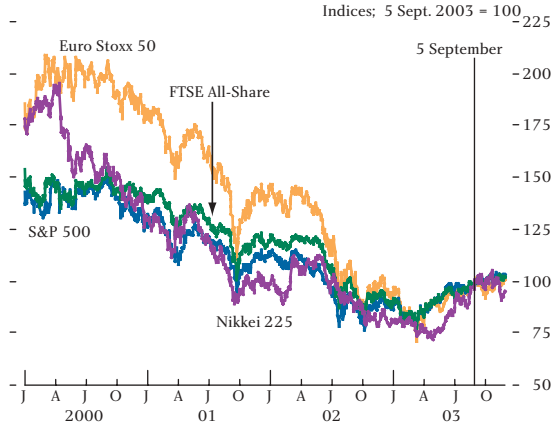
Chart 15
Six-month implied volatilities of selected equity indices(a)



Sources: Bank of England, CME, Eurex and LIFFE.

(a) Thirty-day moving averages.

Chart 16
Selected equity indices



Source: Bloomberg.

partially accounted for movements in the US dollar bilateral exchange rates over the period.

Market contacts suggest that a more plausible proximate explanation for the depreciation of the US dollar is uncertainty about the sustainability of the US current account deficit. Indeed, much of the movement in the US dollar ERI occurred following the 22 September G7 communiqué, with increased market speculation that the US dollar would be allowed to depreciate, especially against Asian currencies. This was followed by a large spike in US dollar-yen option-implied volatility (Chart 18). However, conditions overall in the foreign exchange market were generally orderly and, set against a longer backdrop, the level of implied volatilities was not especially elevated and has since fallen back. Contacts say that one reason implied exchange rate volatilities are not higher is the belief that Asian central banks will intervene effectively to smooth any further appreciation in their currencies against the US dollar.

The sterling ERI was fairly stable over the period as a whole, and has remained within a range of 97 to 102

Chart 17
Effective exchange rates

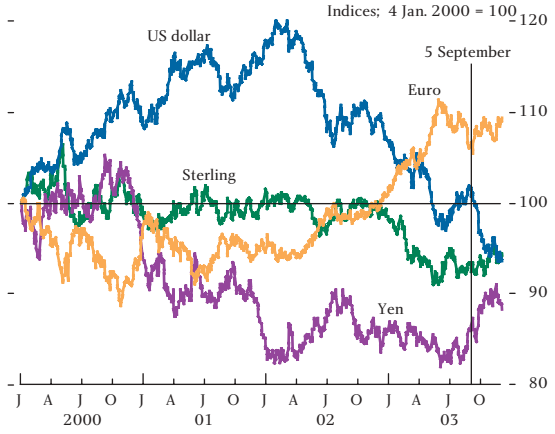
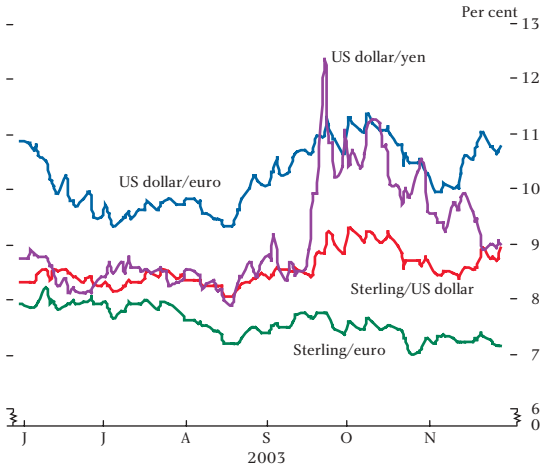


Table B
Exchange rate movements and news: 5 September–28 November

	£ ERI	€/£	$/£	$/€	¥/£	¥/$
Actual change (per cent)	1.4	-0.2	8.5	8.7	1.8	-6.2
Interest rate news (percentage points)	2.9	2.1	4.5	2.4	4.0	-0.5
of which: domestic	*2.0*	*2.0*	*2.0*	*-0.1*	*2.0*	*-2.5*
foreign	*0.9*	*0.1*	*2.5*	*2.5*	*1.9*	*1.9*

Chart 18
Three-month implied foreign exchange volatilities



Source: British Bankers' Association.

prevailing since late February (Chart 19). As sterling reached the upper end of this range in October, market contacts reported that this strength in part reflected 'carry trades' undertaken in anticipation that the MPC would raise the Bank's repo rate in November. (See the box on page 401 for a discussion of such trades.) Some market contacts also reported increased overseas official sector demand for sterling bonds as

Chart 19
Sterling effective exchange rate

part of strategies to diversify exchange rate risk in their foreign reserves.

Developments in market structure

This section provides an update on some significant changes in market infrastructure, as well as developments in sterling money market trading patterns and bond market practices.

Settlement of money market instruments

The final stage of the work programme begun in the late 1990s to reduce risk in UK payment and settlement systems was completed in October, when the remaining paper money market instruments were migrated from the Central Moneymarkets Office (CMO) to CREST. The CMO was closed on 16 October.(1)

Until the migration to CREST, money market securities were generally paper, negotiable instruments, settled in the CMO. They included Treasury bills, bankers' acceptances, and certificates of deposit (CDs).(2) The paper money market securities were held in the CMO Depository and the transfer of the securities was effected as 'contractual delivery' across the electronic records of the CMO. Settlement between the settlement banks of CMO members took place on a bilateral net basis at the end of each day across their accounts at the Bank of England.

The migration of money market securities to CREST followed a series of preparations by the Bank, CRESTCo and HM Treasury (including the UK Debt Management Office) and consultations with the market. Legislation to modify the Uncertificated Securities Regulations 2001 was needed to provide for the non-material equivalents of money market securities, known as eligible debt securities (EDS), and this came into force on 24 June 2003.

Migration occurred in a number of stages from mid-September 2003, with existing negotiable securities being cancelled and equivalent securities being issued into CREST. This was a smooth process, which did not affect, for example, the CD primary market (Chart 20)—some market participants had been concerned about the potential impact of migration on CD market liquidity and amounts outstanding.

(1) See Bank of England News Release, 'MMI migration marks completion of UK securities settlement consolidation', 16 October 2003, www.bankofengland.co.uk/pressreleases/2003/111.htm.
(2) Although in practice, CDs were issued in non-material form in the CMO through a deed of covenant and contractual framework involving issuers and CMO members.

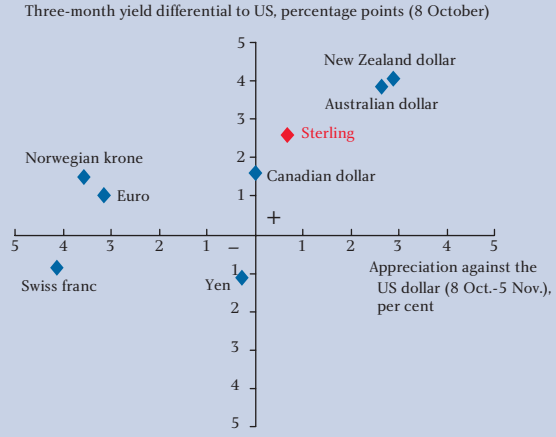
Carry trades in the foreign exchange market

Market practitioners often explain exchange rate movements by referring to the influence of so-called 'carry trades'.(1) This box explains what carry trades are and how they may relate to the uncovered interest rate parity (UIP) concept.

A foreign exchange carry trade occurs when an investor borrows in the currency of a country where nominal interest rates are low by international comparison (the 'low-yielding currency'), and invests in the currency of a country in which interest rates are high (the 'high-yielding currency'). The *interest* gain made is called the 'carry', the interest earned (or lost) by borrowing an asset and using the proceeds to invest in another asset. For example, at present an investor might borrow Swiss franc (the 'low-yielding' currency) in the money market, sell the Swiss franc for a 'high-yielding' currency such as sterling or the Australian dollar and invest the proceeds in sterling or Australian dollar-denominated assets, gaining the interest rate differential. The resulting demand for the 'high-yielding' currency is reported to have contributed to the appreciation of sterling and the Australian dollar during October.

At face value, these 'flow-based' arguments seem to be difficult to reconcile with UIP, which states that *in the absence of risk premia* the positive interest rate differential between, say, the United Kingdom and Switzerland would be associated with an expected depreciation of sterling against the Swiss franc. This depreciation, if it occurs, would be expected to offset *exactly* the carry gained by borrowing in Swiss franc and investing in sterling. However, it is clear that this simple UIP without risk premia does not always hold *ex post* over short periods: the currencies of countries with high interest rates have not consistently depreciated relative to those of countries with low interest rates. This is illustrated in Chart A, which shows the change in the exchange rate of various countries against the US dollar on the x-axis and the differential in three-month interest rates relative to US dollar interest rates on the y-axis. It shows that between the October and November MPC meetings (a period during which market practitioners reported carry trades), currencies such as sterling and the Australian dollar have—despite a positive interest rate differential—*appreciated* against the US dollar, while the Swiss franc—despite a negative interest rate differential—*depreciated* against the US dollar.

Chart A
Interest rate differential versus US interest rates and appreciation against the US dollar



Source: Bloomberg.

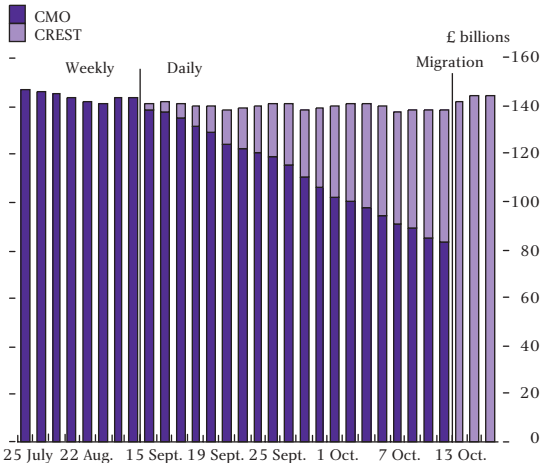
Allowing for risk premia, Chart A need not be inconsistent with UIP, nor is UIP in principle inconsistent with the idea of carry trades. One could think of a carry trade as the investor being paid a risk premium in order to hold the high-yielding currency now, rather than buy it more cheaply in the forward market. But it is not clear why high-yielding currencies should require such premia. And they would need to be implausibly large to explain some of the larger exchange rate movements observed.

Another way to reconcile carry trades and UIP is through changes in expectations about equilibrium exchange rates. If carry trades reflected changes in expectations about equilibrium exchange rates, the resulting appreciation of the high-yielding currency would not contradict UIP as the latter only makes statements about expected exchange rate changes in the absence of shocks to the expected equilibrium level.

An alternative argument is that carry trades reflect herding behaviour. This could be rational if individual investors believed that the current exchange rate levels would persist for long enough to allow them to earn the carry and close out their position in time, despite the interest rate differential. Positions may build up gradually as investors see the profitability of these trades. But once sentiment changes, positions may be unwound in full and abruptly. This can, at least temporarily, lead to sharp changes in exchange rates as investors try to unwind positions at the same time, a so-called 'crowded trade'. In this case, the overall change in exchange rates might be consistent with UIP, but the dynamics would certainly differ.

(1) See for example 'Markets and operations', *Bank of England Quarterly Bulletin*, Summer 2003, page 156.

Chart 20
Sterling CDs outstanding in CMO and CREST



Source: CRESTCo.

As a result of the migration, all UK securities,(1) whether gilts, other bonds, equities or money market securities are now settled on the single CREST platform and infrastructure, which has resulted in both efficiency gains and cost savings. More importantly, there has been a significant reduction in risk, as CREST settlements take place on a delivery-versus-payment basis in central bank money, whereas settlement in CMO had entailed large intraday exposures amongst the CMO settlement banks. The settlement banks are also able to take floating charges over their customers' money market securities (as they can over other securities settled in CREST), further reducing risk to settlement banks.

Another advantage of EDS is their fungibility, and this should reduce issuance costs and increase flexibility for issuers and investors. Costs of printing and storing the paper securities are eliminated.

Transactions in EDS can utilise any of the current CREST transaction functionalities, including delivery-by-value (DBV),(2) member-to-member transactions, RPO transactions (designed for the settlement of term general collateral repo trades)(3) and stock loans. To facilitate such transactions, CRESTCo has established a CREST reference price mechanism for each issue of EDS.(4) These enhancements should encourage the use of money market securities in repo transactions and as collateral. The Bank has observed the wider use of Treasury bills in repo, and contacts report a broader range of banks participating in the Treasury bill market.

Relative cost of funding via foreign exchange swaps

Sterling CDs are an important source of wholesale funding for some UK banks, but they can also raise non-sterling liabilities and raise sterling via the foreign exchange swap market.

As noted in the previous *Bulletin*, some of the major UK-owned banks have used the US dollar money market—in particular CDs and commercial paper—to help to meet their funding need in sterling, which in turn largely reflects the rapid growth of their UK customer lending.(5) These banks have been attracted by the liquidity of the US dollar money market and, contacts report, by relative cost. On an equivalent currency-swapped basis, they report that banks have often been able to secure sterling more cheaply through the foreign exchange swap market.

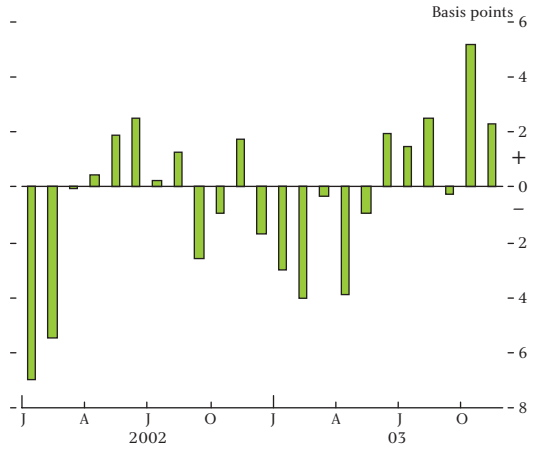
However, over recent months, contacts have reported an increase in the relative cost of generating sterling from US dollars via the foreign exchange swap market—Chart 21 shows an indicative measure of relative cost at the three-month maturity. But contacts have not reported any deterioration in liquidity in either the underlying money markets or in the swap markets, so that the foreign currency markets still provide the banks with a deep and liquid source of funding.

Improving market standards in the sterling and euro fixed-income credit markets

In October, a number of large institutional investors in the sterling and euro corporate bond markets launched an initiative intended to improve standards of disclosure and documentation in those markets. In particular, they distinguished 'event risk'(6) from credit risk, arguing that the absence of effective protection against event risk in

(1) Except those of unit trusts and open-ended investment companies; work continues to improve settlement facilities for these securities.
(2) 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).
(3) For further details, see *Bank of England Quarterly Bulletin*, Spring 2003, page 16.
(4) The mechanism uses a simple discount-to-maturity calculation based on BBA Libor and long-term credit ratings; it is not intended as an accurate guide to the exact market price at any given time—pricing of any individual money market security remains at the discretion of the parties concerned.
(5) See also Speight, G and Parkinson, S (2003), 'Large UK-owned banks' funding patterns', *Bank of England Financial Stability Review*, December.
(6) Event risk is defined as a 'deliberate change of the risk parameters of an issuer that results in an immediate benefit to equity investors at the expense of fixed-income investors. Examples include leveraged buy-outs, leveraged break-up bids or a borrower substantially changing its risk characteristics through a balance sheet restructuring.'

Chart 21
Relative cost of raising three-month sterling from US dollars via foreign exchange swaps(a)



Sources: Bank of England and Bloomberg.

(a) Estimate of the cost of issuing three-month US dollar CDs and swapping proceeds into sterling less the cost of issuing three-month sterling CDs.

bond documentation was undesirable, leading to greater volatility in bond prices and lower liquidity than might otherwise be the case.

The group's main recommendations were:(1)

- The establishment of minimum covenants for investment-grade corporate issues to protect investors against event risk. In particular, bonds should include a change of control provision, a negative pledge and a disposal of asset restriction.

- Moving away from the so-called 'Spens-call' clause, which relates to the discount rate applied to value a bond redeemed early by an issuer. The proposal is to use a swap-based rate, rather than a gilt rate.

- Better standards of disclosure by issuers, including issuers to make prospectuses available at least three working days prior to an investor roadshow, to send prospectuses to all investors and make them available on web sites, to make detailed accounts available semi-annually, to hold annual bondholder meetings to coincide with the full-year results and to disclose market-sensitive information in a timely manner.

- All publicly listed bonds to have a rating from at least two principal ratings agencies active in Europe.

- Issuers and investors to work together to encourage dealers to improve secondary market liquidity. In particular, issuers to consult investors on which lead managers provide secondary market liquidity before awarding mandates.

The Bank welcomes this debate and encourages issuers, investors, dealers and the authorities to consider the issues raised.

Bank of England official operations

Changes in the Bank of England balance sheet

Table C summarises changes in the components of the Bank's balance sheet between 3 September and 26 November.

The foreign currency components of the Bank's liabilities were broadly unchanged—the Bank maintained the nominal value of its three-month and six-month euro-denominated bills outstanding at €3.6 billion by rolling over bills at maturity. Average issuance spreads were little changed—for three-month bills, they were 11.7 basis points below euribor, compared with 11.2 basis points in the previous period (June-August), and for six-month bills 13.4 basis points below euribor, compared with 14.4 basis points in the previous period.

Notes in circulation, the largest sterling liability on the Bank's balance sheet, increased slightly over the period. It fell in September, as the increased demand related to

Table C
Simplified version of Bank of England consolidated balance sheet(a)

£ billions

Liabilities	26 Nov.	3 Sept.	Assets	26 Nov.	3 Sept.
Bank note issue	34	33	Stock of refinancing	23	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	7	Other sterling-denominated assets	3	4
Foreign currency denominated liabilities	11	12	Foreign currency denominated assets	12	12
Total (b)	**51**	**52**	**Total** (b)	**51**	**52**

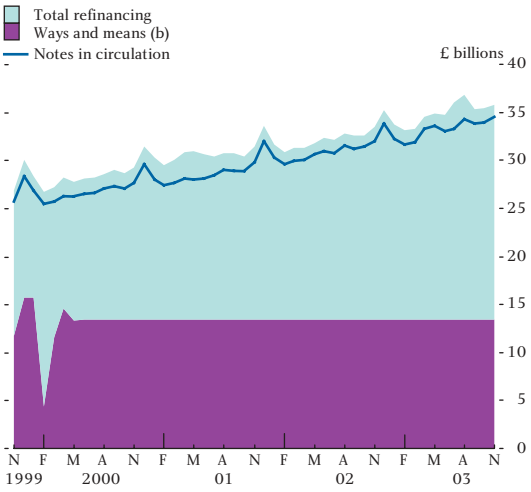
(a) Based on published weekly Bank Returns.
(b) Figures may not sum to totals due to rounding.

(1) For further details, see www.uksip.org/pdfs/BOND.PDF.

the August Bank Holiday unwound, but picked up again late in November, and is likely to continue to rise in the run-up to Christmas and the New Year.

The stock of refinancing provided via the Bank's open market operations moved in line with the changes in notes in circulation (Chart 22). But the size of the banking system's average daily liquidity shortage declined (Chart 23), as there was less recourse to the Bank's overnight lending facilities at 15.30 and 16.20 (Chart 24). This was especially true in the run-up to the MPC's 6 November meeting, when the market expected a quarter-point increase in the Bank's repo rate. Because, under the current operational framework, the Bank's repo rate is fixed for the maturity of the transaction, there was substantial demand by counterparties for two-week repo, at a rate of 3.5%, in the days leading up to the decision. The bid-cover ratio (amount of bids divided by the size of the shortage) in the week leading up to the November MPC decision averaged 4.4, compared with 1.4 in the week prior to the October MPC meeting, when the Committee was expected to maintain the repo rate at 3.5%.

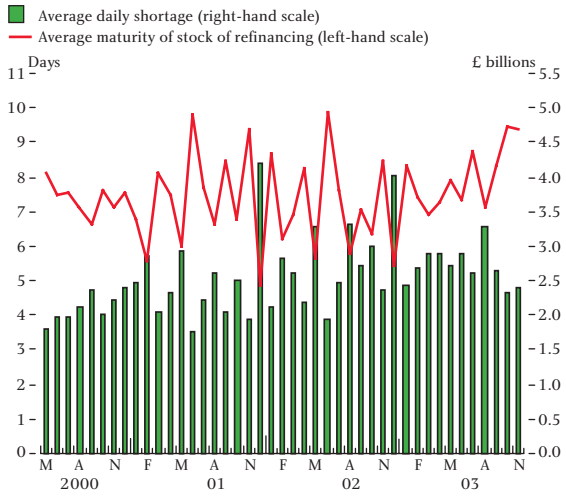
Chart 22
Bank notes in circulation, the stock of refinancing and 'Ways and Means'(a)



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

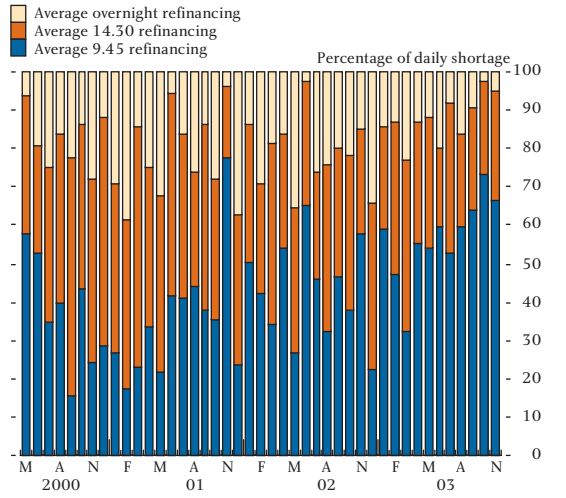
Reduced recourse to the Bank's overnight lending facilities also had the effect of increasing the average maturity of the stock of refinancing (Chart 23). However, the mix of collateral used by the Bank's counterparties was broadly unchanged—gilts, including HM Treasury bills, continued to form the largest part of the Bank's collateral pool. Much of the remainder consisted of euro-denominated EEA government debt (Chart 25).

Chart 23
Maturity of stock of refinancing and size of daily shortage(a)



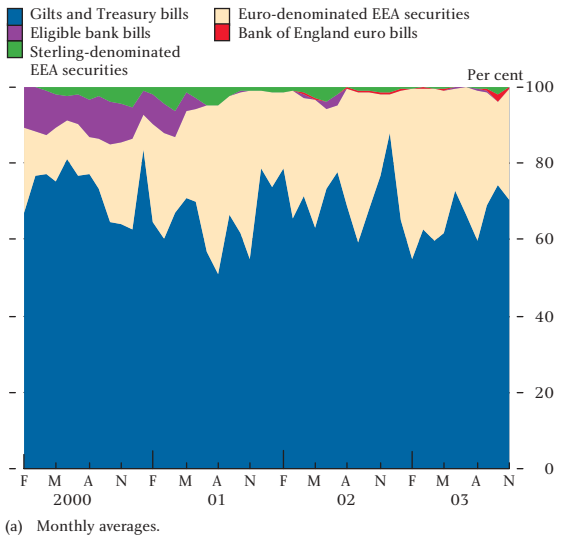
(a) Monthly averages.

Chart 24
Refinancing provided in the Bank's open market operations(a)



(a) Monthly averages.

Chart 25
Instruments used as OMO collateral(a)



(a) Monthly averages.

Review of sterling money markets

On 14 October 2003, the Bank announced it is reviewing its operations in sterling money markets.

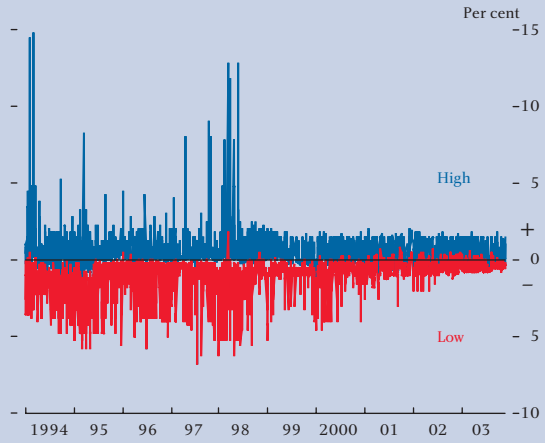
The twin and complementary objectives of the Bank's operations will continue to be to implement monetary policy while meeting the liquidity needs of the banking system. The Bank also wants a framework that continues to support efficient and competitive money markets.

The Bank last reviewed the framework around seven years ago. The changes introduced then—in particular, operating in gilt repo and broadening the range of counterparties—have worked well. The Bank has also made a number of more recent adjustments to its operations, such as the introduction of an overnight deposit facility in June 2001. But the Bank considers it timely to examine now whether there is scope to make further improvements, taking account of the implications for the markets and the wholesale payment systems that support them.

Variability in the sterling overnight interest rate has declined over the past ten years (Chart A). But the dispersion of sterling overnight interest rates remains greater than that in other major currencies. Chart B shows that the distribution of the overnight interest rate index(1) around its average spread to the policy rate is wider for sterling than it is for the euro and the US dollar.

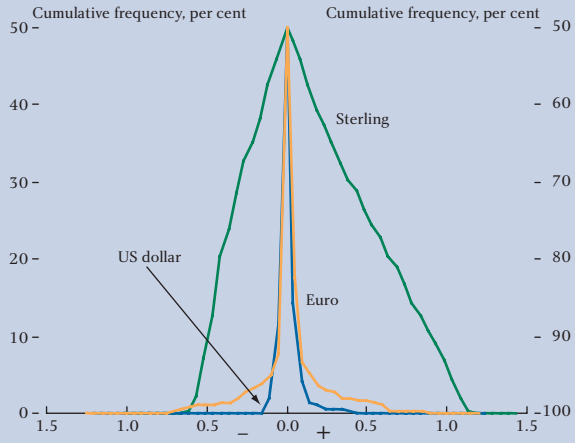
Since its announcement, the Bank has begun a round of consultation with a range of market participants, including the settlement banks, its open market operations counterparties, other banks and intermediaries, other users of the markets, market associations and infrastructure providers. Any other sterling money market participants that wish to give their views are encouraged to contact the Bank.

Chart A
Sterling overnight interest rate(a)



(a) High and low of the day observed by the Bank's dealing desk as a spread of the policy rate.

Chart B
Distribution of the overnight interest rate index around its average spread to the policy rate(a)(b)



Source: Bloomberg.

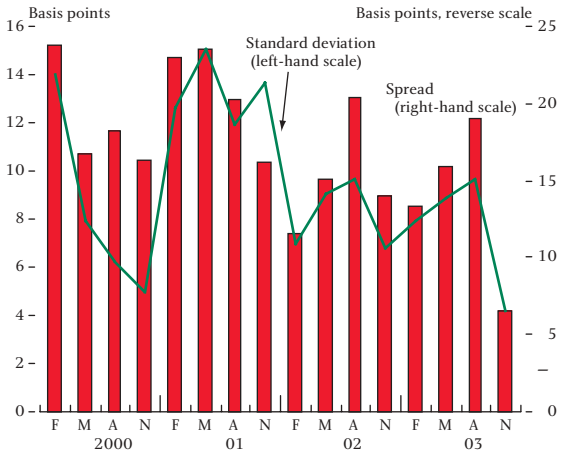
(a) From 2 January 2002 to 28 November 2003.
(b) Figures on the y-axis refer to the frequency with which the average spread was at or below the corresponding figure on the x-axis. For spreads below zero, see the left-hand y-axis; above zero, see the right-hand y-axis.

(1) A representative average overnight interest rate weighted by the size of reported transactions. Exact calculations differ across currencies, but the euro, sterling and US dollar indices are broadly comparable.

The spreads between short-dated sterling money market rates and the Bank's repo rate were narrower during the period than over the preceding three months. The two-week GC repo rate averaged 7 basis points below the repo rate from September to November, compared with 19 basis points from June to August (Chart 26). The variability of the rate also diminished—its standard deviation was 4 basis points from September to November, compared with 10 basis points in the preceding three months.

In October, the Bank announced a review of its operations in the sterling money markets (see the box above).

Chart 26
Size and volatility of two-week GC repo/Bank repo rate spread(a)



(a) Quarterly averages.

Forecasting the liquidity shortage

The average difference between the Bank's daily 9.45 liquidity forecast and the final liquidity shortage of the banking system was close to its average since 2000. There has been some improvement in the accuracy of the 16.20 liquidity forecast in recent months (Table D).

One measure of the quality of settlement banks' own liquidity forecast is the average flow in the End of Day Transfer Scheme (EoDTS).(1) In recent months, these flows have been below their typical 2000–2002 levels. However, there has been a marked increase in use of the Late Transfer Window (LTW). The LTW allows settlement banks to make payments to each other after CHAPS closes, at 16.20, and before the EoDTS takes place. It is intended to provide an opportunity for settlement banks to correct technical problems, relating to system/authorisation failures, that prevent transfers from settling during normal CHAPS operating hours.

Table D
Intraday forecasts versus actual shortages

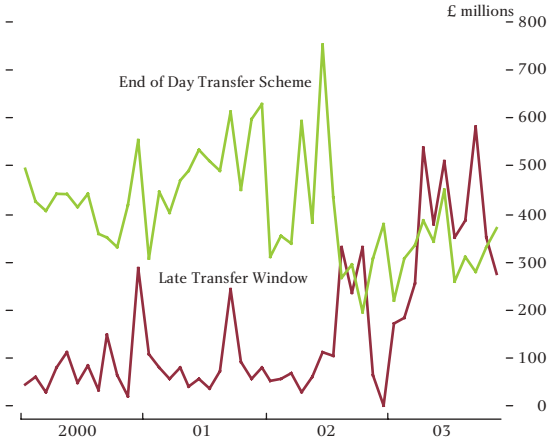
Mean absolute difference (standard deviation), £ millions

	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 H1	99	(108)	50	(66)	35	(37)
July 2003	143	(261)	126	(237)	111	(238)
Aug. 2003	104	(69)	61	(44)	66	(50)
Sept. 2003	105	(109)	83	(98)	76	(80)
Oct. 2003	67	(50)	50	(40)	47	(29)
Nov. 2003	80	(124)	48	(65)	46	(49)

(a) From April 2000.

Chart 27 suggests that, rather than an improvement in forecasting accuracy, the decline in EoDTS flows is related to increased use by settlement banks of LTW transfers. The Bank discourages this substitution, and expects use of the LTW to fall.

Chart 27
Use of the Late Transfer Window and EoDTS(a)



(a) Monthly averages.

(1) For an explanation of this scheme, see page 163 of the Summer 2003 *Quarterly Bulletin*, or the APACS web site: www.apacs.org.uk/downloads/EoDT.pdf.