

Markets and operations

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

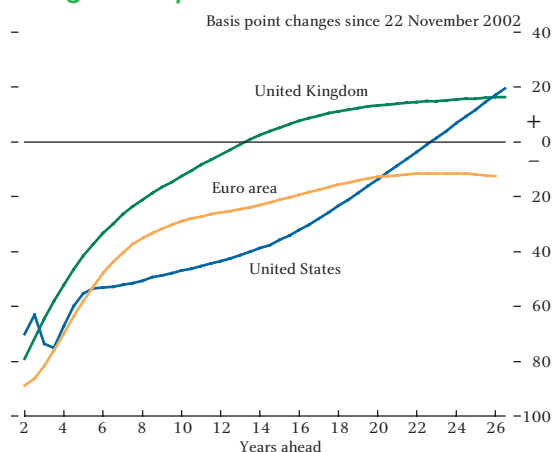
- Forward sterling interest rates over the next five years fell significantly as the yield curve steepened, and the sterling ERI declined to a four-year low.
- This was against a background of broadly similar declines in euro and US dollar interest rate expectations and falls in equity markets globally, consistent with reduced expectations for global economic growth over the next few years.
- But it is difficult to disentangle the financial market effects of uncertainties relating to a possible war with Iraq. Indicators of uncertainty in financial markets give a mixed picture.
- The value of trades, including in sterling, settling through Continuous Linked Settlement has continued to increase, further reducing settlement risk in the global foreign exchange market.
- Work continues to allow money market instruments to be dematerialised, and issued and settled in CREST from September 2003, with the Bank planning to publish finalised pro forma terms of issue for these securities in early summer.
- CRESTCo also plans to introduce a new mechanism for settlement of term general collateral repo transactions, which might bring a welcome reduction in intraday payment flows and exposures among settlement banks and their customers.
- The Bank increased the size of its euro note programme by issuing the first €1 billion tranche of a 2006 note at 7 basis points below the three-year swap rate.

Sterling markets

During the review period, the expected path of future sterling interest rates over the next few years, derived from market prices, declined materially (Charts 1 and 2). Broadly similar changes occurred in euro and US dollar markets, suggesting that the main underlying factors were international rather than specific to the United Kingdom.⁽²⁾

The Monetary Policy Committee (MPC) changed the Bank's repo rate once during the period, reducing it by 0.25 percentage points to 3.75% on 6 February (Chart 3). The Bank's repo rate had been 4% since 8 November 2001, the longest period of unchanged official UK interest rates since the period from February 1964 to June 1965. The rate reduction was followed by sharp falls in money market interest rates. Market participants reported that they had not anticipated a reduction until the second quarter of the

Chart 1
Changes in implied forward rates^(a)



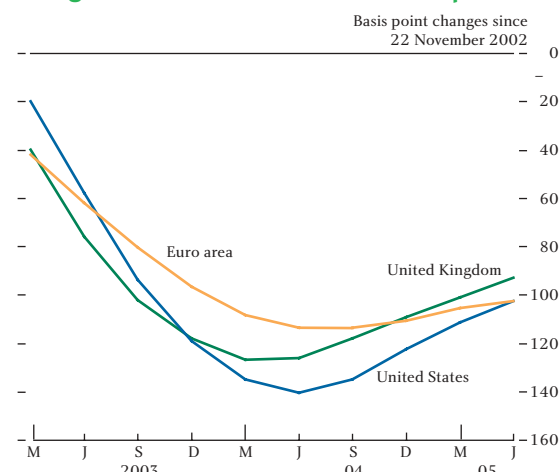
(a) Six-month forward rates derived from the Bank's government liability curves. (Estimates of the UK curve, and of instantaneous forward rates, are published daily on the Bank of England's web site at www.bankofengland.co.uk/statistics/yieldcurve/main/htm.)

year. Prior to the announcement, a Reuters poll suggested that economists had attached a mean probability of 20% to a quarter point rate reduction on

(1) The period under review is 22 November 2002 (the data cut-off for the previous *Quarterly Bulletin*) to 3 March 2003.

(2) On 6 March 2003, shortly after the end of the review period, the European Central Bank reduced its official interest rate by 0.25 percentage points to 2.5%.

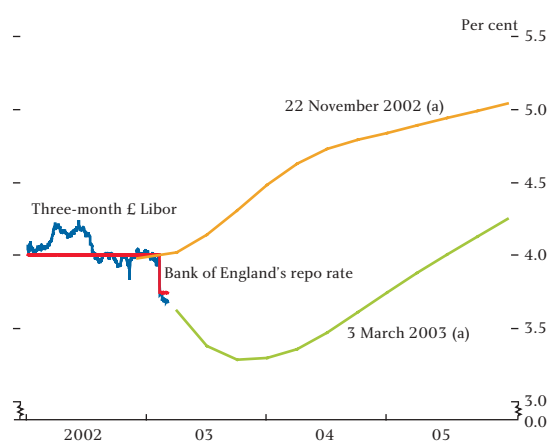
Chart 2
Changes in short-term interest rate expectations^(a)



Source: Bloomberg.

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

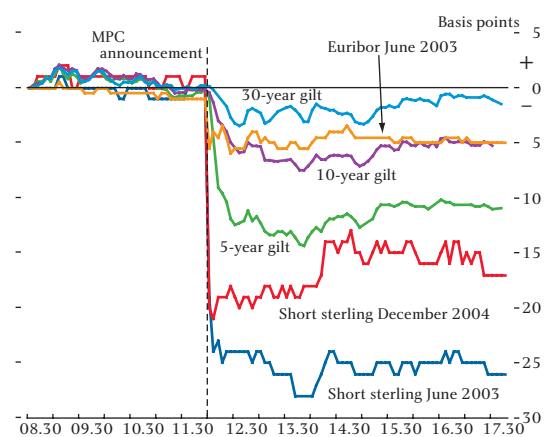
Chart 3
UK interest rates



Source: Bloomberg.

(a) Three-month interest rates implied by short sterling futures contracts at the dates specified. From March 2003 onwards, the x-axis relates to contract expiry dates.

Chart 4
Interest rate changes during 6 February^(a)



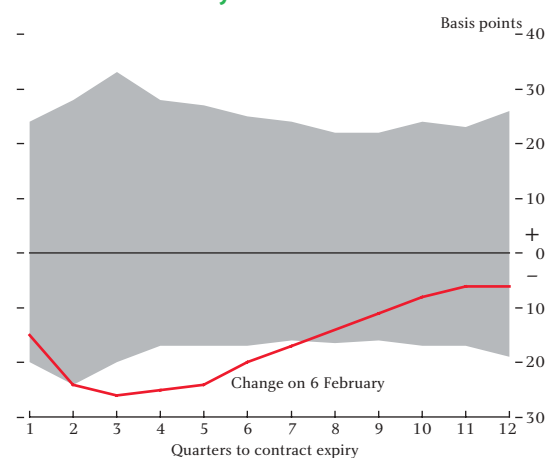
Source: Bloomberg.

(a) Cumulative changes at five-minute intervals.

6 February. Implied forward rates for the second half of 2003 also fell sharply, with an increase in expectations that further rate reductions would follow (Chart 4).

The declines in implied interest rates 6 to 18 months forward were greater than those on all previous MPC announcement days (Chart 5); and these changes in implied rates were larger than reactions to other news events and economic data published since the previous *Quarterly Bulletin* (Table A).

Chart 5
Range of changes in interest rates implied by short sterling futures contracts on MPC announcement days^(a)



Source: Bloomberg.

(a) Grey area shows range of changes in interest rates in reaction to all previous MPC announcements.

Table A
Financial market reactions to economic news^(a)

	June 2003 short sterling implied rate (basis points)	Ten-year gilt yield (basis points)	FTSE 100 (%)	\$/£ (%)	€/£ (%)
Pre-Budget Report (27/11)	7	3	0.67	-0.03	-0.09
US non-farm payrolls and unemployment rate (6/12)	-4	-3	-0.76	0.22	-0.24
US ISM manufacturing (2/1)	3	1	0.90	-0.27	0.40
BRC retail sales monitor (c) (8/1)	-2	-2	0.20	0.80	-0.60
US non-farm payrolls and unemployment rate (10/1)	-4	-3	-1.00	0.29	0.01
UK retail sales (23/1)	4	1	0.50	0.12	-0.20
MPC announcement (6/2)	-22	-3	0.20	-0.32	-0.35
MPC minutes (19/2)	3	1	-0.20	-0.03	0.01
G7 Summit (c) (22-23/2)	-5	-3	0.20	-0.59	0.01
UK Treasury Select Committee (25/2)	-2	-3	-0.70	-0.53	-0.42

Source: Bloomberg.

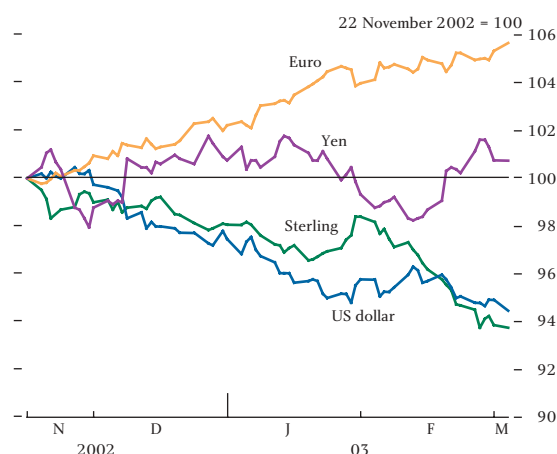
(a) Reactions are broadly from 15 minutes before the data release to 15 minutes after, except for Pre-Budget Report where they are from 15 minutes before to 45 minutes after the Report.

(b) Positive numbers indicate sterling appreciation.

(c) Occurred outside trading hours. Reactions are from close of business the day before to 15 minutes after the market opened.

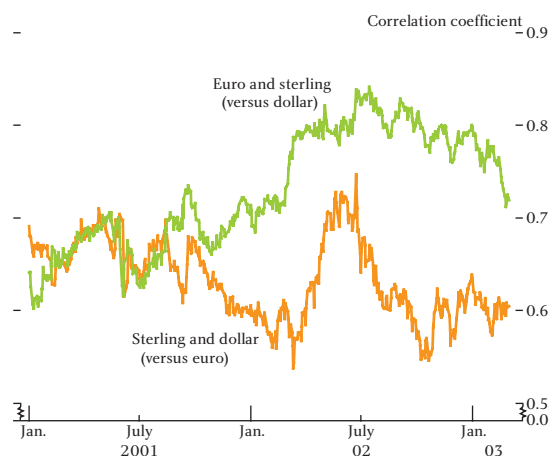
Although changes in sterling money and bond markets were broadly in line with overseas markets over the period, the sterling exchange rate index (ERI) declined by nearly 6.5% (Chart 6).

Chart 6
Effective exchange rate indices



Market participants linked part of the decline in the ERI to the appreciation of the euro against the US dollar between November and January. But in February, sterling depreciated against all currencies in the ERI, and independently of movements in the euro/dollar exchange rate. Implied correlations, derived from options prices, suggested that options market participants had revised downwards their assessment of how closely sterling would trade with the euro over the next year (Chart 7).⁽¹⁾

Chart 7
One-year implied exchange rate correlations



Source: UBS Warburg.

The sterling ERI had fallen to a four-year low of 100.1 by the end of the review period (Chart 8). Although much of this depreciation was subsequent to the reduction in official interest rates by the MPC, it is not easily explained by relative movements in sterling, euro and US

Chart 8
Sterling effective exchange rate



Table B
Exchange rate movements and news:
close of business 22 November–3 March

	£ ERI	€/£	\$/£	\$/€
Actual change (per cent)	-6.3	-7.9	-0.1	8.6
Interest rate news (percentage points)	0.7	1.5	1.7	0.2
of which: domestic	-6.0	-6.0	-6.0	-7.5
foreign	6.7	7.5	7.7	7.7

dollar market interest rates. Table B decomposes exchange rate movements according to the uncovered interest rate parity condition, which seeks to identify the role of interest rate news in explaining exchange rate moves.⁽²⁾ Interest rate news here is measured as the change in the differences between ten-year UK and overseas government bond yields. This measure was not consistent with changes in the direction of either the sterling ERI or the bilateral euro/sterling and dollar/sterling exchange rates.

Market participants have explained the decline in the sterling ERI partly as a result of downward revisions to forecasts for UK GDP growth in the next few years, including in the Bank's February *Inflation Report*. Some have also talked of a higher risk premium being applied to sterling because of expected UK involvement in a possible Iraq war and heightened alerts about possible terrorist attacks.

The Merrill Lynch survey of fund managers found that, despite the depreciation of sterling since December, the balance of respondents who thought sterling was overvalued had risen from 22% in November 2002 to 28% in February 2003. By contrast, more fund

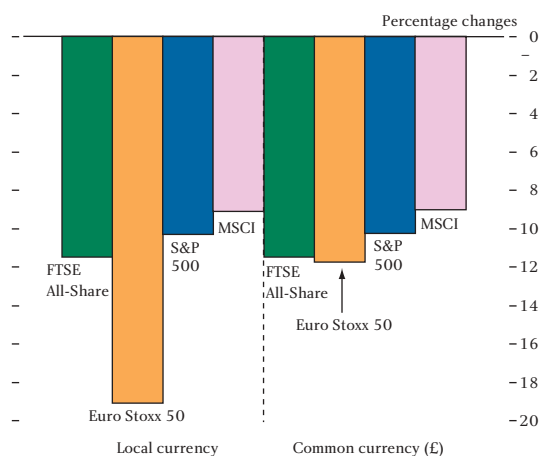
(1) For a discussion of implied correlations, see Butler, C and Cooper, N (1997), 'Implied exchange rate correlations and market perceptions of European Monetary Union', *Bank of England Quarterly Bulletin*, November, pages 413–23.
 (2) The method of decomposing the uncovered interest rate parity condition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

managers thought that the dollar had become less overvalued, and the euro had become less undervalued.

Global asset price developments

The similar declines in sterling, euro and US dollar forward interest rates were combined with common falls in equity indices, particularly in common currency terms (Chart 9), perhaps reflecting expectations of slower global economic growth over the next few years. MSCI world equity price indices of companies in the same industries have fallen across a wide range of sectors (Chart 10), which might also suggest slower expected overall economic growth, or higher overall equity risk premia, rather than altered outlooks for particular industries.

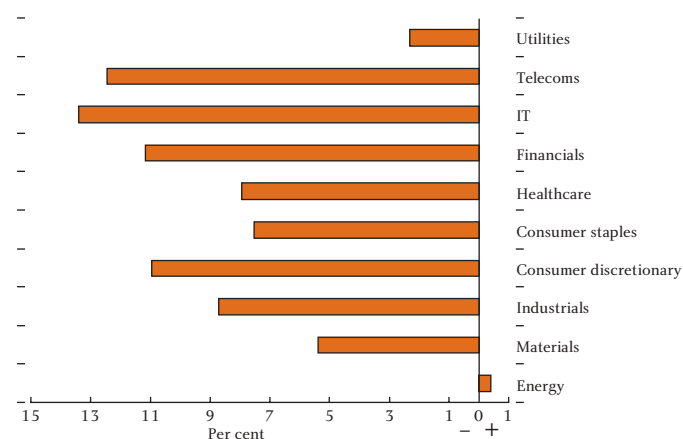
Chart 9
Change in FTSE All-Share, Euro Stoxx 50, S&P 500 and MSCI, (a) 22 November–3 March



Source: Bloomberg.

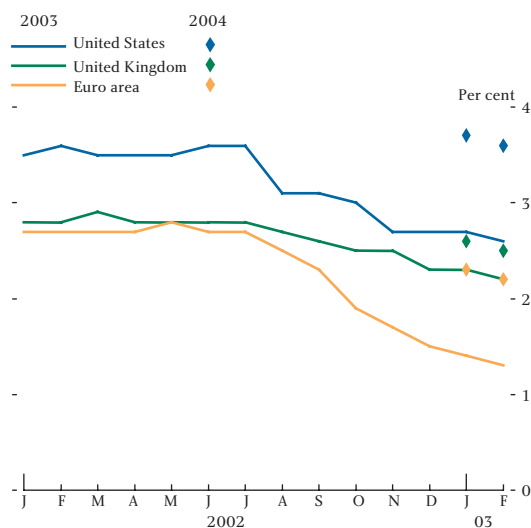
(a) The Morgan Stanley Capital International World index is a capitalisation-weighted index that monitors the performance of stocks from around the world.

Chart 10
Sectoral performance of MSCI world equity index, 22 November–3 March



Source: Bloomberg.

Chart 11
Expectations for GDP growth



Source: Consensus Economics.

Consensus forecasts for UK, euro-area and US growth in 2003 and 2004 have indeed been revised downwards (Chart 11). But these changes in growth expectations are difficult to disentangle from possible changes in the real expected returns that investors require on more/less risky assets, perhaps linked currently to uncertainties about the economic effects of a war in Iraq.

Declines in nominal forward interest rates have been greatest at maturities in 2004–06 (Charts 1 and 2). At longer maturities, US dollar and euro nominal forward rates generally fell by less and sterling forward rates increased slightly as yield curves steepened, perhaps suggesting that the changes to growth expectations related mainly to the next few years rather than to the longer run. That would be consistent with a material fall in short-maturity real forward rates derived from index-linked gilts, whereas longer-maturity real forward rates are broadly unchanged; the net effect being that longer-maturity spot real yields have fallen.

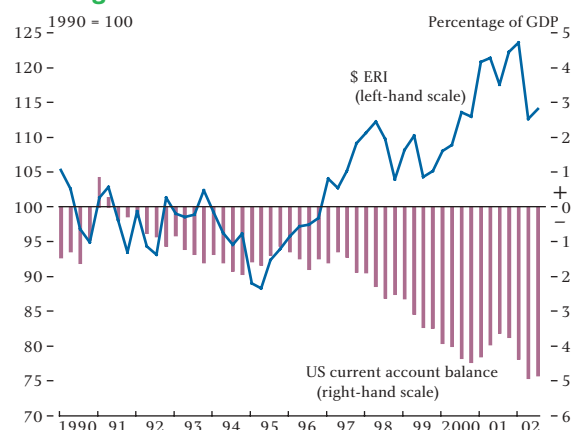
Downward revisions to Consensus forecasts for GDP growth in 2003, although not 2004, have been greater for the euro area than for the United States and the United Kingdom. The greater fall in euro-area equity indices and the greater declines in near-term euro forward interest rates derived from government bonds (Charts 1 and 9) are perhaps consistent with these forecast revisions. But the appreciation of the euro against the US dollar and sterling over the period is less

easy to explain purely in terms of weaker economic prospects.⁽¹⁾

Euro/US dollar exchange rate movements

The underlying explanation for the US dollar depreciation most commonly advanced by market participants is an adjustment to the further widening of the US current account deficit. The December 2002 OECD *Economic Outlook* forecast current account deficits of 5.1% and 5.3% of GDP for the United States in 2003 and 2004, but surpluses of 0.9% and 1.2% of GDP for the euro area and 3.8% and 4.2% of GDP for Japan, respectively. Chart 12 shows the US dollar ERI and the US current account balance since 1990. The appreciation of the US dollar ERI between 1995 and 2001 occurred broadly at the same time as the current account deficit widened, with overseas investors apparently prepared to finance the deficit because of the higher expected returns on US dollar-denominated assets, perhaps associated with the greater increases in US productivity relative to most other developed economies at that time.⁽²⁾

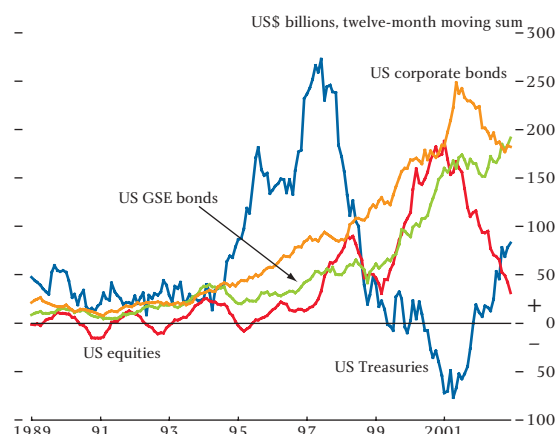
Chart 12 US current account balance and dollar effective exchange rate



Sources: OECD and Bank of England.

For much of 1995 to 2000, net capital inflows to the United States were largely via equity purchases. More recently, purchases of bonds have accounted for a greater share of US capital inflows⁽³⁾ (Chart 13). Increasing purchases of less risky assets may have given overseas investors less scope to benefit from the feed-through into corporate earnings of any greater US

Chart 13 Portfolio inflows into the United States



Source: US Department of the Treasury.

productivity gains. They may therefore have required some depreciation of the US dollar in order for expected risk-adjusted returns to reach their required level.

It may be that such an adjustment to the current and capital account positions of the United States and the euro area, combined with some downward revisions to global growth expectations, explains much of the financial asset price and exchange rate changes over the review period. But market participants have also stressed the importance of uncertainties related to a possible war with Iraq, the effects of which are difficult to disentangle.

Uncertainties about a possible war in Iraq

The financial market reaction to a possible war can be considered in terms of how a war is expected to affect the global economy, including the range of uncertainty around these expectations, and whether increased uncertainty itself has decreased willingness to take risk. The Bank's February *Inflation Report* (pages 48–49) included a broad analysis of the economic implications of a war, stressing the wide range of possible outcomes depending on the nature and length of any conflict and its aftermath. In general, equity prices fell and bond yields declined on developments interpreted by market participants as making war more likely or imminent, perhaps on an interpretation that any war could reduce expected global growth further.

(1) Some of the greater fall in euro-area share price indices may have been to offset the effect of the euro's appreciation on overseas earnings of companies in these indices; but euro-area indices fell by slightly more even in common currency terms.

(2) For a discussion of the US dollar and the US balance of payments in the 1990s, see 'The financial stability conjuncture and outlook', *Financial Stability Review*, December 2000, pages 21–24.

(3) Including purchases of bonds issued by US government sponsored enterprises (GSEs, or 'agencies'). More information on GSEs is contained in Box 5 of the *Financial Stability Review*, June 2000, pages 54–55.

Chart 14
Brent oil futures



Source: Bloomberg.

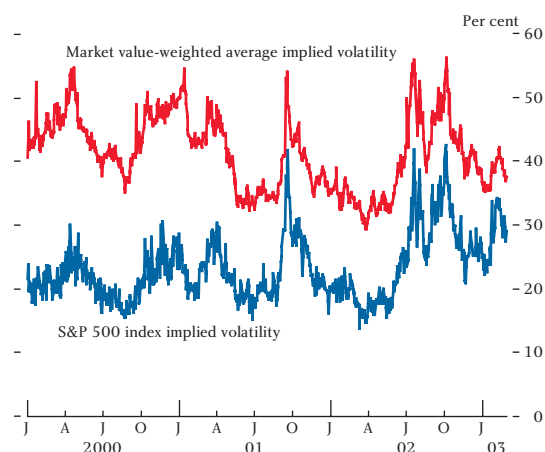
One channel might be through higher oil prices. The spot oil price rose over the period (Chart 14), probably in part reflecting a higher risk premium as concerns about the impact of a war on oil supply increased. Disruption to oil supply related to strikes in Venezuela and heightened demand for heating oil due to the cold US winter may also have been influences.

Added uncertainty about the economic outlook due to a possible war might be expected to have led to higher implied volatilities of equity indices, interest rate swaps and short-term interest rates derived from options prices. But the picture is mixed. Implied volatilities of short-term interest rates have been fairly steady over the period. Equity index implied volatilities have remained at high levels, but below those of mid-2002, before prospects for an Iraq war increased.

One diagnostic that war-related uncertainties might be a factor, however, is that the implied volatility of the S&P 500 index has risen relative to the market value-weighted average of the implied volatilities of the individual stocks in the index, derived from single stock options (Chart 15). This might suggest that current uncertainties are mainly general, affecting all stocks more or less equally, rather than idiosyncratic, affecting some stocks more than others. The uncertain economic effects of a war, including via risk appetite, might be such a general factor.

It is, however, particularly difficult to tell whether war-related uncertainties have led to a general decrease in willingness to take risk. One set of indicators might be the prices of so-called 'safe-haven' assets. Unlike during some previous periods of heightened

Chart 15
Implied volatility of S&P 500 index compared with market value-weighted average implied volatility of S&P 500 stocks



Sources: Bloomberg, Thomson Financial Datastream and Bank of England.

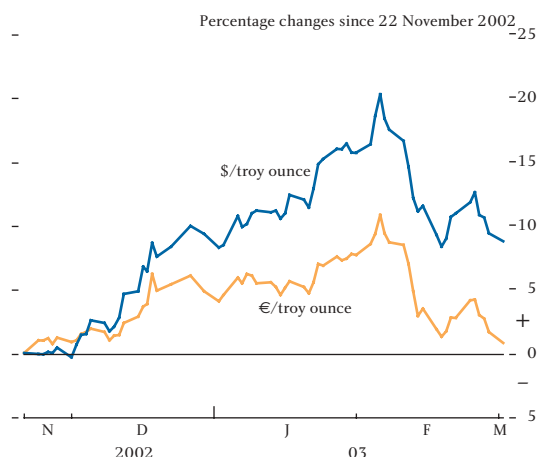
international political tension, the US dollar has not behaved as a 'safe haven' and has fallen against other currencies on events interpreted as increasing the likelihood and bringing closer the timing of an Iraq war. Market participants have attributed this to an expected increase in the fiscal deficit related to a military conflict, against the backdrop of an already pronounced current account deficit and a risk of asset repatriation by foreign investors.

By contrast, the US dollar prices of gold and the Swiss franc rose sharply in the first half of the period (Charts 16 and 17). This may, however, simply have reflected the more general US dollar depreciation. There were smaller changes in the euro-denominated price of gold and the value of the Swiss franc against the euro over the period, indicating that the changes primarily reflected US dollar weakness.

Other indicators of willingness to take risk are also inconclusive or suggest little change. Spreads of swap rates over government bond yields rose in the euro area, except at shorter maturities, and generally declined in the United States and the United Kingdom. And in the corporate sector, spreads over swaps of US dollar and euro-denominated corporate bonds generally fell over the period while those on sterling-denominated corporate bonds fell for the first part of the period, but subsequently moved a little higher (Charts 18 and 19). The fall in spreads in December and January may have reflected some unwinding of the significant but selective tightening of wholesale credit markets in the late autumn, particularly in the United States.⁽¹⁾ Access to

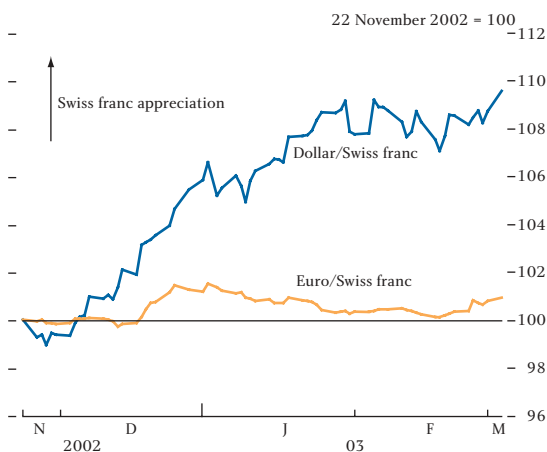
(1) See also 'The financial stability conjuncture and outlook', *Financial Stability Review*, December 2002, pages 48–54.

Chart 16
Change in gold price



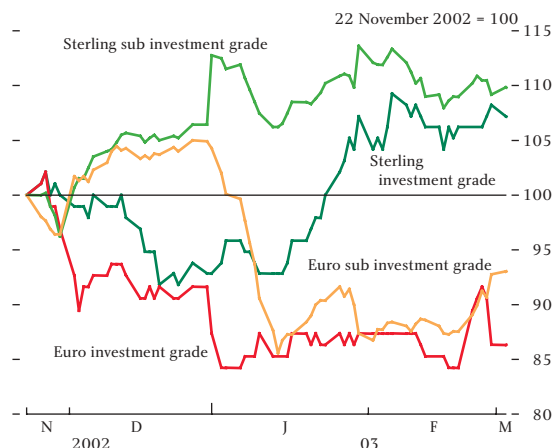
Source: Bloomberg.

Chart 17
Swiss franc exchange rates



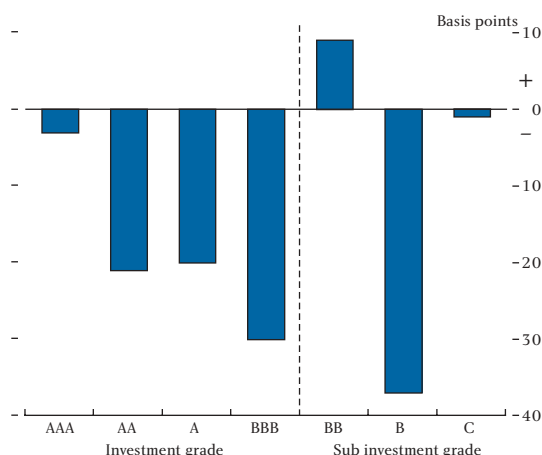
the primary market then bifurcated, with high demand for issues by strong companies, but with companies in more troubled sectors or with high leverage having to pay a premium for, or being unable to access, bond finance. Secondary market conditions were occasionally somewhat disorderly, and there was a sharp rise in demand for credit protection, for example in credit derivative markets.⁽¹⁾ By contrast, in the early months of 2003, non-government international bond issuance was strong (Chart 20), even for less creditworthy issuers. Many corporate issuers were able to raise funds at longer maturities, including 30-year euro-denominated issues by some European telecoms companies. While the US and European markets for initial public offerings have remained difficult, companies have been able to issue sizable convertible bonds in US dollars and euro.

Chart 18
Spreads over swaps of international investment and sub investment-grade corporate bonds



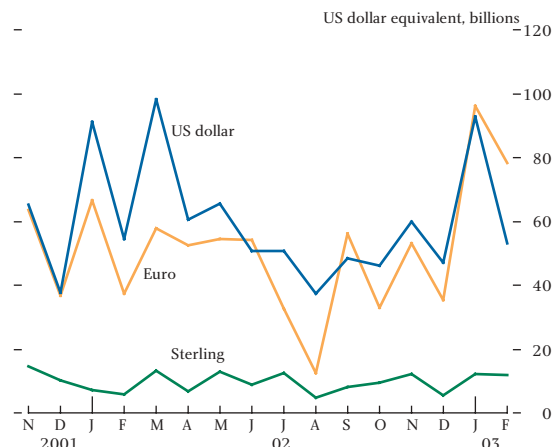
Source: Merrill Lynch.

Chart 19
Changes in spreads over swaps of US dollar corporate bonds, by credit rating 22 November–3 March



Source: Merrill Lynch.

Chart 20
Non-government international bond issuance



Source: Dealogic.

(1) For a discussion of this market, see Rule, D. 'The credit derivatives market: its development and possible implications for financial stability', *Financial Stability Review*, June 2001, pages 117–40.

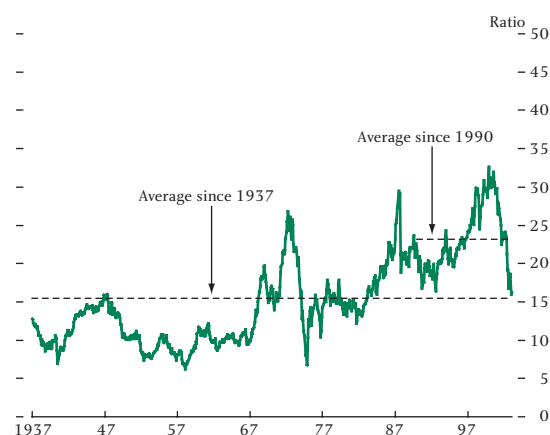
Reassessment of relative valuations of equities and bonds

Some market participants have linked the contrast between the strength of primary bond markets and weakness of primary equity markets, and between rising bond prices and falling equity prices, to evidence of sizable portfolio reallocations from equities into bonds. Many UK life funds, for example, have made substantial switches over the past couple of years and these are said to have continued over the period (see the box on page 13). Changes in pension fund asset allocation are said generally to have been smaller. Retail investors also seem to have favoured corporate bond rather than equity funds: for example, net sales of UK corporate bond individual savings accounts (ISAs) were significantly higher in January 2003 than a year previously, and net sales of UK equity ISAs significantly lower. Over 2002 in the United States, there was a net outflow from equity mutual funds, for the first time since 1988, of US\$27 billion, or 0.9% of equity fund assets. Net new investments in bond funds reached a record US\$140 billion.

It is tempting to link flows to relative price changes, and there may be some short-term impact. Over a longer period, however, arbitrage would be expected broadly to correct any obvious movement of prices away from the risk-adjusted present value of expected future cash flows. But the reallocations might have reflected a reassessment by some investors of the equity risk premium: the additional returns required on equities compared with bonds to compensate investors for equity market risk. In theory, the risk premium should depend on the covariance between equity returns and investors' consumption—so required returns would rise if expected equity returns or consumption became more volatile, or if they became more correlated. There is anecdotal evidence that some managers of life funds and company pension funds have indeed been rethinking what equity risk premium they require given the nature of the funds' liabilities. On the other hand, the series of leveraged buyouts of whole, or parts of, listed companies in recent months in Europe and the United States might suggest that other investors assess equity risk differently.

Looking forward, uncertainty about the equity risk premium may make it more difficult to judge whether equity prices have reached 'fair' values following recent declines. The decline in the price-earnings ratio for the

Chart 21
FTSE All-Share price-earnings ratio
(based on ten-year trailing earnings)

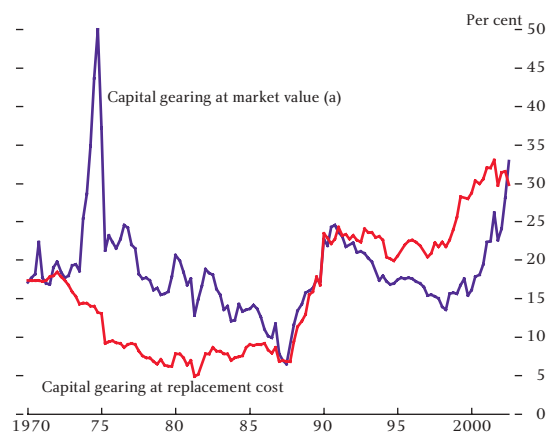


Source: Global Financial Data.

FTSE All-Share index—calculated in Chart 21 on the basis of ten-year trailing earnings to attempt to smooth out temporary variations in earnings—could be consistent with a rise in the equity risk premium to close to its average since 1937, but downward revisions to expected future earnings growth could equally explain some or all of this change.⁽¹⁾

Another possible explanation for the decline in equity prices and bond yields is that there has been a reassessment of corporate bond risk following attempts by some companies to reduce debt and refinance existing debt at longer maturities. Chart 22 shows a reduction in capital gearing (at replacement cost) for UK private non-financial companies (PNFCs), from the peak of 33% in September 2001. Other things being equal, as a company's debt is progressively reduced

Chart 22
Capital gearing of UK PNFCs



Sources: ONS and Bank of England.

(a) PNFCs' net debt divided by the market valuations of PNFCs.

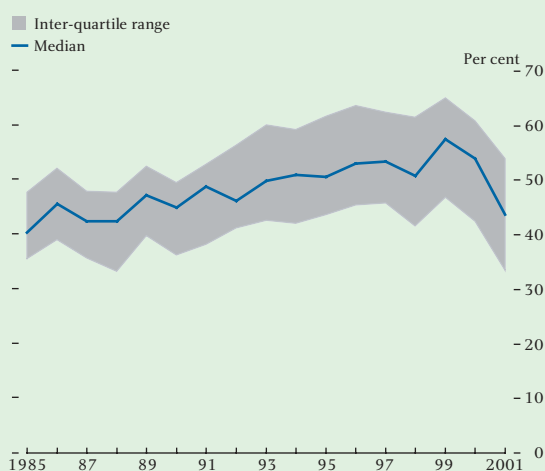
(1) See Vila Wetherilt, A and Weeken, O (2002), 'Equity valuation measures: what can they tell us?', *Bank of England Quarterly Bulletin*, Winter, pages 381–404, for a detailed analysis.

UK life insurance companies

UK life insurance funds intermediate a significant proportion of long-term UK household savings. For example, at end-2001 they held 20% of total UK equities.⁽¹⁾ Some of the market risk on these assets is passed on to savers: for example, through unit-linked products. But the companies are also exposed to falls in asset values, for example, through the provision of guaranteed returns on savings products, annuities, and 'with profits' policies.

Over recent years, the proportion of life insurance companies' assets held in equities has fallen (Chart A). In part, this reflects the fall in the value of equities relative to other assets. But they have also made net disposals of equities: for example, ONS data show that life insurers were net sellers of over £750 million in the third quarter of 2002.⁽²⁾ The funds appear to have increased their holdings of bonds, particularly corporate bonds.

Chart A
Large UK life insurance companies' equity asset share^(a)



Sources: Standard & Poor's and Bank of England.

(a) Direct holdings and holdings in collective investment schemes.

Financial Services Authority (FSA) regulations require UK life insurance companies to have a sufficient surplus of assets over liabilities (referred to as the regulatory minimum margin) under current investment conditions and following possible future declines in asset values, including a fall in equity indices of up to 25%.

At times during the review period, and particularly in late January, market participants talked of further

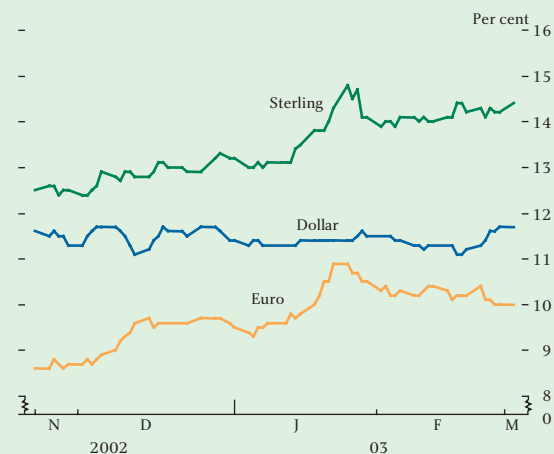
sales of equities by UK life insurance companies, possibly motivated in part by the need to continue to meet these requirements as equity markets fell.

Many of the sales were said to have been executed in the first instance by selling futures contracts on the FTSE 100 index, consistent with a rise in volumes of contracts traded on LIFFE in late January. Purchases of futures would offset losses on cash equity holdings as a result of further declines in the overall market.

Market contacts also reported greater trading of FTSE index options. One strategy that life insurance companies were said to have employed was the simultaneous purchase of an out-of-the-money put option, to protect against significant further declines in equity prices, and sale of an out-of-the-money call option, in order to reduce the net cost of the protective put by giving up gains if the market were to rise significantly.

Insurers may also be exposed to falling bond yields if the bonds that they hold are of shorter maturity than the savings products or annuities on which they have guaranteed the returns. One way to hedge against this risk is through purchases of long-maturity swaptions, giving the right to receive a fixed return over a defined future period. Implied volatilities of 20-year euro and sterling swaptions exercisable in ten years' time rose in late January, with market contacts referring to further buying of swaptions by European and UK insurers and pension funds (Chart B).

Chart B
Implied volatility of 10-year/20-year swaptions in selected currencies



Source: Bloomberg.

(1) 'Share ownership: a report on ownership of shares as at 31 December 2001', *National Statistics* (2002).

(2) 'Insurance companies, pension funds' and trusts' investment', *National Statistics*, January 2003.

below the level of its assets, bond-holders become more confident that the debts will be repaid and hence will tend to require a lower credit risk premium.⁽¹⁾ There is evidence of similar debt restructuring in the United States and the euro area: for example, income gearing of US non-financial companies has fallen from its high in 2001 and US firms took on little net new debt in 2002, with balance sheet adjustment continuing through Q4.

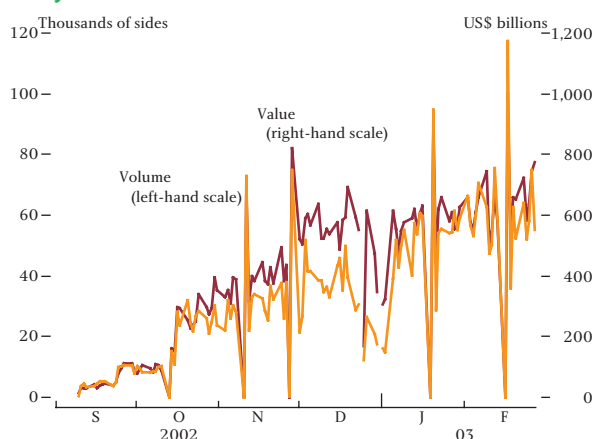
Developments in market structure

Over the period, Continuous Linked Settlement of foreign exchange transactions has continued to grow, with an associated reduction in foreign exchange settlement risk; preparations for dematerialisation of money market instruments and their settlement in CREST have continued; CRESTCo has published details of a new means of settling repo transactions against general collateral, which could bring a welcome reduction in intraday flows and credit exposures between settlement banks and their customers; and major UK banks have increased the share of UK Treasury bills in their stock of liquid assets.

Continuous Linked Settlement

Both the volume and the value of foreign exchange transactions settling through Continuous Linked Settlement (CLS)⁽²⁾ rose over the period. On 18 February, CLS Bank International (CLSB) settled trades with a gross value of just over US\$1 trillion (Chart 23). The average daily value settled in February 2002 was US\$618 billion compared with US\$339 billion in November 2002, as reported in the previous *Quarterly Bulletin*. Comparing this with the Bank for International Settlements' (BIS) 2001 triennial survey of foreign exchange and over-the-counter derivatives suggests that CLS now settles just under half of the value of foreign exchange transactions undertaken by major banks.⁽³⁾ Market participants expect that business will continue to increase this year, for a number of reasons. First, more non-European branches of CLS members will be submitting trades to CLSB.⁽⁴⁾ Second,

Chart 23
Daily settlement volumes and values in CLS^{(a)(b)}



Source: CLS Bank International.

- (a) Each trade consists of two sides.
(b) 14 October, 11 November, 28 November 2002, 20 January and 17 February 2003 were US holidays, which accounts for the very low levels of trades settled on those days.

more institutions are expected to become third-party members of CLS, settling foreign exchange trades via CLS members. Third, four new currencies are expected to become eligible for settlement through CLS—the Norwegian Krone, Swedish Krona, Danish Kroner and Singapore Dollar. Finally, CLSB has announced proposals to enable settlement of foreign exchange trades carried out by third-party customers of custodian banks, such as investment funds. These will require foreign exchange market participants to adopt a common identifier for such funds. The 2001 BIS triennial survey estimated that 10% of global foreign exchange turnover was related to such securities trading.

Market liaison committees

The introduction of CLS is one issue that has been discussed at the Foreign Exchange Joint Standing Committee (FX JSC), one of the three market liaison committees which the Bank chairs. The others are the Money Markets Liaison Group (MMLG) and the Stock Lending and Repo Committee (SLRC). They exist to provide a forum for discussion between market practitioners and the authorities in the respective markets.⁽⁵⁾

(1) See Cooper, N, Hillman, R and Lynch, D (2001), 'Interpreting movements in high-yield corporate bond market spreads', *Bank of England Quarterly Bulletin*, Spring, pages 110–20 which includes a summary of the Merton framework.

(2) Continuous Linked Settlement, operated by CLS Bank International, was launched on 9 September 2002. It reduces foreign exchange settlement risk significantly by settling bought and sold currencies on a 'payment-versus-payment' basis. See the *Bank of England Quarterly Bulletin*, Autumn 2002 (pages 257–58) and Winter 2002 (pages 365–66), and the *Financial Stability Review*, December 2002 (pages 82–85).

(3) 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 US\$689 billion. 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.

(4) Some settlement members are currently using CLSB to settle only foreign exchange trades submitted by their European branches. Others are settling their entire global business through CLSB.

(5) For more information on the work of the FX JSC over the past year, see the article 'A review of the work of the London Foreign Exchange Joint Standing Committee' in this *Quarterly Bulletin*. For more information on the MMLG and SLRC, see *Quarterly Bulletin*, Winter 2001, pages 451–53. The minutes of the meetings of the Bank's market liaison groups are available on the Bank's web site at www.bankofengland.co.uk/markets/

FX JSC has also recently addressed the issue of undisclosed principal trading in the context of the Non-Investment Products (NIPs) Code. And contingency planning has been a major focus for both FX JSC and MMLG, which have been considering the needs of the various markets in London, including information flows, communications between firms and back-up sites, and liquidity needs. Conference call facilities have been set up and rehearsed for both FX JSC and MMLG members. MMLG has also made non-binding recommendations as to the appropriate rate to be applied to unintended long and short balances in the sterling money markets following major market disruption.

As well as contingency planning, subjects discussed by SLRC in recent months have included short selling, voting of lent stock, CREST stock lending statistics and a publication about securities financing.

Other issues discussed by MMLG have included the calculation of the Sterling Overnight Index Average (SONIA),⁽¹⁾ the use of gilts in the London Clearing House's RepoClear service, the Financial Services and Markets Act (and, linked to this, the NIPs Code) and the dematerialisation of money market instruments.

Settlement of sterling money market instruments

Work continues to dematerialise money market instruments (certificates of deposit, commercial paper, Treasury bills and bankers' acceptances), allowing them to be issued and settled in CREST from September 2003. At present, money market instruments are settled through a separate settlement system, the Central Moneymarkets Office (CMO), operated by CRESTCo and supported by a physical depository at the Bank of England. Following the planned changes, they will be settled in the same way as other CREST securities with delivery-versus-payment (DvP). Although CMO offers same-day issuance and settlement, it entails intraday payment system exposures. Payment for transfers of money market instruments are made by the CREST settlement banks on behalf of their CMO member customers. Such payments by settlement banks are not assured and CMO does not offer DvP, leading to large intraday credit exposures among members and their bankers.

Work on these changes is proceeding in three main areas. First, HM Treasury is preparing the necessary amendments to the Uncertificated Securities Regulations 2001 to allow non-material equivalents of money market instruments to be settled in CREST.

Second, in January, CRESTCo published details of the arrangements for the migration of money market instruments from CMO to CREST.⁽²⁾

Third, the Bank is considering the responses to its November consultation on standardised *pro forma* terms of issue for money market securities in CREST.⁽³⁾ It intends to put out a revised version for further market consultation shortly and to publish a final version in early summer.

CREST settlement of repo transactions

Linked to the changes needed for the settlement of money market instruments, CRESTCo is also planning a new settlement mechanism for repos of CREST securities, including gilts, equities and money market instruments.

In general, repo transactions are either motivated by lending of specific securities with cash taken as collateral, or by lending of cash with a basket of any securities meeting defined criteria taken as 'general collateral' (GC). In CREST, settlement of cash-driven repos against GC often occurs using the delivery-by-value (DBV) function, by which CREST delivers to the cash lender a basket of securities to a specified current market value and meeting pre-defined criteria (for example, gilts) selected from the account of the cash borrower, using an automated algorithm. Since they were first developed in the Central Gilts Office settlement system in the mid-1980s, DBVs have settled at the end of each day and unwound at the start of the next day, making them most suitable for overnight GC repo transactions.

But, at present, DBVs are also used to settle term GC repo transactions, with the parties agreeing to enter into a series of DBVs on consecutive days. For the cash borrower, this has the advantage that the DBV algorithm automatically selects the GC securities to be delivered each night according to what the borrower has available in its CREST account.

(1) A weighted average of rates on unsecured, sterling overnight cash transactions brokered in London between midnight and 4.15 pm each day reported to the Wholesale Markets Brokers' Association.

(2) This document can be found on CRESTCo's web site: www.crestco.co.uk/home.html#news/cmo-migration

(3) This consultation document was publicised in the *Quarterly Bulletin*, Winter 2002, page 368.

But so-called ‘term DBVs’ have important and in some ways undesirable consequences for the operation of the payment system. When DBVs unwind each morning, real time gross settlement (RTGS) and delivery-versus-payment mean the cash borrower must finance the repurchase of its securities intraday. Repurchases of gilt DBVs are facilitated by the self-collateralisation process in CREST. The borrower’s purchase of its securities is financed by its settlement bank via an automated repo facility which enables the cash borrower to borrow from the settlement bank against the collateral of the returning securities. The settlement bank in turn finances the purchase from the Bank of England via a linked, automated repo facility, in which the same securities act as collateral. All repos must unwind by close of business.

Term DBVs therefore give rise to large intraday flows of securities and cash between counterparties, their settlement banks and the Bank, together with large intraday exposures between the Bank and settlement banks (always fully collateralised); between settlement banks and cash borrowers in DBV (typically partly collateralised); and between cash lenders in DBV and their settlement banks (unlikely to be collateralised). These flows could magnify the impact of any disruption to CREST or to the related payment arrangements.

From mid-September 2003, CRESTCo plans to make available to members a new type of transaction designed specifically for the settlement of such term GC repo transactions. This transaction—called ‘RPO’—will be available for all securities settled in CREST, including money market securities.⁽¹⁾

Some of the planned key features include: the ability for members to select up to ten lines of stock for each repo transaction, including any mixture of security types; the automatic creation of a repurchase instruction in CREST for the return of stock on an agreed date; and the flexibility to substitute securities and terminate specific lines in a repo transaction and to ‘roll over’ existing repo transactions.

Like term DBVs, RPOs would preserve for cash lenders some flexibility to substitute collateral securities each day. But, unlike term DBVs, the RPO transaction

between the parties to the repo would remain intact until maturity. There would be no need for large intraday movements of cash and securities, which should bring some reduction in intraday credit exposures among settlement banks and their customers.

The Bank supports the principle of the new transaction facility. It has allowed its counterparties to settle two-week gilt repo transactions using term DBVs since they became a part of its daily open market operations in 1997. It is currently considering the practicalities of also allowing the proposed new RPO transaction in the settlement of these operations.

Banks’ holdings of liquid assets

Sound and well-functioning sterling repo markets are also central to the liquidity management of the large UK banks. Most banks are involved in maturity transformation, exposing them to liquidity risk. One important way of mitigating this risk is to hold a stock of high-quality, marketable assets which can be sold or repoed to raise funds if a bank faces a liquidity squeeze. As ‘banker to the banks’, the Bank has a keen interest in the stock of liquid assets of the major British banking groups (MBBG), currently monitored through the sterling stock liquidity regime (SLR).⁽²⁾ Assets eligible for inclusion in this stock correspond to those eligible in the Bank’s open market operations and for intraday liquidity.

The composition of the stock held by MBBG banks has altered significantly in recent years. Over the review period, the most marked change was the increase in Treasury bills, reaching a peak of over £11 billion (Chart 24). This has coincided with an increase in the value of Treasury bills outstanding. At present, there is no established market in Treasury bill repo, but the dematerialisation of money market instruments may stimulate this.

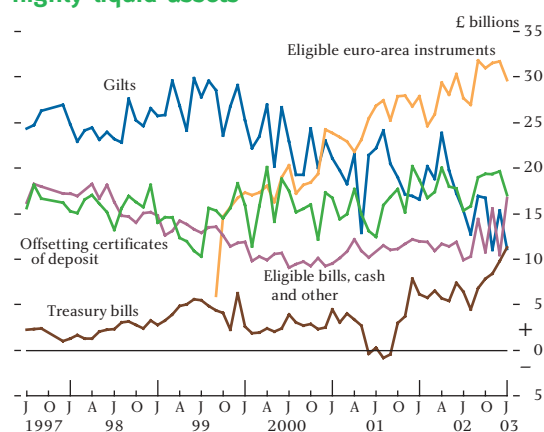
Over a longer period since 2000, holdings of gilts⁽³⁾ have declined but holdings of euro-area government securities have increased. These became eligible for stock liquidity purposes following the Bank’s decision to accept them as collateral in its daily open market operations and for intraday liquidity in late 1999,

(1) Further details can be found in CREST’s white books *Enhancing CREST—Extending repo facilities in CREST* and *Money market instruments and repo facilities in CREST: Member trialling strategy* to be found at www.crestco.co.uk/home.html#news/cmo-migration

(2) The Financial Services Authority requires the major UK banks to meet stock liquidity requirements. See also Chaplin, G *et al* (2000), ‘Banking system liquidity: developments and issues’, *Bank of England Financial Stability Review*, December, pages 93–112.

(3) Including outright holdings and net (reverse repo less repo) repo positions.

Chart 24
Major British banking groups' holdings of highly liquid assets



Source: Financial Services Authority.

underlining the close relationship between how banks choose to manage their liquidity, central bank collateral requirements and the regulatory liquidity regime.⁽¹⁾

Bank of England official operations

Changes in the Bank of England balance sheet

The largest change in the Bank of England's balance sheet between 27 November 2002 and 26 February 2003 (Table C) was an increase in foreign currency assets and liabilities. (See the box on page 18 for an explanation of the main elements of the Bank's balance sheet.) On 21 January, the Bank auctioned €1 billion of euro-denominated notes maturing in 2006 as part of its euro-denominated note programme, begun in 2001. Cover at the auction was 4.1 times the amount on offer, and the average accepted yield was 2.986% (some 7 basis points below the three-year swap rate). This increased to €5.0 billion the nominal value of three-year notes outstanding in the market. A second auction of €1 billion of the 2006 note is scheduled for 18 March 2003.⁽²⁾

The Bank maintained unchanged the nominal value of its euro-denominated bills outstanding at €3.6 billion

Table C
Simplified version of Bank of England consolidated balance sheet as at 26 February 2003^(a)

Liabilities	£ billions (b)	Assets	£ billions (b)
Bank note issue	31 (32)	Stock of refinancing	19 (20)
Settlement bank balances	<0.1 (<0.1)	Ways and Means advance to HM Government	13 (13)
Other sterling deposits, CRDs and the Bank of England's capital and reserves	6 (5)	Other sterling-denominated assets	4 (3)
Foreign currency denominated liabilities	11 (10)	Foreign currency denominated assets	11 (10)
Total (c)	47 (46)	Total (c)	47 (46)

(a) Based on published Bank Returns. The Bank's full financial accounts for the year ended 28 February 2003 are due to be published in May.

(b) Figures in brackets as at 27 November 2002.

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

(1) Chart 28 below shows the types of security used as collateral in the Bank's daily open market operations.

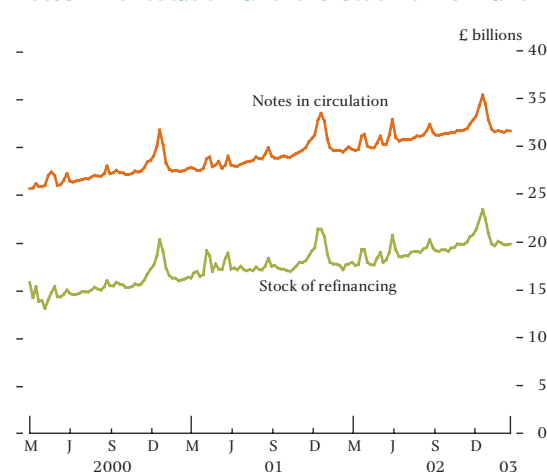
(2) Shortly after this publication went to print.

(3) Overnight funds are offered to counterparties at 15.30 at a rate normally 1 percentage point above the official repo rate and, if the shortage still remains at the end of the day, to settlement banks at 16.20 at a rate normally 1.5 percentage points above the repo rate.

(€1.8 billion of bills with three-month and €1.8 billion of six-month original maturities), rolling over maturing bills at auctions held monthly during the period.

By contrast, the sterling components of the Bank's balance sheet changed little over the period as a whole. But there were large fluctuations, particularly over Christmas and New Year, in line with the usual seasonal increase in demand for bank notes (Chart 25).

Chart 25
Notes in circulation and the stock of refinancing



Growth in the note issue at the end of December led to a corresponding increase in the stock of money market refinancing provided through the Bank's daily open market operations. This was one reason for an increase in the daily liquidity shortages in late December and early January as the higher stock turned over. Additionally, the average size of daily shortages increased in December as a greater share of refinancing was provided overnight rather than at a two-week maturity, causing the rate of turnover of the stock to rise and its average maturity to fall (Charts 26 and 27). The Bank offers overnight funds if counterparties fail to clear the shortages in full at its main rounds of two-week operations at 9.45 and 14.30.⁽³⁾

Components of the Bank of England's balance sheet

A central bank's principal liabilities are unique: bank notes and banks' settlement or reserve accounts that together form the final settlement asset (central bank money) for payment in an economy. Central banks vary in their choice of assets. But they are typically of high quality so that, consistent with a stability-oriented monetary policy regime, the integrity of central bank money is assured. In many cases, a portion of assets is rolled over at short maturities in order to implement monetary policy decisions and to accommodate fluctuations in demand for central bank money, aiding banking system liquidity management.

The Bank of England's balance sheet reflects these key characteristics. Its principal sterling liabilities are:

- *Note issue.* This grows approximately in line with nominal GDP growth⁽¹⁾ but also fluctuates from day to day and seasonally with the public's demand for bank notes, for example, around bank holidays.
- *Settlement balances.* Settlement banks are obliged to maintain a minimum balance of zero on their Bank of England settlement accounts at the end of each day; any unauthorised negative balance would need to be collateralised with eligible securities and would normally be charged a penal rate of interest. In practice, the settlement banks prefer their end-of-day balances to be slightly above zero in order to cover themselves against uncertainties in their daily cash flows. Consequently, the Bank of England targets a small positive level of aggregate bankers' balances within its overall forecast of the banking system's net liquidity position each day.
- *Customer deposits.* In the course of its banking business, the Bank takes sterling, foreign currency and gold deposits from government, central bank and other customers. The United Kingdom Debt Management Office (DMO) also maintains a sterling account at the Bank of England.
- *Capital and reserves.*
- *Cash ratio deposits (CRDs).* Deposit-taking institutions in the United Kingdom are required to place cash ratio deposits, equal to 0.15% of their liabilities on deposit at the Bank of England. These deposits are non-interest bearing and enable the Bank to finance its unrecovered costs associated with its monetary policy and financial stability activities.

The Bank's principal sterling assets are:

- *Ways and Means.* The 'Ways and Means' is an advance to HM Government, held constant since

April 2000 when responsibility for Exchequer cash management transferred to the DMO.

- *Other sterling-denominated assets.* The Bank holds a portfolio of fixed-income securities, principally gilts.
- *The stock of refinancing (SoR).* This stock largely consists of short-term reverse repos of government securities arranged by the Bank of England in its open market operations (OMOs).

The SoR serves two purposes. First, it is a short-term asset in contrast to the long-term nature of the Bank's note issue liability. That maturity mismatch allows the Bank, through its choice of repo maturity dates, to keep the banking system in a net short liquidity position and to act on most days as the marginal provider of central bank money at the MPC's official repo rate.⁽²⁾

Second, the SoR is used to accommodate fluctuations in demand for central bank money, in normal circumstances mainly demand for bank notes.

The Bank also has foreign currency denominated liabilities and assets:

- *Euro bills and notes.* The Bank has euro-denominated liabilities arising from its issues of euro bills and notes.⁽³⁾
- *'TARGET' portfolio.* The Bank invests part of the proceeds of its euro notes issuance in a portfolio of €3.6 billion high quality euro-denominated securities, used daily to raise euro liquidity intraday via custodians and national central banks in the euro area. The Bank then uses these funds to provide intraday liquidity to participants in the CHAPS Euro payment system, which is connected to TARGET, the European cross-border RTGS payment system.
- *Foreign currency denominated assets.* The Bank holds and manages its own portfolio of foreign currency reserve assets.

Table C on page 17 shows a consolidated version of the Bank of England's balance sheet at a high level of aggregation. In practice, the Bank of England is required by the Bank Charter Act 1844 to separate the note issue function from its other activities. Accordingly, for accounting purposes, the balance sheet is divided into two accounting entities: Issue Department and Banking Department. The Issue Department comprises solely the note issue and the assets backing it. The Banking Department comprises all the other activities of the Bank of England.⁽⁴⁾

(1) Changes in the velocity of circulation of narrow money also affect the rate of growth of the note issue (see *Inflation Report*, November 2002, page 9).

(2) See *The Bank of England's operations in the sterling money markets*, May 2002, for more details. Very occasionally, the market may have a net long liquidity position (ie a surplus). On these days, the Bank allows settlement banks to reach near-zero settlement account balances by inviting counterparties in open market operations to place money with it in a short-term repo transaction.

(3) Details of the issue of euro securities can be found at www.bankofengland/pr99002.htm

(4) Details of the Issue and Banking Department balance sheets can be found in the Bank of England's *Annual Report*, the weekly Bank Return and Table B1.1 of the Bank of England's *Monetary and Financial Statistics* (all available at www.bankofengland.co.uk).

Chart 26
Average maturity of stock of refinancing and average daily shortage

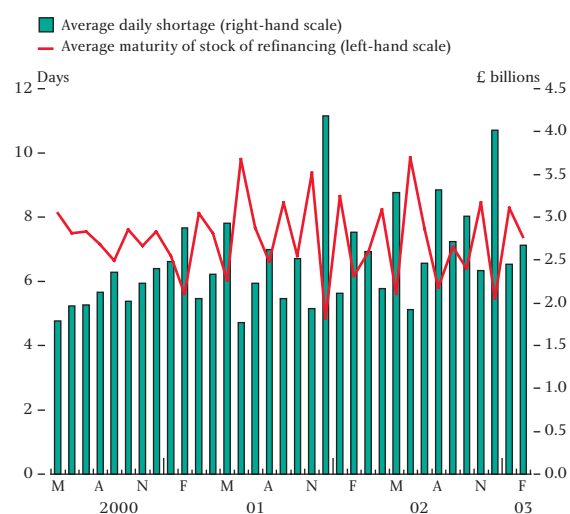
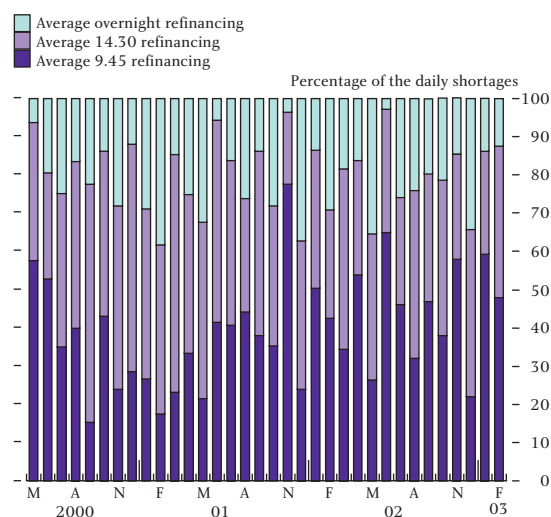


Chart 27
Refinancing provided in the Bank's open market operations



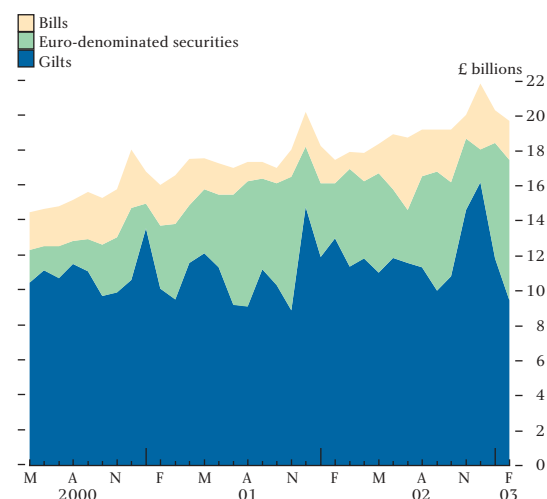
More extensive use of the Bank's overnight facilities in December reflected tighter conditions in the short-dated sterling money markets. For example, the average spread between SONIA⁽¹⁾ and the Bank's official repo rate was +33 basis points in December, compared with -19 in January and -10 in February. And in December, the average spread between two-week GC repo rates and the Bank's official repo rate was -9 basis points, compared with -17 in January and -14 in February.

Greater use of the Bank's overnight rounds in December also skewed the composition of the collateral securities repoed to the Bank towards gilt DBV (Chart 28). Counterparties are unable or reluctant to deliver other collateral types after the first round of daily OMOs due to timetable constraints in other settlement systems.

Forecasting the liquidity shortage

Seasonal changes in the demand for currency, and their precise day-to-day pattern, can pose challenges for the Bank's forecasting of daily system liquidity shortages.

Chart 28
Instruments used as OMO collateral



If the Bank were to supply liquidity equal to the full amount of the forecast shortage at 9.45 but forecast bank note demand that day was later revised downwards, settlement banks would be left with settlement bank balances above desired levels. In order to minimise the risk of oversupply, the Bank usually holds over £200 million of the banking system's forecast liquidity need from the 9.45 to the 14.30 round. On 23 December, the Bank announced that it would increase that amount to £400 million, to allow for greater seasonal uncertainty in the change in the note circulation. This was reversed on 13 January.

Table D illustrates that there were larger-than-usual revisions to the 9.45 liquidity forecast in December—reflecting greater uncertainties in the notes forecast—but that there was little change in the accuracy of the final, 16.20 daily forecast.

Table D
Intraday forecasts versus actual shortages

	Mean absolute difference (standard deviation), £ millions		
	9.45 forecast	14.30 forecast	16.20 forecast
Dec.-Feb. 2001/02	98 (97)	42 (45)	26 (29)
Mar.-May 2002	92 (149)	51 (156)	41 (137)
Jun.-Aug. 2002	91 (98)	40 (43)	29 (34)
Sept.-Nov. 2002	48 (42)	33 (43)	24 (31)
Dec. 2002	142 (141)	63 (64)	27 (25)
Jan. 2003	79 (82)	41 (56)	24 (25)
Feb. 2003	93 (81)	54 (61)	49 (37)

(1) See footnote 1 on page 15.