

# Markets and operations

*This article reviews developments in sterling fixed income and foreign exchange markets since the Autumn Quarterly Bulletin.<sup>(1)</sup>*

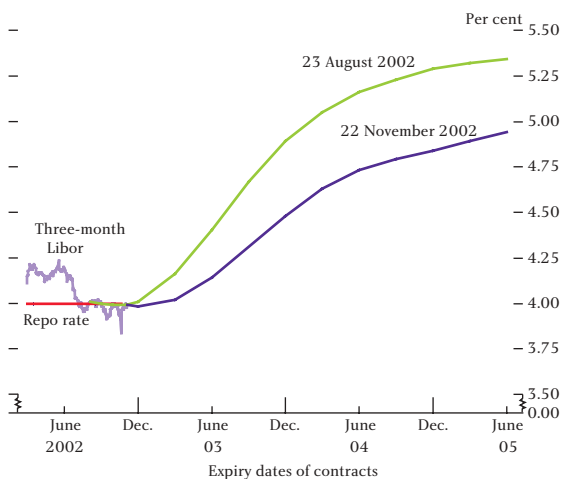
- *Sterling forward interest rates from futures and gilts fell out to just beyond five years and rose a little beyond that. Sterling's effective exchange rate index increased slightly.*
- *The FTSE All-Share index fell sharply to late September, but in the second half of the period it rose and equity market volatility fell from high levels.*
- *Since CLS Bank International commenced live operations in September 2002, the value of trades, including in sterling, settling through Continuous Linked Settlement has grown sharply.*
- *Work continues to enable money market instruments to be issued in electronic form and to be settled in CREST, with delivery-versus-payment, reducing daylight credit exposures, from the second half of 2003.*

## Sterling asset markets

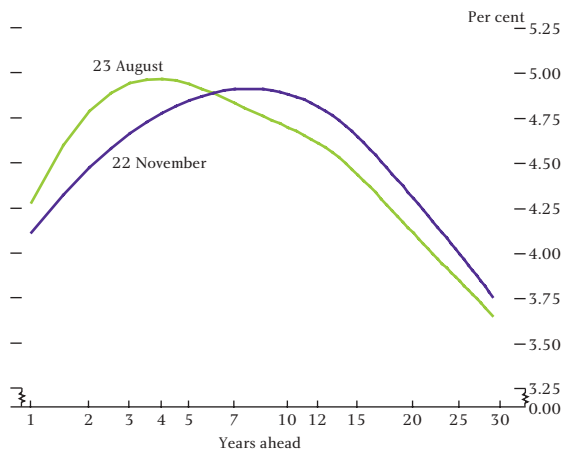
### Interest rate movements

The Bank of England's Monetary Policy Committee (MPC) left the official repo rate unchanged at 4% during the period. Forward interest rates derived from market prices, however, fell out to just beyond five years (Charts 1, 2 and 3). At short maturities, as of 22 November the December 2002 short sterling contract implied a rate of 3.98%, effectively unchanged from 4.01% on 23 August, and the June 2003 short sterling contract implied a rate of 4.14%, down from 4.40%.

**Chart 1**  
Bank of England official repo rates, three-month Libor and expectations from futures contracts



**Chart 2**  
Forward sterling yield curves<sup>(a)</sup>



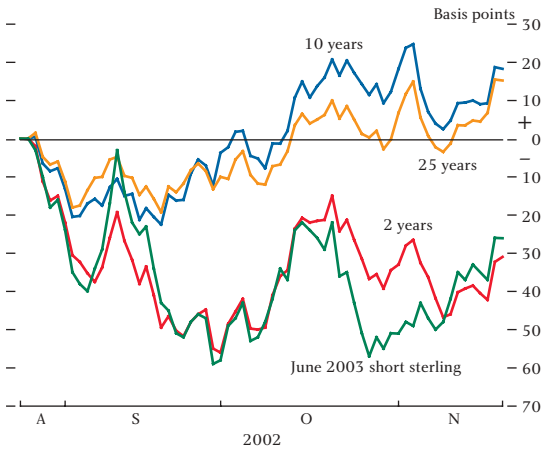
(a) Six-month forward rates derived from the Bank's government liability curve. (Estimates of this curve, and of instantaneous forward rates, are published daily on the Bank of England web site at [www.bankofengland.co.uk/statistics/yieldcurve/main.htm](http://www.bankofengland.co.uk/statistics/yieldcurve/main.htm).)

The rates implied by short sterling contracts were consistent with a central expectation in the market that the official repo rate would remain unchanged at 4% until at least the middle of 2003. Reuters' poll of economists' forecasts, conducted over 26–27 November<sup>(2)</sup> indicated a mean forecast of 4% for end-2002 and 4.42% for end-2003, and options on short sterling futures suggested that market participants assigned only a very slight probability of a reduction in the official rate by the end of 2002. At times during the period, however, market rates indicated significantly

(1) The period under review is 23 August (the data cut-off for the previous *Quarterly Bulletin*) to 22 November.

(2) Shortly after the end of the period under review.

**Chart 3**  
Cumulative changes in sterling interest rate expectations<sup>(a)</sup>

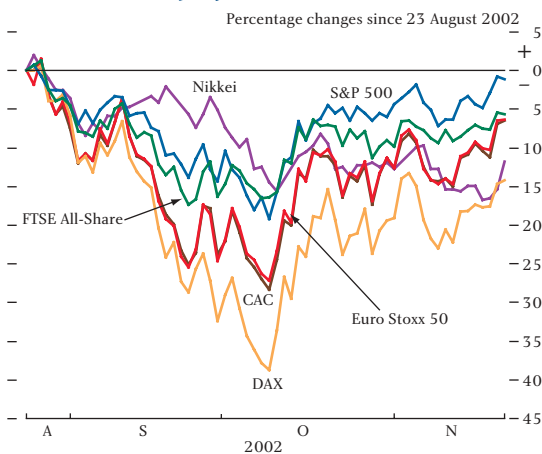


(a) June 2003 short sterling is the three-month Libor rate implied by the June 2003 short sterling contract. Other rates are three-month forward rates implied by the Bank's government liability curve.

higher probabilities of lower official repo rates at the end of 2002 and in the first half of 2003. Reflecting these changing expectations, historical volatilities of implied rates from short sterling futures have remained at fairly high levels.

From late August to early October, major US and European equity markets fell sharply and movements in money market interest rates followed closely (Charts 4 and 5). Over the period as a whole, the major US and European equity indices continued to move together, suggesting that some of the factors driving equities remained global, consistent with relative stability in exchange rates (see below). Nonetheless, in the first half of the period, euro-area equity indices—and implied forward interest rates—fell by more than those in the United States and the United Kingdom. By the end of

**Chart 4**  
International equity indices



Source: Bloomberg.

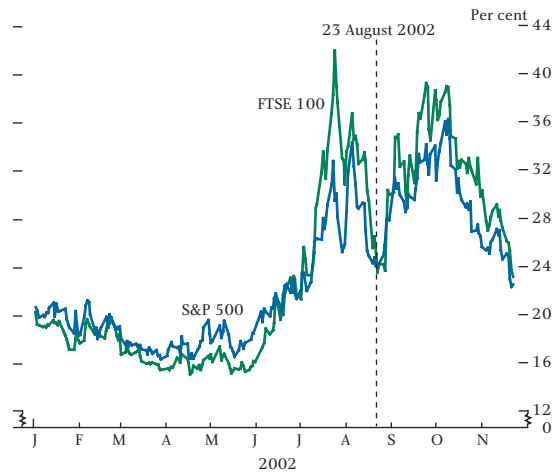
(1) RPIX data have been volatile in recent months; see the November 2002 *Inflation Report*, page 43.

**Chart 5**  
Cumulative changes in short-term interest rate expectations<sup>(a)</sup>



(a) As implied by interest rate futures contracts maturing in June 2003.

**Chart 6**  
Three-month implied volatilities of S&P 500 and FTSE 100 equity indices



Sources: LIFFE, CME, and Bank calculations.

September, the rate implied by the June 2003 short sterling contract had fallen by 59 basis points from its level on 23 August, a similar decline to that of the equivalent implied US dollar rate, but materially less than the equivalent euro rate (Chart 5).

From 9 October, equity indices rose strongly for over a week (Chart 4), in part following some better-than-expected US Q3 corporate earnings, and implied volatilities of equity indices declined over the remainder of the period (Chart 6). Money market interest rates also rose initially, with sterling rates increasing following the publication on 15 October of a larger-than-expected rise in the UK retail price index (RPIX) for September.<sup>(1)</sup> But they then declined, with growing market expectations of reductions in official

**Table A**  
**Short-term sterling interest rate expectations: reactions to economic news and official announcements and publications<sup>(a)</sup>**

	Expected	Actual	Intraday change (basis points) (b)	Daily change (basis points) (c)
US ISM manufacturing (3/9)	51.8	50.5	-4	-8
US unemployment rate (6/9)	6.0%	5.7%	3	3
MPC minutes (18/9)	n.a.	n.a.	-3	-6
US durable goods orders (26/9)	-3.0%	-0.6%	5	1
Industrial production (m-o-m) (7/10)	0.8%	-0.3%	-3	-7
RPIX (y-o-y) (15/10)	2.0%	2.1%	6	12
MPC minutes (23/10)	n.a.	n.a.	-6	-13
US consumer confidence (29/10)	90.0	79.4	-3	-5
FOMC decision (6/11)	n.a.	1.25%	-4	7
MPC decision (7/11)	n.a.	4%	15	7
<i>Inflation Report</i> (13/11)	n.a.	n.a.	4	6
Retail sales (y-o-y) (21/11)	5.0%	6.0%	3	7

n.a. = not available.

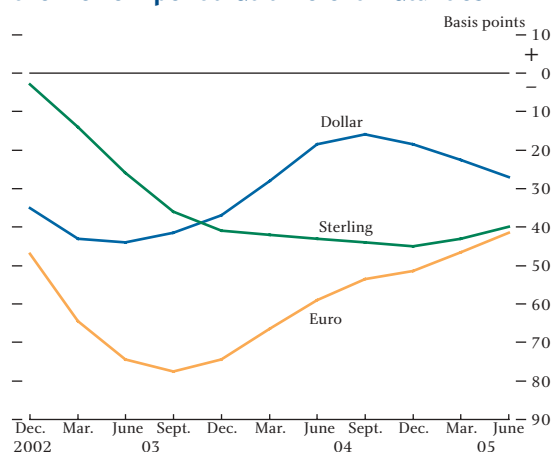
Source: Bloomberg.

- (a) Reactions in rates implied by short sterling futures contracts (December 2002 contract up to 18 September, subsequently March 2003 contract).  
 (b) Change in rates implied by short sterling from 15 minutes before to 15 minutes after the economic news release or publication of document, or for news outside trading hours from previous closing price to 30 minutes after start of trading the following trading day.  
 (c) For news outside trading hours, from closing price preceding the news to closing price following the news.

rates ahead of the Federal Open Market Committee (FOMC), European Central Bank (ECB) and Bank of England MPC policy meetings at the beginning of November. In particular, sterling forward rates fell following publication of the minutes of the October meeting of the MPC, which revealed a 6:3 vote to leave the official rate unchanged, with the minority favouring a reduction of 25 basis points (Table A). Although neither the Bank of England's MPC nor the ECB changed official rates in November, sterling forward interest rates for December 2002 and March 2003 rose subsequently whereas the equivalent euro rates fell. Market participants said that expectations of a reduction in official interest rates in the United Kingdom decreased following the 4.7% increase in the Halifax house price index for October, publication of the Bank's *Inflation Report* on 13 November, and stronger-than-expected retail sales data. The ECB was widely expected to lower its policy rate at its 5 December policy meeting and subsequently did so, by 50 basis points to 2.75%. Over the period as a whole, euro forward money market interest rates fell by more than those in sterling or US dollars (Chart 7).

At longer maturities, forward yields derived from gilts fell out to around six years but rose further out. Movements in yields often followed equity indices closely, with yields falling (rising) as equity markets fell (rose).<sup>(1)</sup> This pattern has been common across US and European

**Chart 7**  
**Changes in short-term interest rate expectations over review period at different maturities<sup>(a)</sup>**



(a) As implied by interest rate futures contracts.

government bond markets. News about global growth prospects might have led to this kind of relationship, with a changing economic outlook altering expectations about future dividend payments and monetary policy. Another possible explanation might be changing perceptions of equity risk, with investors, at times, demanding less risky assets, such as gilts, causing their yields to fall.<sup>(2)</sup> Market contacts have reported sizable reallocation flows between equities and bonds, in each direction at different times, which may have contributed to the close correlation in movements of the two instruments. Yields on some shorter maturity gilts fell to low levels during the period; but part of this expensiveness probably also reflected developments in the gilt repo market, as explained in the box on page 360.

The gilt market, while volatile, has been significantly less so than the US Treasury market. Market contacts suggested that greater volatility in the US Treasury market in part reflected hedging of options embedded in US mortgage-backed securities.<sup>(3)</sup> Unlike in the United States, UK households do not generally have long-term fixed-rate mortgages with prepayment options. As a result, UK mortgage lenders do not carry the same structural 'short' interest rate volatility position and do not need to 'delta hedge' this risk by buying and selling gilts or sterling interest rate swaps.

Real forward yields, as implied by index-linked gilts, rose over the review period, but by more at both very short and long maturities. As a result, derived breakeven

(1) The correlation between movements in the FTSE All-Share index and the December 2002 long gilt futures contract was -58.8%, compared to -45.9% in the previous review period. See also the November *Inflation Report*, Chart 1.5 (page 5).

(2) See also 'The financial stability conjuncture and outlook', *Financial Stability Review*, December 2002.

(3) See *Financial Stability Review*, June 2002, Box 4, page 36 for an analysis of the structure of the US mortgage market and Box 7, page 72 for an explanation of negative convexity and mortgage prepayment risk.

## Bond yields and repo rates

Contacts reported that for much of the review period, the 5% Treasury 2004 traded between 10 and 15 basis points expensive to neighbouring gilts (the 6½% Treasury 2003 and the 6¾% Treasury 2004), and at times could be borrowed in overnight repo at a rate as much as 200 basis points below that of most other gilts. The expensiveness of this gilt at times affected the short-dated part of yield curves derived from yields on individual gilts, potentially giving misleading signals to those not close to the market about market expectations of the future path of official interest rates.

If a bond is thought to be trading at a lower yield than neighbouring bonds it is 'expensive' and traders will seek to sell it. If they already hold the bond, that selling would tend to drive the price down to its fair value. But if they do not hold the bond, as is typically true, for example, of market makers and hedge funds, they must borrow it in order to sell it. Bonds can be borrowed through the repo market: one counterparty borrows the bond from the other in exchange for a cash loan. The interest rate at which the cash is lent is the price of the repo, and if the particular bond is in great demand, this rate can be quite low. The bond would then be said to be 'tight' or 'special' in the repo market, and the additional cost of selling a bond short has to be balanced against any possible returns from a subsequent fall in its price (rise in its yield).

So asking why a bond is expensive is often equivalent to asking why a particular bond's repo rate is low. The low repo rate will usually reflect holders requiring an additional return before they will increase their lending in response to a rise in demand to borrow the bond, which could occur for a number of reasons, including:

- The bond being deliverable into a futures contract. Especially if it is cheapest to deliver, many players may wish to borrow the bond to deliver it.
- There being an auction or other new issuance of that bond, prompting market makers to sell the bond short in advance, with the intention of repurchasing it more cheaply at the auction.
- There being an issue of corporate debt at a certain spread above a particular gilt, prompting market participants to hedge the interest rate risk on the corporate bond by selling the gilt.
- Intermediaries short of a stock needing to borrow it in order to meet an increase in investor demand for this stock in the secondary market.

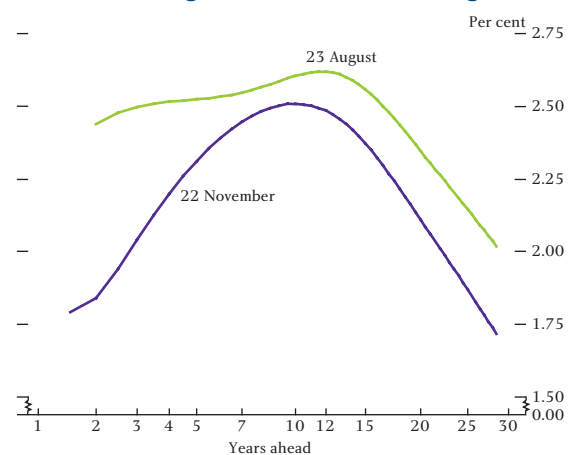
inflation rates were lower at the end of the period, and more so at both short and long horizons (Chart 8). According to market contacts, movements in real yields over the period were influenced by changing investor assessments of expected real returns on equities and of the additional real returns required on equities compared to index-linked gilts to compensate investors for bearing equity risk (the so-called 'equity risk premium').

### Sterling market liquidity and issuance

Liquidity in the conventional gilt market was reported to be good throughout the period, with high turnover in gilts, particularly in October.<sup>(1)</sup>

In the gilt repo market, average daily turnover by value increased in the quarter to end-August 2002, according to the Bank's quarterly survey (Table B). The breakdown

**Chart 8**  
Forward sterling inflation derived from gilts<sup>(a)</sup>



(a) One-year forward rates derived from the Bank's government liability curve.

by maturity remained broadly consistent with previous quarters, with the majority of activity at 'on call and next day'. Market contacts reported that liquidity at short

(1) Based on trades reported to the London Stock Exchange.

**Table B**  
**Turnover of money market instruments**

Average daily amount, £ billions

	2001				2002		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Short sterling futures (a)	60.0	66.0	71.5	69.6	74.1	69.9	66.3
Gilt repo (b)	15.7	17.9	18.2	20.0	21.3	26.6	28.1
Interbank (overnight) (c)	10.3	11.1	9.5	10.8	12.4	12.4	12.5
CDs, bank bills and Treasury bills	11.8	12.4	11.4	11.7	10.5	11.1	10.6

Sources: LIFFE, Bank of England, Wholesale Markets Brokers' Association (WMBA) and CRESTCo.

- (a) Sum of all extant contracts, converted to equivalent nominal amount.  
 (b) Quarters are to end-February (Q1), end-May (Q2), end-August (Q3) and end-November (Q4).  
 (c) These figures are based on all unsecured sterling overnight cash transactions brokered in London as reported to the WMBA and used to calculate the SONIA fixing. They do not include transactions made bilaterally between money market participants, and so may understate actual turnover significantly.

maturities deepened further following the clearing of gilt repo trades by the London Clearing House (RepoClear), which began in August.<sup>(1)</sup> There also seems to be a belief that further improvement might follow if clearing was extended to repos of baskets of gilts selected using the 'delivery-by-value' facility in CREST.<sup>(2)</sup> The quite sharp fall of reported gilt repo outstanding in 2002 Q3 (Table C) is puzzling. It is not easy to reconcile this with higher gilt repo turnover and reports from market contacts. One possibility is that survey responses were affected by the introduction of RepoClear.

While slightly lower than in the previous quarter, short sterling futures volumes remained broadly in line with those in recent years (Table B and Chart 9). Implied interest rates from short sterling contracts continued to be more volatile than those from Libor fixings, and at times by a larger margin than had previously been typical. The increase in the volatility of implied interest rates from futures is consistent with high-frequency traders increasingly using exchange-traded derivatives rather than cash markets for speculation and hedging.

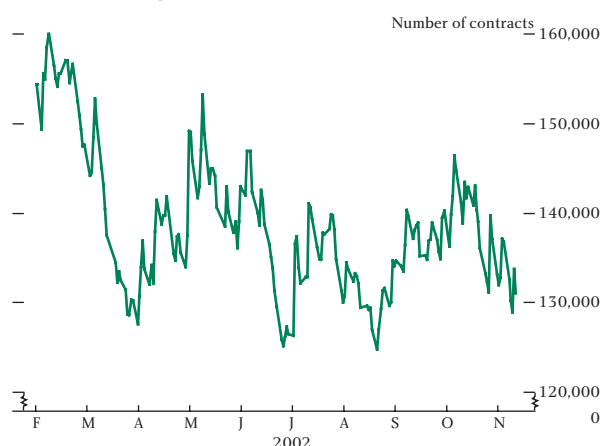
**Table C**  
**Sterling money markets**

Amounts outstanding: £ billions

		Interbank (a)	CDs (a)	Gilt repo (b)	Stock lending (b)	Eligible bills (a)	Commercial paper (a)	Other (c)	Total
2000	Q1	156	132	100	51	14	15	6	474
	Q2	159	135	124	54	12	16	7	507
	Q3	162	125	127	53	12	16	7	502
	Q4	151	130	128	62	11	18	9	509
2001	Q1	171	141	126	67	13	19	7	544
	Q2	177	131	128	67	12	22	6	543
	Q3	187	134	144	52	11	21	6	555
	Q4	185	131	130	48	11	20	16	541
2002	Q1	190	139	134	66	11	22	14	576
	Q2	229	130	148	46	11	26	20	611
	Q3	241	138	114	48	11	27	22	601

- (a) Reporting dates are end-quarters.  
 (b) Reporting dates are end-February for Q1, end-May for Q2, end-August for Q3, end-November for Q4.  
 (c) Including Treasury bills, sell/buy-backs and local authority bills.

**Chart 9**  
**Short sterling volumes<sup>(a)</sup>**



Sources: LIFFE, Bank calculations.

- (a) Twenty-day moving averages.

Market contacts have suggested that some firms reacted to high price volatility by requiring traders to close out loss-making positions more quickly, setting so-called 'stop-loss' limits closer to current market levels.

In contrast to short sterling futures, market contacts reported lower liquidity in the market for bank certificates of deposit (CDs). There was a reduction in the turnover of CDs, bank bills and Treasury bills during 2002 Q3 (Table B).

Sterling CD issuance this year has been broadly unchanged from 2001 levels. By contrast, interbank deposits have continued to grow rapidly (Table C). Anecdotally, the relative growth of interbank deposits has reflected an increasing weight of money market activity in the overnight market or at very short maturities. Consistent with this, the sterling net wholesale liabilities becoming due over the next five days

(1) See *Quarterly Bulletin*, Autumn 2002, page 258, and 'Strengthening financial infrastructure', *Financial Stability Review*, December 2002.

(2) CREST's delivery-by-value functionality enables members to give and receive centrally selected bundles of securities meeting defined criteria as collateral within CREST, usually against the creation of a corresponding CREST payment.

of the major UK-owned banks increased significantly in the month to mid-September and remained broadly at this level in the month to mid-October, although these data are volatile. Demand for longer-maturity money market assets was said to have fallen a little, reflecting the relative flatness of the money market yield curve and, to varying degrees over the period, continuing perceptions of significant interest rate risk. Contacts also linked the increase in short-term interbank deposits to, at times, significant increases in deposits by institutional investors seeking a safe haven from volatile equity markets (although non-bank financial institutions' sterling deposits with banks increased by only around £3 billion over 2002 Q3 as a whole, so that the anecdotal evidence is difficult to assess).

Though issuance of CDs has been flat, some UK banks have reported increased investor demand for medium-term notes, which represent an alternative source of funds. In particular, institutional investors, primarily overseas, are said to have bought structured notes, in which the investor effectively writes an interest rate option or options to the issuer in return for an above-par coupon.

Money market activity may also have been affected by changing perceptions of financial sector robustness, particularly during September when equity markets were falling. Some market participants were reassessing, and in some cases reducing, the size of limits, both to counterparties and to geographical concentrations of counterparties. For much of the period, the interest rate differential between government bond repo and unsecured interbank deposits—one indicator of perceived bank credit risk in money markets—widened in sterling, although it subsequently narrowed, ending the period little changed. In the past, this gap has generally been wider in sterling than in euro, but the differential between the two narrowed during the quarter, perhaps reflecting a marginally greater increase in credit concerns among market participants about banks more active in the euro area (Chart 10). However, these interest rate spreads have remained narrow compared with those prevailing in the Autumn of 1998 or in late 1999, when they reached over 50 basis points in sterling markets.

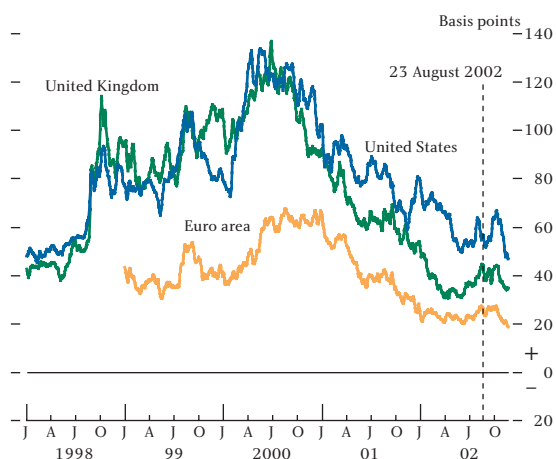
The yield differential between conventional gilts and sterling interest rate swaps—one possible measure of perceived bank credit risk at longer maturities—also

**Chart 10**  
Spread of three-month interbank rates over general collateral government bond repo rates



Sources: BBA and EBF.

**Chart 11**  
Ten-year swap spreads<sup>(a)</sup>



Source: Bloomberg.

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

widened in the early part of the period, though it too remained significantly below levels in 1999 and 2000 (Chart 11). Contacts again attributed the change to greater credit concerns amongst financial intermediaries. Widening spreads may have encouraged sterling fixed-rate issuance by various AAA-rated supranational and government-backed issuers, which often swap their fixed-rate sterling debt to a floating-rate obligation, in sterling or other currencies. Such demand to receive fixed in swaps, together with some reduction in credit concerns in financial markets, may help to explain the narrowing of spreads in the second half of the period.

Total sterling-denominated non-government bond issuance in 2002 Q3 was lower than in 2002 Q2 and

**Table D**  
**Sterling bond issuance in 2002 Q3**

**DMO gilt auctions** (£ millions)

Conventional	Date	Amount issued	Stock
	24.07.02	2,750	5% Treasury Stock 2014
Index-linked	Date	Amount issued	Stock
	10.07.02	950	2% Index-linked Stock 2035
	25.09.02	900 (a)	2% Index-linked Stock 2035

**Corporate issuance**

	Number of issues	Amount (£ billions)	By credit rating:			
			AAA	AA	A	BBB and lower
<b>Fixed-rate issues</b>						
UK corporates	17	3.3	1.1	0.5	0.8	0.9
UK financials	14	2.4	0.0	1.1	0.8	0.6
Supranationals	9	1.1	1.1	0.0	0.0	0.0
Overseas borrowers	18	2.8	1.3	0.4	1.2	0.0
<b>Total (b)</b>	<b>58</b>	<b>9.6</b>	<b>3.5</b>	<b>1.9</b>	<b>2.7</b>	<b>1.5</b>
<b>FRNs</b>						
UK corporates	9	1.1	0.3	0.0	0.4	0.5
UK financials	23	2.5	1.2	0.3	0.6	0.4
Supranationals	0	0.0	0.0	0.0	0.0	0.0
Overseas borrowers	31	2.0	0.4	0.7	0.8	0.0
<b>Total (b)</b>	<b>63</b>	<b>5.6</b>	<b>1.9</b>	<b>0.9</b>	<b>1.8</b>	<b>0.9</b>

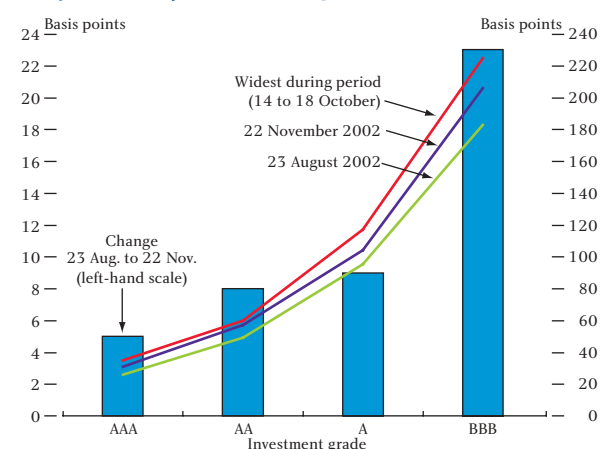
Sources: Bank of England, Debt Management Office, Moody's and Standard and Poor's.

(a) £826 million nominal sold to market, £74 million nominal held in official portfolios. £74 million rump stock subsequently sold to market on 14 November.

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

roughly the same as in 2001 Q3 (Table D). The fall was attributed by market contacts to lower investor demand for the debt of less creditworthy issuers, such as those rated single A or below. A number of lower-rated issues were withdrawn or postponed, mainly by foreign companies. In August, in particular, the bond market in sterling (as well as in other currencies) was effectively closed for all but the most creditworthy issuers. The market reopened subsequently, but investors seem to have remained selective in their willingness to take credit risk, often preferring supranational and asset-backed bonds and, for corporate borrowers, placing emphasis on transparency of management information

**Chart 12**  
**Spreads of sterling corporate bond yields over swap rates, by credit rating**



Source: Merrill Lynch.

and accounts and on an established position in more stable industries. For some companies in certain sectors, such as telecoms, media, energy and insurance, issuance remained difficult, although conditions appeared to ease towards the end of the period.

Consistent with increased sensitivity towards credit risk among investors, spreads of sterling corporate bond yields over swap rates generally widened over the period as a whole, and by more for lower-rated investment-grade bonds (Chart 12). This was most marked in particular industries, including autos and insurance. As credit concerns eased later in the period, spreads fell from the widest levels reached in October.

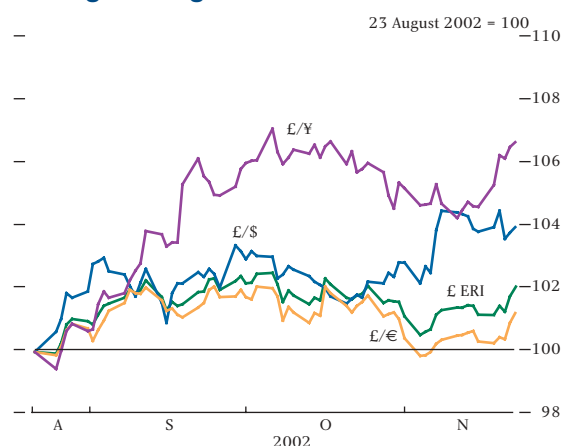
### Sterling exchange rates

Between 23 August and 22 November, sterling appreciated by 1.2% against the euro, 4.0% against the dollar and 6.7% against the yen. Sterling's effective exchange rate index (ERI) increased by 2.0% (Chart 13).

Changes in the dollar-sterling and euro-sterling exchange rates were broadly consistent with relative movements in interest rates (see also Chart 7). Table E illustrates a decomposition of exchange rate movements according to the uncovered interest parity condition, which seeks to identify the role of interest rate news in explaining exchange rate moves.<sup>(1)</sup> Interest rate news

(1) The method of decomposing the uncovered interest parity condition to assess the impact of interest rate news on the exchange rate is explained in Brigden, A. Martin, B and Salmon, C (1997), 'Decomposing exchange rate movements according to the uncovered interest rate parity condition', *Bank of England Quarterly Bulletin*, November, pages 377–89.

**Chart 13**  
Sterling exchange rates



**Table E**  
Exchange rate movements and interest rate news:  
23 August to 22 November<sup>(a)</sup>

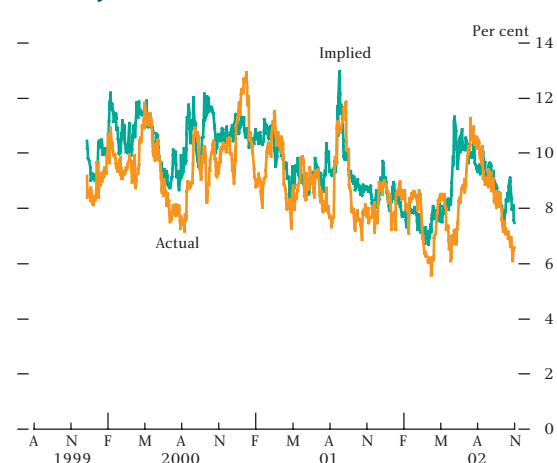
	Sterling ERI	Euro-sterling	Dollar-sterling
[A] Actual change (per cent)	2.0	1.2	4.0
[B] Interest rate news (percentage points)	0.4	0.7	0.8
of which [C] domestic	-1.8	-1.8	-1.8
[D] foreign	2.2	2.4	2.5

(a) [B] = [C] + [D]. Components may not sum exactly due to rounding. Interest rate calculations use the Bank's government liability curve. For details, see Chart 2.

here is measured as the cumulative expected return on a ten-year government bond over a ten-year horizon. In the United States and the euro area, this measure fell by more than in the United Kingdom, consistent with the direction, but not the size, of the changes in the dollar-sterling and euro-sterling exchange rates. The effect of movements in interest rates was most marked in November when the FOMC cut the fed funds target rate but the MPC and the ECB kept policy rates unchanged. Both sterling and the euro appreciated sharply against the dollar in the following days.

The high levels of volatility in international equity and interest rate markets were not matched in currency markets. Between 23 August and the end of October, actual one-month volatilities<sup>(a)</sup> for an average of the five most traded currency pairs against the US dollar<sup>(1)</sup> fell back towards the historical lows reached in March this year (Chart 14), and implied volatilities at one-month and longer horizons also fell. Most market participants reportedly had little appetite for taking directional speculative positions, or for hedging themselves against particular directional moves, partly because of uncertainty about the consequences of a possible war with Iraq. This was reflected in the level of risk-reversals:

**Chart 14**  
One-month implied and actual exchange rate volatility<sup>(a)</sup>



(a) For an average of the five most traded currency pairs against the US dollar.

at the end of October, risk-reversals were close to zero for most major currency pairs.<sup>(2)</sup> The depreciation of the dollar in early November was accompanied by a brief rise in implied volatilities, but they ended the period close to historically low levels.

In an environment of low and apparently falling volatility, contacts reported interest in investing in currencies that offered a higher yield—so-called 'carry trades'. The Norwegian krone was said to be the most popular of these currencies, with a short-term interest differential of more than 500 basis points over the US dollar, and it was also viewed positively as offering a hedge against rising oil prices. On 17 October the Norges Bank Governor publicly cautioned that, as Norwegian money market liquidity is not high, the 'exit' from such positions could prove disorderly should carry-trade players decide to close their positions simultaneously. Other currencies that have risen on the back of positive carry were said to have been the Australian and New Zealand dollars, and the Swedish krone. The prevalence of model-based trading—where a simple 'carry' calculation is often a key component—may have encouraged such trades.

Some market participants have ascribed sterling's 2% appreciation—at least in part—to similar factors, with some also referring to the United Kingdom being a net oil exporter. But sterling money market yields were around the average of G10 yields.

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

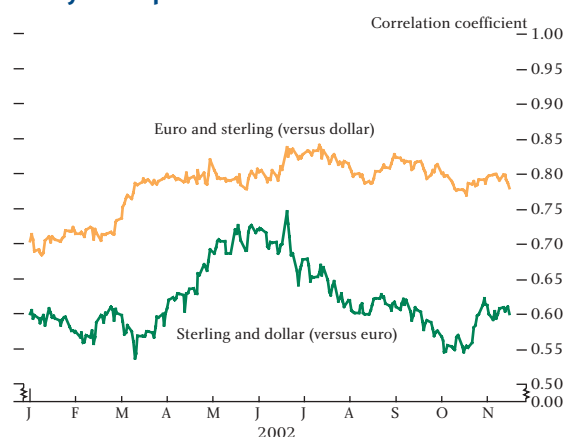
(2) The risk-reversal is the difference in price between a 25-delta call option and a 25-delta put option. It is interpreted by some traders as a measure of market sentiment towards a particular currency relative to another currency.



Another possible explanation might be changes in market perceptions of the United Kingdom's relative short-term growth prospects. Between August and November, *Consensus* growth forecasts for the United Kingdom for 2003 were scaled down by 0.2 percentage points, compared with 0.8 percentage points for the euro area and 0.4 percentage points for the United States, and one-year ahead forecasts for sterling against the dollar and the euro were revised up.

Sterling has also been seen as somewhat independent from the US dollar and the euro and this is to some extent reflected in implied correlations, derived from options prices, of sterling with the dollar and the euro (Chart 15).<sup>(1)</sup> The one-year implied correlation of sterling with the dollar (against the euro) fell close to its lowest level since June 1999 at the end of October, but subsequently increased to end the period broadly unchanged (Chart 15). The implied correlation of sterling with the euro (based on exchange rate movements against the dollar) remained little changed.

**Chart 15**  
One-year implied correlations



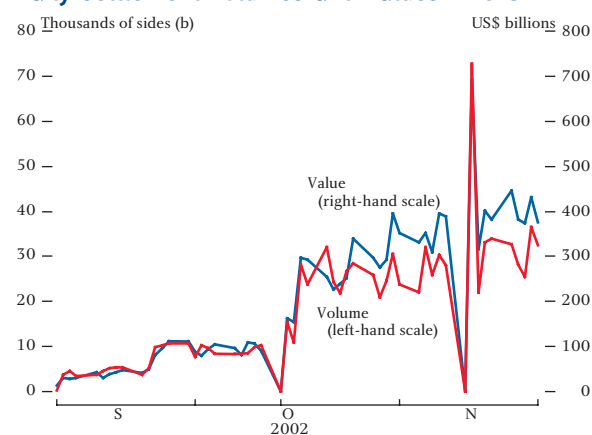
## Developments in market structure

The past few months have seen further important developments in settlement arrangements for transactions in foreign exchange and UK securities, as well as work on contingency planning for London's markets.

## Continuous Linked Settlement (CLS)

As described in the Autumn *Quarterly Bulletin*, CLS Bank International (CLSB) began live operations on 9 September 2002, settling foreign exchange transactions in seven major currencies, including sterling.<sup>(2)</sup> Since then, values<sup>(3)</sup> settling through CLS have risen sharply (Chart 16).

**Chart 16**  
Daily settlement volumes and values in CLS<sup>(a)</sup>



Source: CLS Bank International.

- (a) 14 October and 11 November were both US holidays, which accounts for the very low level of trades settled on those days.  
(b) Each trade consists of two sides; see footnote 3 of this page.

CLSB initially placed some controls on participants in CLS in order to limit the impact of any problems during the first few weeks. These restrictions were removed on 14 October, which partly accounts for the large increase shortly thereafter (Chart 16). Since 17 October, sterling has accounted for around 12%<sup>(4)</sup> of the value of trades settled through CLS, similar to the Japanese yen. In comparison, the euro accounted for around a quarter of the value of trades and the US dollar for around a half. Over the same period, the average daily value settled through CLSB has been \$339 billion. Comparing this with the Bank for International Settlements' (BIS) 2001 triennial survey of foreign exchange and over-the-counter (OTC) derivatives suggests that CLS may already settle around a quarter of the value of foreign exchange transactions undertaken by major banks, which would be a significant reduction of foreign exchange settlement risk in a short period of time.<sup>(5)</sup> By way of comparison, in October the sterling equivalent of

(1) For a discussion of implied correlations, see Butler, C and Cooper, N (1997), 'Implied exchange rate correlations and market perceptions of European Monetary Union', *Bank of England Quarterly Bulletin*, November, pages 413–23.

(2) 'Markets and operations', *Bank of England Quarterly Bulletin*, Autumn 2002, pages 257–58.

(3) Each trade consists of two sides and is recorded as such by CLSB. For example, the sale of \$15 million for £10 million would, in US dollar terms, equate to two sides with a combined value of around \$30 million.

(4) Since each trade consists of two sides, any one currency can account for a maximum of 50% of the overall value settled through CLS. The figure in the text is approximate, since it is not possible exactly to convert the values traded into a common currency.

(5) The latest (April 2001) BIS survey reported the average daily foreign exchange turnover of the largest market participants ('reporting dealers')—which includes all those currently settling trades through CLS—to be \$689 billion in April 2001. However, CLSB data show both sides to a foreign exchange trade, whereas the BIS data are adjusted to show one leg of the trade only. Therefore to compare the two sets of data, it is necessary to halve the CLSB data.

around \$330 billion was settled each day on average through CHAPS RTGS Sterling,<sup>(1)</sup> and the comparable figure for CHIPS and Fedwire's fund transfers combined during 2002 H1 was \$2,833 billion.<sup>(2)</sup>

Third-party settlement began on 4 November. This permits customers (the third parties) to submit trades to their CLS settlement members, who then settle the trades through CLS. The impact of this change on total volumes settling through CLSB has been small so far, as few such third parties have chosen to begin settling trades in this way immediately—anecdote suggests that many are waiting until the beginning of 2003.

Participating banks have been required to modify their intraday liquidity management to meet CLSB's payment deadlines. The Bank has been monitoring this. So far contacts have not reported consequent liquidity pressures in sterling payment systems or money markets.

### Contingency planning in London markets

CLS is designed to reduce counterparty risk in foreign exchange settlement, so underpinning the financial system's resilience. As such, it is an important part of the financial infrastructure. The events of 11 September 2001 highlighted the operational challenges that can arise if infrastructure is significantly disrupted. Since then, the UK financial sector authorities—HM Treasury, the Bank of England and the Financial Services Authority (FSA)—have established a resilience and continuity subgroup of the tripartite Standing Committee<sup>(3)</sup> to coordinate the work of the authorities and other collective bodies for the UK financial sector.<sup>(4)</sup> Strands of work have included: development of emergency contact databases; the assessment of financial firms' business contingency plans; and, in association with other groups, the establishment of a working group to review the resilience of financial sector telecoms; and work on the physical infrastructure.

In the same vein, the Sterling Money Markets Liaison Group (MMLG), chaired by the Bank, has been considering how to respond to any widespread

disruption in the sterling money markets. In the event of such disruption, there may well be unexpected overdrafts and credit balances. A subgroup of the MMLG has, therefore, considered at what rate such unintended overdrafts and balances should be charged or remunerated, its recommendations being accepted by MMLG.

MMLG has recommended use of the Bank's official repo rate, which has the advantages of neutrality, of being known to all in the market, and hence of giving rapid certainty and transparency. Nonetheless, consistent with paragraph 106 of the Non-Investment Products Code,<sup>(5)</sup> the Bank would continue to have discretion to determine and publish a rate following a market-wide event of this kind, taking account of the particular circumstances. The subgroup's report and recommendations were published in October 2002 and are annexed to this article.

The Foreign Exchange Joint Standing Committee, also chaired by the Bank, has created an operations subgroup to focus specifically on technical operational issues within the foreign exchange and international money markets, including contingency planning.

### Securities lending and short selling

Another market committee chaired by the Bank is the Stock Lending and Repo Committee (SLRC). Over the past year, it has discussed the relationship between securities lending and short selling, including the merits of greater transparency in these markets.<sup>(6)</sup>

Short selling is the sale of an asset, say an equity or bond, by a trader who does not own it. In order to meet their delivery obligation, the trader has to borrow the asset through the stock borrowing or repo markets. The SLRC, which guides markets standards and practices in the UK stock borrowing market, has therefore contributed to the debate about whether greater transparency in this market would provide a useful window on short selling. On 21 October the FSA published a discussion paper seeking views on possible

(1) The Clearing House Automated Payment System (CHAPS) is the United Kingdom's interbank payment system for high-value wholesale payments. It is a real time gross settlement (RTGS) system.

(2) CHIPS is the Clearing House Inter-Bank Payments System. Fedwire data are for 2002 H1. CHIPS data for 2002 year to 1 November.

(3) As described in the 1997 Memorandum of Understanding between HM Treasury, the Bank of England and the FSA, the Standing Committee meets on a monthly basis to discuss individual cases of significance and other developments relevant to financial stability. Meetings can be called at other times by one of the participating institutions if it considers there to be an issue which needs to be addressed urgently. See [www.bankofengland.co.uk/financialstability/mou.htm](http://www.bankofengland.co.uk/financialstability/mou.htm)

(4) These initiatives are described on the web site, [www.financialsectorcontinuity.gov.uk](http://www.financialsectorcontinuity.gov.uk)

(5) Available at [www.bankofengland.co.uk/markets/nipscode.pdf](http://www.bankofengland.co.uk/markets/nipscode.pdf)

(6) The minutes of the SLRC are published on the Bank's web site: [www.bankofengland.co.uk/markets/](http://www.bankofengland.co.uk/markets/)

**Table F**  
**Euroclear/CRESTCo merger settlement details<sup>(a)</sup>**

	Euroclear	CRESTCo	New Group
Value of securities	€130,000 bn £81,000 bn	€96,400 bn £59,900 bn	€226,000 bn £141,000 bn
Number of (pre-netted) transactions settled	161 million	74 million	235 million
Number of (netted) transactions settled	47 million	74 million	121 million
Securities held in custody	€7,900 bn £4,800 bn	€2,900 bn £1,800 bn	€10,700 bn £6,600 bn
Coverage of European equity market (Eurotop 500)			60%
Coverage of European domestic fixed-income securities outstanding			52%
Number of eligible securities	208,000	16,000	215,000
Number of domestic market links	32	3	32
Number of settlement currencies	32	3	32

Sources: Euroclear and CRESTCo.

(a) Based on year-end 2001 data.

options for increased disclosure of short selling or securities lending.<sup>(1)</sup> Neither the FSA's paper nor the SLRC have seen any case for applying constraints on, or further regulation of, short selling in the United Kingdom. However, the FSA suggested various means by which the transparency of short selling could be increased. One of these would be through publication of additional statistics on stock borrowing levels in individual UK equities and gilts by CRESTCo, which might provide a proxy for short selling activity. The deadline for comments on the FSA paper is 31 January 2003.

### Merger of CREST and Euroclear

On 4 July the Boards of Euroclear and CRESTCo announced a merger proposal and, following shareholder and regulatory approval, CRESTCo became a wholly owned subsidiary of Euroclear plc on 23 September, with CRESTCo shareholders receiving a 19% stake. CRESTCo will become part of Euroclear Bank SA/NV in due course.

The new Euroclear Group provides settlement services for Belgian, Dutch, French, Irish and UK securities, as well as international bonds and a broad range of other securities (Table F).

It is intended that the Group will integrate Euroclear Bank, CREST and the other national settlement platforms into a single settlement system. By 2005, the Group aims to incorporate core functions only of each legacy system, which users will initially be able to access via existing interfaces. Customers will continue to have a

choice as to the jurisdiction under which they hold securities, but in functional terms all customers will have a single securities account number for their holdings. A second phase is intended to deliver a common interface to the single settlement system and to provide various additional optional services such as custody, tri-party repo and securities lending and borrowing by 2008. Customers will be able to choose between payment in 'commercial bank money' balances (for example across the books of Euroclear Bank or of other banks) or in 'central bank money' (either directly or, as in the current CREST model, through a range of commercial settlement banks, which in turn settle in central bank—in the case of CREST, Bank of England—money). The precise details will be important to the nature and extent of payment system risk entailed in settling trades in the markets that Euroclear serves.

### Reform of settlement of money market instruments

A range of money market instruments—certificates of deposit (CDs),<sup>(2)</sup> Treasury bills, commercial paper and bankers' acceptances—are still paper instruments, 'immobilised' in a depository at the Bank of England, with transfers effected by book-entries in the Central Moneymarkets Office (CMO) system, which is owned by CRESTCo. Moving to delivery-versus-payment (DVP) has for some time been on the agenda of the UK authorities for improving the safety and soundness of the UK payment and settlement systems. Unlike the CREST settlement system, CMO does not offer DVP, entailing potentially large intraday settlement exposures amongst CMO members.

Work is now progressing to enable money market instruments to be issued in non-material form and settled in the CREST system from the second half of 2003, with title evidenced by names on an electronic register (as is currently the case for gilts and corporate securities). The aim is for dematerialised equivalents of money market instruments—called eligible debt securities (EDSs)—to be issued into CREST from Summer 2003. This requires legislative amendment to the Uncertificated Securities Regulations 2001 and the amendment of legislation relating to Treasury and local authority bills. HM Treasury's aim is to have the legislation in force by mid-2003, so that the issuance of non-material securities into CREST can begin from 2003 H2. These proposals are discussed in HM Treasury's consultation document 'Modernising the settlement of money market instruments' of September 2002.

(1) Available at [www.fsa.gov.uk/pubs/discussion/17/](http://www.fsa.gov.uk/pubs/discussion/17/)

(2) Although most CDs are already dematerialised in this system by deed of covenant and contractual arrangement.

The Bank's and CRESTCo's consultations in 1999–2000 set the general shape of the changes to CREST necessary to support the issuance and redemption of EDSs and improved collateral management facilities. This work has been followed up with more recent discussions with the market, and CRESTCo published a response to these consultations in October.<sup>(1)</sup> More work on the transitional arrangements continues.

It will be necessary for issuers of EDSs to produce terms of issuance in order to constitute the securities and to enable them to be issued into CREST. The Bank has been working on a set of standard terms with a subgroup of the MMLG and its legal advisers, and draft terms of issuance and draft explanatory notes were published on 22 November 2002.<sup>(2)</sup> Comment is requested by 20 December, and a second stage of consultation is expected in January or February 2003. The aim is to reach a market consensus by March 2003, so that issuers, issuing and paying agents, and investors can be familiar with the documentation in good time before issuance of EDSs is due to begin in late Summer 2003.

Dematerialisation will enable money market securities to be issued as fungible securities; and to be settled in real time with delivery-versus-payment, eliminating the current settlement exposures among CMO members. This would complete the programme of work, begun in the early 1990s, to reduce intraday settlement risk in the UK payment and settlement systems by introducing real-time gross settlement and DVP in central bank money.

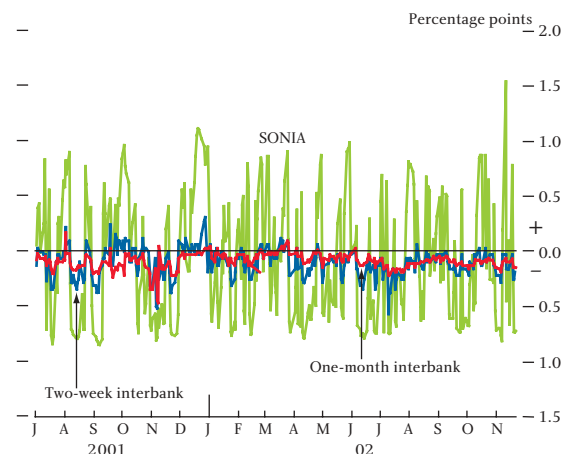
## Bank of England official operations

Over the review period, spreads of one-month CD, interbank and general collateral repo rates averaged 12, 10 and 18 basis points below the Bank of England's official repo rate respectively, compared with 11, 8 and 17 basis points in the year to 23 August. Two-week general collateral repo rates averaged 15 basis points below the Bank's repo rate compared with 16 basis points in the year to 23 August.

Overnight cash rates remained almost entirely within the  $\pm 100$  basis points range around the official repo rate determined by the Bank's collateralised overnight lending and deposit facilities. The average spread

between the Sterling Overnight Index Average (SONIA) and the Bank's repo rate was plus 14 basis points in August, minus 13 basis points in September, plus 9 basis points in October and minus 37 basis points from 1 to 22 November (Chart 17).<sup>(3)</sup>

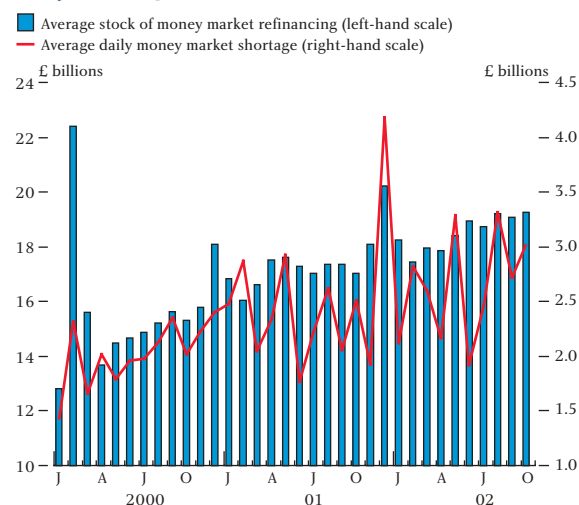
**Chart 17**  
Spread of SONIA, two-week and one-month interbank rates over the Bank's repo rate



## Open market operations

The stock of money market refinancing held on the Bank's balance sheet (which comprises the short-term assets acquired via the Bank's open market operations (OMOs)) averaged £19.2 billion in the three months to end-October (Chart 18). This was slightly higher than in the previous three-month period, consistent with the underlying growth of notes in circulation.

**Chart 18**  
Stock of money market refinancing and daily shortages



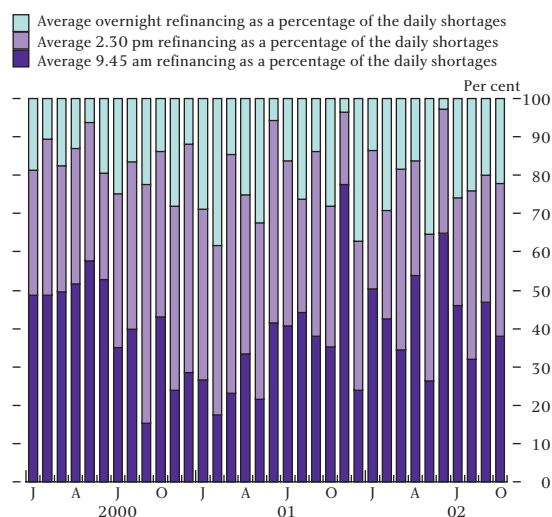
(1) *Money market instruments in CREST: consultation response*. CRESTCo also recently published an *Enhancing CREST white book—extending repo facilities in CREST* and a further *Enhancing CREST white book—money market instruments in CREST*.

(2) Available at [www.bankofengland.co.uk/markets/money/eligibledebt.pdf](http://www.bankofengland.co.uk/markets/money/eligibledebt.pdf)

(3) See also the article 'Money market operations and volatility in UK money market rates', pages 420–29 of this *Bulletin*.

During August, September and October counterparties chose to refinance 78% of the daily money market shortages at the 9.45 am and 2.30 pm rounds of operations (which largely have a two-week maturity) and 22% in the late rounds of operations, on an overnight basis (see Chart 19). As a result of the higher proportion of overnight lending, the rate of turnover of the Bank's stock of refinancing increased to once every 6.3 days (from once every 7.2 days during the previous three-month period and an average of 8.3 days since the reformed system was introduced in 1997); and the average daily money market shortage increased to just over £3 billion in the three months to end-October (Table G).

**Chart 19**  
Refinancing provided in the Bank's open market operations



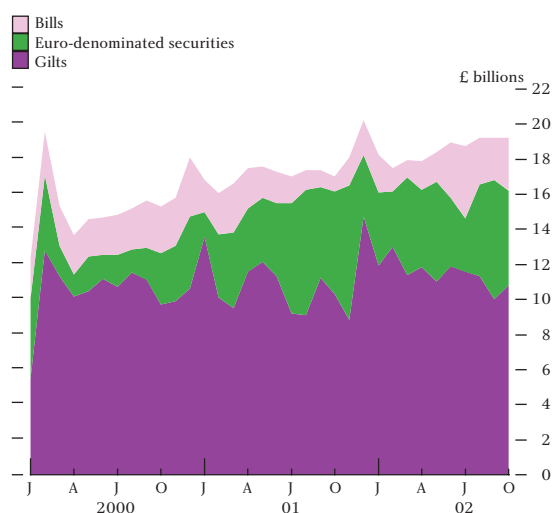
**Table G**  
Average daily money market shortages

£ billions		
1998	Year	1.42
1999	Year	1.20
2000	Year	2.02
2001	Year	2.48
2002	Q1	2.50
	Q2	2.50
	July	2.46
	August	3.32
	September	2.72
	October	3.00

Compared with the previous three-month period, gilts accounted for a lower proportion of the stock of collateral taken by the Bank in its OMOs in the three months to end-October, with euro-denominated securities (issued by EEA governments and supranational bodies) increasing (Chart 20).

Counterparties placed money with the Bank, under the terms of the Bank's 3.30 pm deposit facility, on three

**Chart 20**  
Instruments used as OMO collateral



occasions during the three-month period. In order to leave the market square by close of business, the Bank increased the amount of refinancing available at the 4.20 pm late repo facility by the size of the deposits and, on each occasion, the settlement banks borrowed the full amount of refinancing available. The Bank continues to keep under review the operation of this still relatively new deposit facility, which so far has fulfilled its objective of providing a floor to the interbank overnight money market rate, and consequently other short-dated market interest rates.

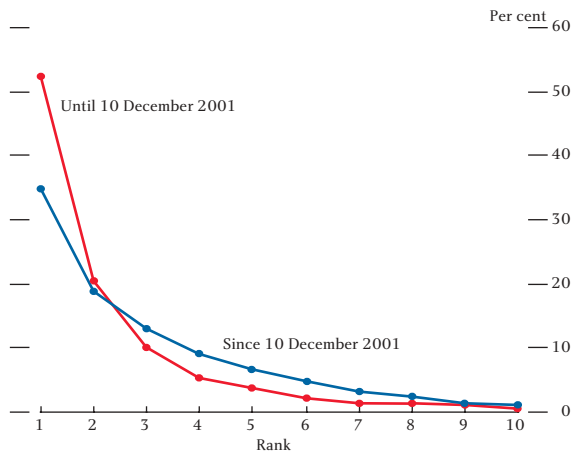
The Bank used foreign exchange swaps to lend a total of £1 billion against US dollars on 3 and 4 October, maturing on 8 and 9 October, in order to help smooth the pattern of future daily liquidity shortages.

The number of counterparties in the Bank's regular OMOs increased during the period from 17 to 18.

In its OMOs the Bank reserves the right to scale down its allotment of funds to individual counterparties. Such action may be taken to reduce what the Bank considers to be an undue concentration of its OMOs in the hands of one or more counterparties and so help ensure that access to sterling liquidity is available as smoothly as possible to a wide range of market participants. Since December 2001, the Bank has contacted individual counterparties in advance if, for this reason, they might be scaled down if they were to participate in its OMOs on the following day.

Chart 21 shows the change in concentration of counterparty shares of the stock of the Bank's refinancing since this change in December 2001. The

**Chart 21**  
**Median share of the stock of refinancing by rank**



red dots show the median shares of counterparties with the *n*th largest share of the stock on each day over the period leading up to 10 December 2001. The median share of the largest counterparty on each day over this period was around a half of the stock. The blue dots show the same information for the period since

10 December 2001. The median share of the largest counterparty over this period has fallen to just over a third and the shares of the third to eighth largest counterparties have increased correspondingly. So the concentration across counterparties of the stock of refinancing has declined somewhat.

**Bank of England euro issues**

The Bank of England continued to hold regular monthly auctions of euro bills during the period. Each month €900 million of bills were auctioned, comprising €600 million of three-month and €300 million of six-month Bank of England euro bills. The stock of euro bills outstanding on 22 November was €3.6 billion. The auctions continued to be oversubscribed, with the issues being covered an average of 6.9 times the amount on offer; bids were accepted at average yields of between Euribor minus 10.4 and 17.2 basis points.

The Bank of England did not issue any euro notes during the period under review.

## Annex

### Sterling Money Markets Liaison Group Contingency Planning Rates Subgroup

#### Terms of reference

1. The subgroup had the following terms of reference:

‘To propose to MMLG non-binding guidelines for the interest rates that might be applied to unexpected long and short balances in the event of major market disruption or infrastructure failure.

The proposals might be in the form of various options with pros and cons in different circumstances.

The subgroup might helpfully review practice in other markets and note relevant past events in the sterling market.’

#### Background

2. Previous disruptions in UK markets included the 1987 hurricane and a Central Gilts Office interruption in early 1990. On both those occasions a rate which was in practice equal to the official policy rate had been recommended for application to consequential overdrafts and credit balances. A more recent occasion in April 2002 had been an interruption to settlement of deliveries-by-value in CREST, preventing settlement of some repo, but not unsecured, transactions. It was questionable whether this had been an event of sufficient scale to be covered by the subgroup’s terms of reference, but on that occasion the Bank of England had applied the day’s high and low to any settlement bank overdrafts and credit balances respectively.
3. On 11 September 2001, New York markets followed long-established New York Clearing House guidelines to apply the effective fed funds rate (plus an administration fee) for any displaced balances. In its operations the Fed switched from lending sufficient funds for banks to meet reserve balance targets to lending as much as counterparties wanted: for one week after the disaster, open market operations were in overnight repo. The Fed encouraged counterparties to make all their payments and give customers liquidity.

4. In the euro area the Federation Bancaire has agreed that EONIA +/- 25 basis points should be applied to compensation claims in respect of ordinary business. No such ground rules for compensation exist in sterling markets, but in any case the purpose of the subgroup was not to discuss undue enrichment in a day-to-day context.
5. In the Pan-EU TARGET system for euro payments a compensation scheme based on the ECB’s main refinancing rate has been in operation for use when payments remain unprocessed at the end of a business day because of a malfunction (for whatever reason) of a TARGET component. The scheme is based on the principle of no undue enrichment and is cost-neutral for national central banks. There are, however, current discussions as to whether the compensation rate should be based on a market rate such as EONIA.

#### Discussion

6. The consensus among subgroup members was that the approaches adopted in other international markets, although of interest, were probably of more relevance in their respective domestic contexts given different money market structures and operational techniques.
7. The subgroup considered a range of scenarios—an event causing physical or electronic disruption to a significant number of key market participants or infrastructure providers, a CREST problem, a CHAPS problem or a SWIFT problem. It concluded there need be no difference between the approach applied in these various possible situations—long and short positions would result because of an inability to complete the day’s business in one or more of the settlement and payment systems. The key point was that this should have market-wide consequences rather than affecting the business of one or two market participants only.
8. The view of the subgroup was that a single rate should be applied to both long and short positions arising from a large-scale disruption. Long and short positions arising from a disruption would not be deliberate, so any penalties would be arbitrary. It was also not obvious how a fair spread could be determined. The subgroup also saw no justification for the application of administration fees, it being unclear what the concept meant in

this context. And in any event administration costs tended to net out between parties.

9. The minutes of the subgroup's meeting<sup>(1)</sup> describe the various arguments for and against applying a rate based on what may have already taken place in the market prior to any disruption. In the event of a large-scale shock, it may prove to be impossible to establish any middle market rate which would be generally acceptable. The use of a SONIA-type average rate, reflecting business successfully conducted before the event, was considered but ruled out on the grounds that it was open to challenge and would probably take too long to determine, or perhaps not be possible to determine at all. The use of the previous day's SONIA was also considered, as was a long-run average of it, but these too were thought inappropriate. A rate based on quotes collected from a BBA-type panel of banks was another idea, but this also was thought to be likely to take too long and again be open to challenge. The prevailing Bank of England official repo rate was on the other hand neutral and, of course, known to all in the market. Use of the Bank's official repo rate would give rapid certainty and transparency.

### Recommendations

- Following an event causing market-wide disruption to settlement of sterling money market transactions, unintended long balances should be remunerated and unintended overdrafts charged at the current Bank of England official repo rate.
- The rate to be applied to balances should be the official repo rate most recently announced by the Bank of England's Monetary Policy Committee at the close of business on the day of a disruption, following any changes announced on that day.
- Transactions agreed before any disruption occurred, including on that day, should stand at the rates at which they were struck.
- Maturing transactions, if extended because of the inability to return funds, should run on at the Bank's repo rate, not the rate applicable to the original transaction.
- Notwithstanding the subgroup's recommendations and as reflected in the NIPS code, the Bank of England would continue to have discretion to determine and publish a rate following a market-wide event of this kind. It was important to retain this flexibility given the impossibility of forecasting the circumstances at the time.
- Members of the APACS End-Of-Day Transfer Scheme have agreed to use the rate of interest published by the Bank for loans between members on the day of a disruption.
- The Wholesale Markets Brokers' Association has agreed to use the rate of interest published by the Bank as the fixing of the Sterling Overnight Index Average (SONIA) on the day of a disruption.

October 2002

(1) Available at [www.bankofengland.co.uk/markets/mmlgj02sub.pdf](http://www.bankofengland.co.uk/markets/mmlgj02sub.pdf)