Markets and operations

This article reviews developments in international and domestic financial markets and describes Bank of England market operations in the period 30 September 1999 to 14 January 2000.

- *The century date change passed with minimal disturbance to markets. Financial market turnover was generally low in December and corporate bond issuance fell, but activity rapidly returned to normal levels in early January.*

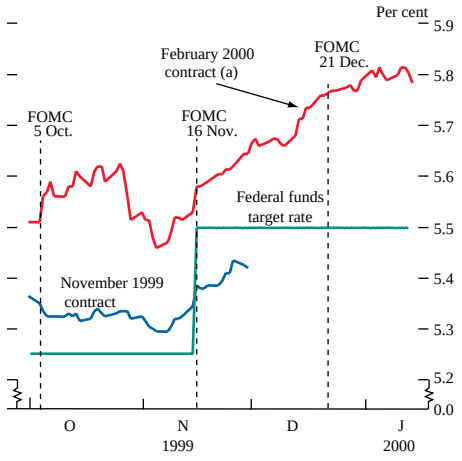
- *Official interest rates were raised in both the euro area and the United States in November, by 50 and 25 basis points respectively. During the period, yield curves in the euro area and the United States shifted upwards, largely in response to stronger-than-expected economic growth and in anticipation of further monetary policy tightening.*

- *Short-term market interest rates also rose in the United Kingdom, partly reflecting the MPC's decisions to raise the Bank's repo rate by 25 basis points in November and January. But long gilt yields fell, further accentuating the inversion of the gilt yield curve.*

- *Equity markets in all the major economies rose strongly during the period.*

- *The euro depreciated further against the other major currencies, despite higher market interest rates.*

Chart 1
Interest rates implied by Federal funds futures



Source: Bloomberg.

(a) FOMC meeting scheduled for 1–2 February 2000.

International markets

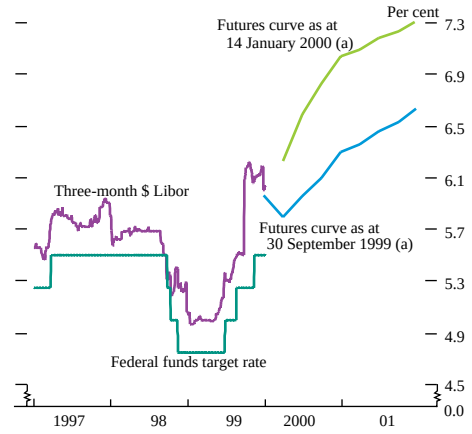
US developments

At its meeting on 5 October, the Federal Open Market Committee (FOMC) left the Federal funds target rate unchanged at 5¼%, but adopted a directive 'biased toward a possible firming of policy going forward'. Short-term market rates rose in the days following the announcement. However, data released in late October and early November indicated weaker-than-expected inflationary pressures in the US economy and prompted a significant rally in global money and bond markets.

By 8 November, the interest rate implied by the November Federal funds futures contract had fallen to 5.3% (see Chart 1), suggesting that markets saw a less than one in two chance of a ¼ percentage point increase in official rates at the FOMC meeting on 16 November.(1) But the stronger-than-expected October PPI release on 10 November led to renewed inflationary concerns, and by the time of the November FOMC meeting, there was a general expectation of a rate rise. Consequently, when the FOMC did announce a ¼ percentage point increase in its target rate to 5½%, there was little change in market interest rate expectations for 1999

(1) Each Federal funds futures contract settles on the simple average of the effective overnight Federal funds rate for that month, which tends to equal the FOMC's target rate. The target rate was expected to remain at 5.25% before the FOMC meeting on 16 November, so an implied average effective Federal funds rate of 5.3% for November suggested an expected target rate of 5.35% for the period 16–30 November. Hence, market participants placed roughly a 40% chance on a 25 basis points rise at the November meeting.

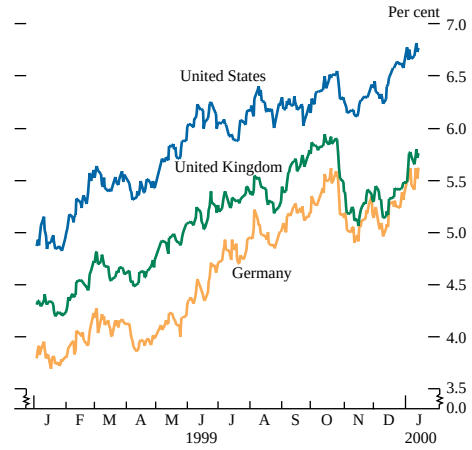
Chart 2
US interest rates



Source: Bloomberg.

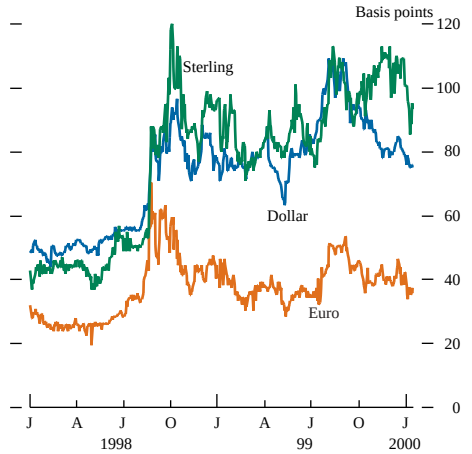
(a) Interest rates implied by eurodollar futures contracts at the dates specified. From December 1999, the x-axis relates to contract expiry dates.

Chart 3
Nominal ten-year government bond yields(a)



(a) Derived from Svensson par yield curves.

Chart 4
Ten-year swap spreads, by currency



Source: Bloomberg.

Q4, and market uncertainty about the near-term interest rate outlook, as measured by implied volatilities in interest rate options, fell (see the box on page 8).

Over the remainder of the period, US short-term interest rate expectations generally increased as economic indicators (such as retail sales and the trade deficit) reflected the continued strength of domestic demand. As had been expected, the FOMC left the stance of monetary policy unchanged at its meeting on 21 December. But in early January market interest rates increased further, on the view that Y2K-related concerns would no longer impede a rise in official interest rates. By 14 January, Federal funds futures fully priced in a ¼ percentage point rate rise at the FOMC meeting on 2 February; and some market participants felt that a larger increase was possible (see Chart 1).

Looking further ahead, interest rates implied by eurodollar futures contracts for end-2000 and end-2001 increased by about 70 basis points over the period as a whole, to 7% and 7.3% respectively (see Chart 2). This increase was larger than that for comparable euro, yen and sterling futures contracts.

During the period, Treasury yields reached their highest levels in more than two years; by 14 January, five and ten-year yields were some 60–70 basis points higher than on 30 September and thirty-year yields were up by around 50 basis points (ten-year yields are shown in Chart 3). The Treasury market responded to domestic news in much the same way as the short-term interest rate markets; yields increased at the beginning of the period, before falling back in late October and early November and rising again from mid-November onwards.

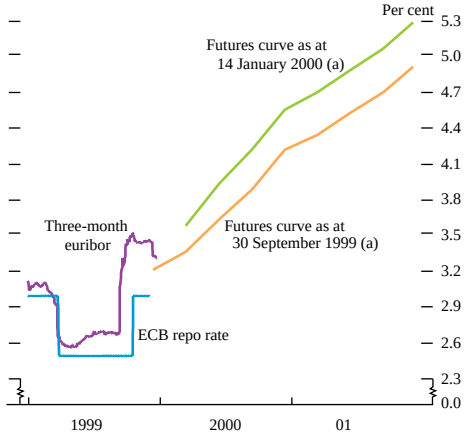
US ten-year swap spreads continued to narrow during Q4, falling from their August peaks towards levels last seen in January 1999 (see Chart 4). This may have reflected the decline in US non-government bond issuance in Q4, which would have allowed underwriters to carry less inventory. Reduced demand to hedge such inventory by paying fixed interest in a swap transaction may have led swap rates to fall relative to Treasury yields. In addition, concerns about market conditions over the century date change eased in November and December (see the box on pages 18–19). The demand to hold Treasury securities for precautionary purposes over the year-end may therefore have fallen, reducing the price premium on Treasury securities over private sector assets.

Euro-area developments

The pattern of market interest rate movements in the euro area was similar to that in the United States during the period. In early and mid-October, interest rates implied by euribor futures edged higher, as inflation concerns grew following stronger-than-expected data releases for euro-area PPI, French CPI and German import prices, as well as comments by ECB officials about the upside risks to euro-area inflation.

During late October and early November, however, market interest rates fell, triggered by the fall in US market interest rates. This was despite the release of stronger-than-expected European data (such as euro-area M3 and the French INSEÉ manufacturing survey) and the decision by the European Central Bank (ECB) on 4 November

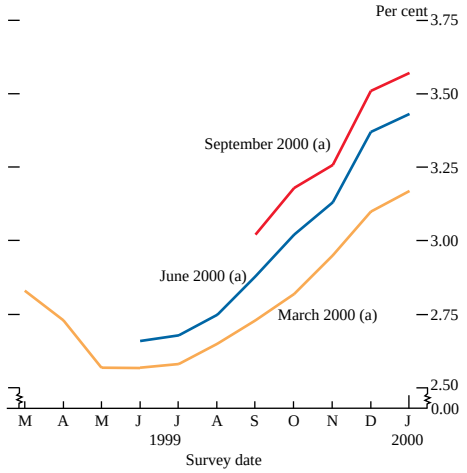
Chart 5
Euro-area interest rates



Source: Bloomberg.

(a) Interest rates implied by euribor futures contracts at the dates specified. From December 1999, the x-axis relates to contract expiry dates.

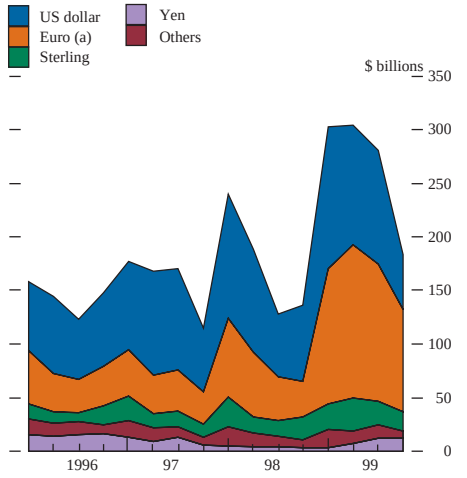
Chart 6
ECB repo rate expectations



Source: Reuters poll of economists.

(a) Mean expectation of ECB repo rate at dates shown. Economists polled differed across surveys.

Chart 7
Non-government international bond issuance, by currency



Source: Capitaldata Bondware.

(a) Based on issuance in the eleven euro-area legacy currencies before 1 January 1999.

to increase its repo rate by a ½ percentage point to 3%. Markets had increasingly come to expect this repo rate rise; following the announcement, interest rates implied by futures contracts for 2000 and 2001 actually fell. This reaction probably reflected three factors. First, the increases in US interest rates. Second, the November ECB rate rise was seen, on one view, as 'pre-emptive', lessening the need for higher rates in the future. And third, the ECB's move reduced near-term market uncertainty about monetary policy (see the box on page 8). Interest rate expectations fell further following the larger-than-expected falls in German industrial production and retail sales, announced on 8 and 12 November respectively.

By mid-January, however, some in the market had come to expect a further increase in the ECB repo rate as early as 2000 Q1, following signs of stronger-than-expected economic activity in the euro area. In particular, market interest rates increased following the German Ifo survey of business confidence, released on 16 December. There was also concern about possible wage pressures in Germany following the demand from the engineering union IG Metall for a 5½% annual pay award.

Over the period as a whole, interest rates implied by euribor futures increased by 20 basis points for the March 2000 contract and by some 35 basis points for contracts expiring at the end of 2000 and 2001 (see Chart 5). Similarly, most private sector economists increased their forecasts of the ECB repo rate in 2000 by about 40 basis points (see Chart 6).

Bund yields also rose over the period, by some 45 basis points at the ten-year horizon (see Chart 3). Yields occasionally increased following lower-than-expected bid-to-cover ratios in Bund auctions. At other times, yields increased when the euro weakened, and fell on its recovery. Both dollar and euro-denominated bond issuance fell in 1999 Q4 (see Chart 7). Nonetheless, the euro's share of total bond issuance increased. This reflected continued expansion of European capital markets following the introduction of the euro.

Japanese developments

The Bank of Japan (BoJ) maintained its zero interest rate policy during Q4 and announced, on 13 October, a wider range of money market operations to ensure 'further permeation of the effects of monetary easing'. This included the introduction of outright sales and purchases by the BoJ of short-term government securities, the addition of two-year government securities as eligible collateral for BoJ repo operations, and further temporary operational changes to accommodate any stronger-than-usual demand for liquidity related to Y2K concerns.

Over the period as a whole, interest rates implied by euroyen futures for contracts expiring in 2000 H2 and 2001 H1 increased by 5 to 10 basis points. Changes in Japanese market interest rates were less closely related to those in the United States and the euro area: the correlations between daily changes in interest rates implied by euroyen futures and those implied by eurodollar and euribor futures over the period were 0.3 and 0.4 respectively, compared with a eurodollar-euribor correlation of 0.6. Instead, domestic considerations were more important. Although market interest rates fell following the weaker-than-expected Q3 GDP data

Interest rate option volatility

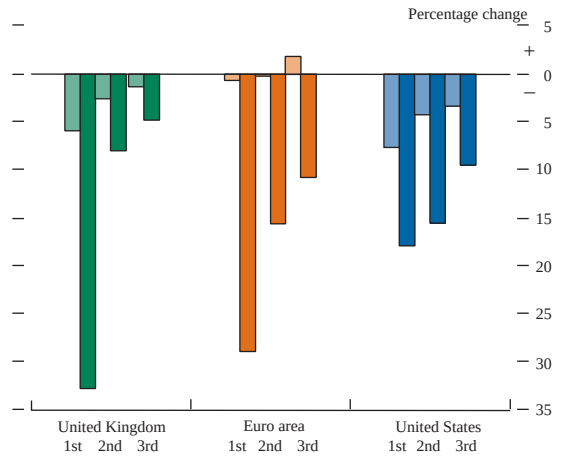
Implied volatilities (IVs) of options on short-term interest rate (STIR) futures are a measure of market uncertainty about the interest rate outlook.(1) IVs generally fall following policy announcements because the policy decision provides significant new information on the level of interest rates likely to prevail at the maturity date of the option, and because the number of possible changes in official interest rates that remain before the futures contract expires falls by one as each monetary policy meeting passes.

In November 1999, the monetary authorities in the United Kingdom, the euro area and the United States all increased their official interest rates. This monetary tightening was followed by a much larger fall in the IVs of options on STIR futures than is usual in response to monetary policy changes.(2) Furthermore, the fall in the December UK IV following the MPC's rate rise on 4 November 1999 was the largest daily percentage fall on the front short sterling futures contract since the MPC raised rates in August 1997, a move which market participants had expected to be the final increase in that interest rate cycle.

The chart shows the average percentage changes in IVs on monetary policy announcement days (in lighter shades), and the percentage changes in IVs in response to the November 1999 interest rate rises (in darker shades) for the front three STIR futures contracts in each economy.(3) Part of the fall in IVs of the December 1999 options may have been related to perceived Y2K risks. Some in the markets had been concerned that an increase in interest rates in December could increase the premium on borrowing over the millennium date change, because a rate rise would come at a time when markets were illiquid. The rise in official rates in November was seen as removing, or at least greatly reducing, the chance of a December rate rise, and thus reduced the uncertainty attached to future short-term interest rates by more than usual.

The large falls in IVs in November may also have been related to market perceptions of the monetary policy outcome. For instance, in the euro area, market players were expecting interest rates to rise, but were unsure of the timing of such a move. When the ECB raised its repo rate on 4 November, this uncertainty was removed and, at that time, market participants were confident that euro-area rates would remain at their new 3% level for some time to come. Similarly, in the United Kingdom, markets also saw the November rate rise as being pre-emptive, thereby reducing the need for further rate increases in the future. In the United States, the November rate rise was accompanied by a statement from the FOMC noting that increasing labour market tightness 'must eventually be contained if inflationary imbalances are to remain in check and economic expansion continue'. Although this led US market interest rates to rise, the unambiguous nature of the statement helped to reduce uncertainty about the future path of near-term rates.

Reaction to IVs to monetary policy announcements



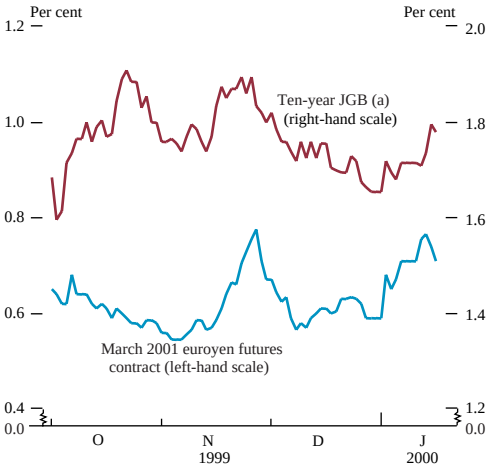
Sources: Bank of England and Bloomberg.

Note: Light shade: average reaction. Dark shade: November 1999.

In addition to the considerations noted above, technical factors may have augmented the decline in UK IVs. There is said to be less liquidity in sterling fixed-income and derivatives markets than in dollar and euro markets, and UK banks are said to have been heavy buyers of caps.(4) Both of these factors are thought to have generated a higher implied volatility in short sterling futures prior to November, and may therefore have exaggerated the downward reaction of UK IVs to the developments described above. The volume of options traded on the front three short sterling futures contracts in the week of the November MPC meeting totalled some 110,000 contracts, equivalent to £55 billion-worth of notional principal. While this represented reasonable market liquidity by UK standards, the turnover was low relative to the US and euro-area contracts. The equivalent turnover volume for options on the front three euribor futures contracts in the week of the November ECB meeting and the front three eurodollar futures contracts in the week of the November FOMC meeting were around £100 billion and £240 billion respectively.

(1) Implied volatilities (IVs) are the market's expectation of the standard deviation of the distribution of future daily changes in the interest rates implied by a futures contract. Higher IVs reflect greater market uncertainty.
(2) Relevant STIR futures are short sterling (for the United Kingdom), euribor (for the euro area) and eurodollar (for the United States).
(3) The sample covers May 1997 to October 1999 for the United Kingdom and United States, and January to October 1999 for the euro area. Only options on March, June, September and December futures contracts are used.
(4) Caps are a strip of options on Libor interest rates traded in the over-the-counter market.

Chart 8
Japanese market interest rates



Sources: Bloomberg and Bank of England.

(a) Derived from Svensson par yield curve.

Table A
International equity market performance

Percentage changes from previous period, in local currencies

	1998	1999		
	Year	H1	Q3	Q4 (a)
United States				
S&P 500	26.7	11.7	-6.6	14.2
Dow Jones 30	16.1	19.5	-5.8	13.4
Nasdaq	39.6	22.5	2.2	48.0
Europe				
CAC 40 (France)	31.5	15.1	1.2	26.1
Dax (Germany)	17.7	7.5	-4.3	39.3
Dow Jones Euro Stoxx 50	32.0	13.4	-3.1	31.6
FTSE 100	14.6	7.4	-4.6	10.4
Japan				
Nikkei 225	-9.3	26.6	0.4	7.7

Source: Bloomberg.

(a) 30 September 1999–14 January 2000.

Table B
Revisions to forecasts for GDP growth in 2000

	October 1999 (per cent)	January 2000 (per cent)	Difference (percentage points)
Euro area	2.8	3.0	0.2
Japan	0.4	0.7	0.3
United Kingdom	2.8	3.1	0.3
United States	2.9	3.6	0.7

Source: Consensus Economics.

Table C
Interest rate expectations implied by futures contracts for December 2000

	Implied yields (per cent)		Change
	30 September 1999	14 January 2000	(basis points)
Japan	0.51	0.61	10
United Kingdom	7.05	7.25	20
Euro area	4.23	4.56	33
United States	6.30	7.04	74

Source: Bloomberg.

in early December, there was a general improvement in sentiment about the outlook for the Japanese economy. In addition, statements by BoJ officials were interpreted as suggesting that the zero interest rate policy might end sooner than some market participants expected. Both of these factors at times led Japanese market interest rates to rise. Japanese government bond (JGB) yields also increased, by around 15 basis points (see Chart 8).

International equity market developments

Most major international equity markets reached record highs in Q4, despite the increase in market interest rates. Over the period, the Nasdaq composite index, which has a large IT component, increased by 48% (see Table A); IT stocks similarly accounted for a large proportion of the gains made by other major equity market indices. In the euro area, share price increases were also influenced by anticipated merger activity and, in Germany, by the government's announcement in December of the proposed easing of tax disincentives to sales of cross-company shareholdings.

Foreign exchange markets

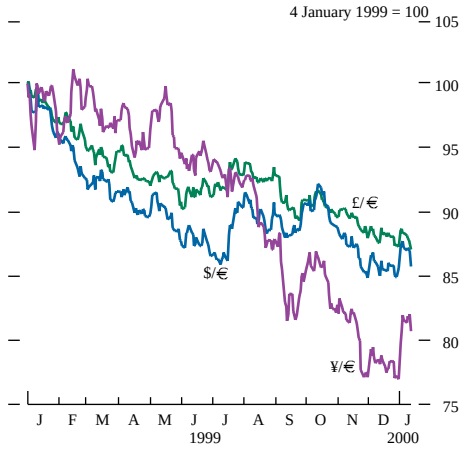
The US dollar's effective exchange rate index increased by 1.3% over the period, largely reflecting a 5.2% appreciation against the euro and a small appreciation against sterling. These bilateral movements were partially offset by depreciations of 0.4% and 1.3% against the Japanese yen and the Canadian dollar (these two currencies together account for 55% of the US dollar index).

Changes in growth prospects and interest rate expectations help to explain the dollar's appreciation against the euro and sterling. Although growth forecasts were typically revised upwards for all the major industrialised countries during the period, projections for US growth in 2000 were generally revised up the most (see Table B). These changes in perceptions about growth prospects were accompanied by similar movements in short-term interest rate expectations. As can be seen from Table C, the increase in interest rates implied by futures contracts maturing in December 2000 was greater for the United States than it was for the United Kingdom, the euro area and Japan. However, while these considerations help to explain the dollar's appreciation against the euro and sterling, they fail to explain the dollar's small depreciation against the yen.

Relative growth prospects and interest rate differentials were not the only influences on dollar exchange rates during the period, however. In particular, the correlation between movements in the dollar and US equity prices remained relatively high by recent historical standards. For example, the dollar fell following the stronger-than-expected average hourly earnings and producer price releases in early and mid-October. Although these data were widely interpreted as increasing the probability and likely size of interest rate increases by the FOMC, the dollar was more sensitive over short time horizons to the impact of higher interest rates on the US equity market than it was to changes in the yield curve. Falls in the Dow Jones Industrial Average therefore tended to coincide with falls in the dollar, often notwithstanding an increase in US interest rate expectations.

The euro continued to depreciate over the period, by around 5% against the dollar and the yen and by 4.4% against sterling. The

Chart 9
Euro exchange rates



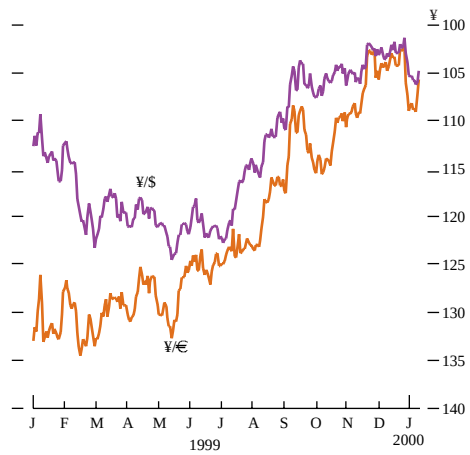
decline in the euro's effective exchange rate was slightly smaller (3.5%), reflecting little change in the level of the euro against other European currencies. During December, the euro fell to new lows against the dollar, sterling, and the yen (see Chart 9).

As noted above, some of the depreciation of the euro against the dollar reflected changes in relative interest rates and growth expectations. It is less easy to explain the euro's depreciation against sterling and the yen. Interest rates implied by euribor futures contracts actually increased by more than those for either short sterling or euroyen futures contracts, and although consensus forecasts of growth in 2000 were revised up by more for the United Kingdom and Japan than for the euro area, the differences between the revisions were small.

This anomaly may be partly explained by the greater weight that market participants have appeared to place on German data than on data from the other euro-area economies. Evidence about the strength of the German economy was mixed during the period, and market participants tended to react more to signs of weakness. For instance, the euro depreciated following the weaker-than-expected German industrial production and retail sales data in November. Furthermore, during the period as a whole, the consensus forecast for German GDP growth in 1999 was revised down and the forecast for 2000 revised up by only 0.1 percentage point, a smaller increase than for the rest of the euro area.

At first glance, the depreciation of the euro also appears odd in the context of rising equity prices and increased euro-denominated bond issuance. However, foreign investor demand for euro-area bonds and, to a lesser extent, equities, appears to have been quite low. The available evidence from flow of funds data suggests that it is euro-area investors (rather than foreign investors) that have been the major buyers of euro-area equities and euro-denominated bonds. Balance of payments data suggest that the euro area had a deficit (ie net outflow) of foreign direct investment for the first eleven months of 1999 of €121 billion, compared with a deficit of €99 billion for the same period in 1998.

Chart 10
Yen exchange rates



Looking ahead, most market participants expect the euro to appreciate in 2000. Private sector analysts responding to a survey conducted in January by Consensus Economics attached a 65% probability to the prospect of the euro appreciating against the US dollar by more than 4% over the coming year.

Following a rise of 12.1% in 1999 Q3, the Japanese yen's effective exchange rate index appreciated by a further 2.2% during the review period. The yen rose sharply against the euro, appreciating by 5.6% (see Chart 10).

As already noted, the yen's appreciation cannot easily be rationalised in terms of changes in relative growth prospects or interest rate expectations. One explanation for the yen's movements relates to the strong rise in Japanese equity prices last year. Measured in common currency terms, the Nikkei rose by more than any of the other major stock market indices in 1999. This performance has attracted, and been aided by, considerable purchases of Japanese equities by foreign investors. Many of these

Chart 11
Sterling exchange rates

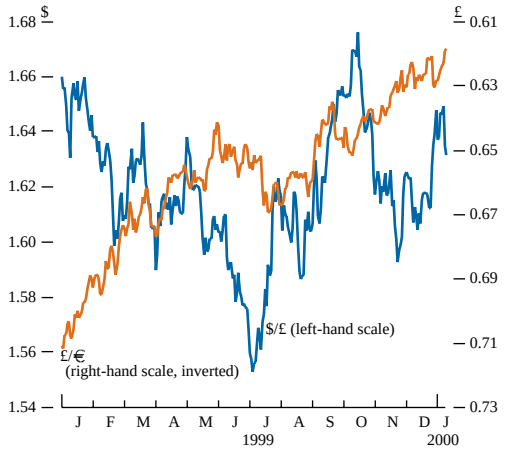
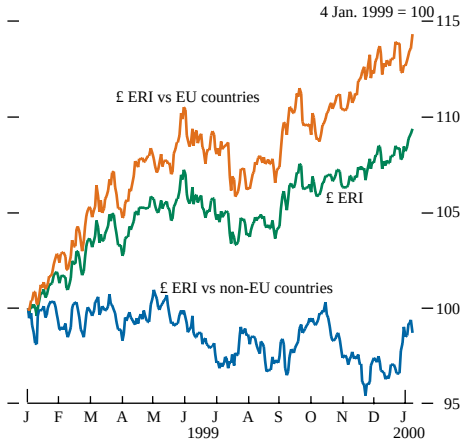


Chart 12
Sterling effective exchange rates



transactions are likely to have generated increased demand for yen. The BoJ was reported to have intervened to limit the appreciation of the yen on four occasions over the period: twice in late November (after the yen hit a four-year high against the dollar of ¥101½), on Christmas Eve and on 4 January (again as the dollar reached ¥101½). Following the latter intervention, the yen fell to ¥103 against the dollar, and continued to fall over the following week to ¥105.

Sterling

Sterling's exchange rate index (ERI) rose by 3.0% over the period, to 108.3, its highest level since April 1998. The pound appreciated by 4.4% against the euro to £0.62, equivalent to an exchange rate against the Deutsche Mark of DM3.16. Against the US dollar, sterling depreciated by 0.7% to $1.63½ (see Chart 11).

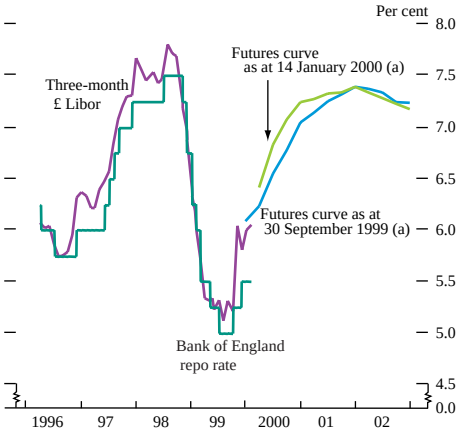
Since the beginning of 1999, the dominant influence on sterling's ERI has been the sterling-euro exchange rate, which has a 65% weight in the index; the pound has been broadly unchanged against other currencies on a trade-weighted basis (see Chart 12). During the review period, many of the factors which accounted for the euro's weakness were also responsible for sterling's strength. For example, the appreciation of sterling against the euro to a low of £0.6201 in late December reflected the euro's more general weakness. As noted previously, sterling's movements against the euro are not easy to explain in terms of relative interest rate developments. The depreciation of the euro may have partly reflected the market's particular focus on economic prospects in Germany, which have tended to be weaker than elsewhere in the euro area. During the period, forecasts of GDP growth for the United Kingdom in 2000 were revised up by more than for Germany, and market participants increasingly talked about the possibility that the United Kingdom's long-run potential rate of growth had increased.

Despite these developments, the difference between the price of sterling call and put options against the euro (known as risk reversals) remained small during the period, suggesting that demand for protection against further sterling appreciation was not very strong. This was consistent with market forecasts of the euro-sterling exchange rate throughout Q4, which were for sterling to depreciate against the euro; market participants also expected the dollar to depreciate against the euro.

With supply-side improvements also perceived to have taken place in the US economy, sterling's modest depreciation against the dollar appears to have been more closely related to movements in relative interest rates.

In addition to the above considerations, sterling continued to be supported by actual and anticipated mergers and acquisition activity. During the period, inward takeovers (ie purchases of UK firms by overseas companies) greatly exceeded outward takeovers in total value, perhaps partly because stock market valuations in the UK were lower than in some overseas markets. Many of these deals will have involved orders to buy sterling in the foreign exchange markets.

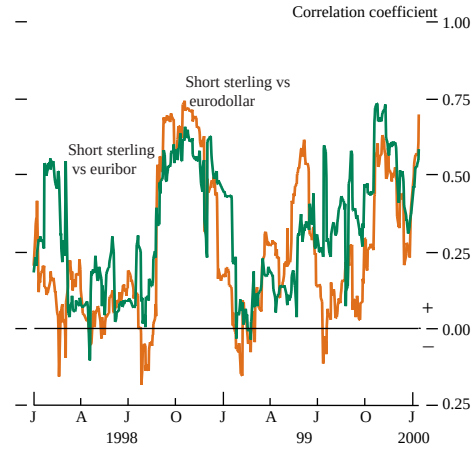
Chart 13
UK interest rates



Sources: Bank of England and Bloomberg.

(a) Interest rates implied by short sterling futures contracts at the dates specified. From December 1999, the x-axis relates to contract expiry dates.

Chart 14
Correlations between futures contracts(a)



Sources: Bank of England and Bloomberg.

(a) 30-day rolling correlations between front contracts; euro-DM futures contracts used prior to 26 February 1999.

Sterling markets

Short-term interest rates

The Monetary Policy Committee (MPC) raised the Bank's repo rate by 25 basis points on two occasions during the period: on 4 November and on 13 January. At each of the MPC meetings during the period there was some market expectation that the Bank's repo rate would be raised and sometimes by a larger amount than the eventual rise. Rates implied by futures contracts fell in the trading sessions following each of the MPC announcements. The largest decline followed the November announcement; this repo rate increase was interpreted by some market participants as indicating that future monetary policy tightening might be smaller than had been previously thought.

Short-dated interest rates implied by futures contracts for dates in 2000 and 2001 rose during the review period, by 30 basis points for the September 2000 contract, but the peak in implied interest rates, at close to 7.40% in 2002, was little changed (see Chart 13). Hence, markets expected monetary policy to be tightened sooner than previously thought: on 14 January the futures market projected that three-month Libor would rise to 7.25% by December 2000, whereas at the end of 1999 Q3 this level was not expected to be reached until June 2001.

Much of this increase in market interest rates can be explained by stronger-than-anticipated economic activity, perhaps giving rise to inflationary pressures sooner than had previously been expected. At various times, the strength of average earnings, house price rises, business sentiment surveys, and retail sales surprised markets. Most forecasters revised up their projections of output growth during this period (see Table B). Money market rates also rose after the publication of the minutes of the November MPC meeting: the discussion of a possible 50 basis point rise and the 8–1 vote in favour of monetary tightening came as a surprise (at least two members had been expected to vote for an unchanged rate).

Movements in UK market interest rates were also strongly influenced by international developments during the period. The evolution of implied futures rates in the United Kingdom, the euro area, and the United States shared a common pattern, rising until late October, falling until mid-November, and then rising again thereafter. For example, on 14 October, implied interest rates in the United States, the euro area and the United Kingdom rose in response to the stronger-than-expected rise in US retail sales. Correlation coefficients between interest rate futures prices for the three areas were relatively high during the period (see Chart 14); the sterling-euribor correlation increased over the period, reaching its highest level for the past two years.

Interest rates implied by short sterling futures contracts are just one measure of expectations for the future path of the Bank's repo rate. Other measures include interest rates derived from the gilt repo market and forecasts made by private sector economists. There are some differences between these measures. Futures contracts settle on three-month Libor (effectively showing this as a forward three-month rate); surveys are based on the Bank's two-week repo rate; and the expectation derived from the gilt repo market is a

Table D
Sterling interest rate expectations

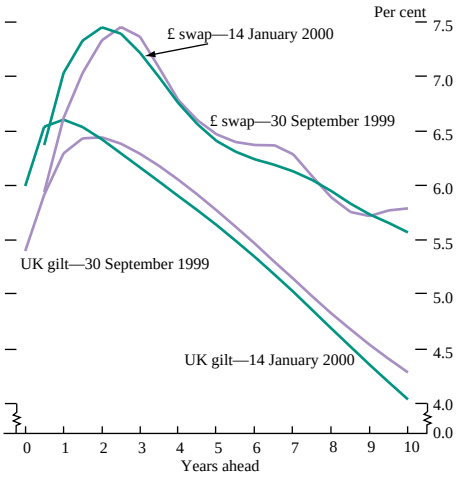
Levels; per cent

	30 September 1999	5 January 2000	Change
December 2000			
Reuters survey (a)	5.98	6.32	0.34
Short sterling futures	7.05	7.38	0.33
GC repo market (b)	6.32	6.69	0.37
December 2001			
Reuters survey	5.98	6.10	0.12
Short sterling futures	7.39	7.47	0.08
GC repo market	6.45	6.53	0.08

Sources: Bank of England, Reuters and Bloomberg.

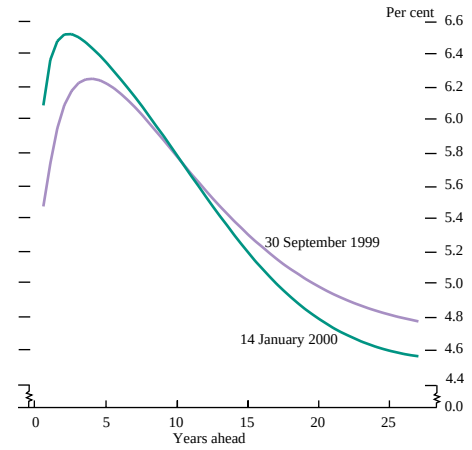
(a) Economists' median forecasts for the Bank's repo rate at the specified dates.
(b) Two-week forward rate derived using the Bank's 'variable roughness penalty' (VRP) curve fitting technique (see November 1999 *Quarterly Bulletin*, page 387).

Chart 15
UK gilt and swap six-month forward rates(a)



(a) The gilt curve is derived using the VRP curve fitting technique.

Chart 16
UK gilt par yields curve(a)



(a) Derived using the VRP curve fitting technique.

two-week forward rate.(1) As can be seen from Table D, all of these measures show an increase in interest rate expectations since September.

Each rise was of a similar magnitude, leaving the spreads between the various measures little changed. About 30 basis points of the spread between the rates derived from futures contracts and those derived from surveys can be explained by technical factors.(2) Differences of opinion between traders and economists may also help to explain some of the gap. The remainder could be attributable to factors such as 'overshooting' in markets because of momentum trading, shifts in supply and demand pressures in the futures market, and the diminished supply of risk capital during 1999 (through reduced hedge fund activity). There were also differences between interest rate expectations derived from futures and from surveys in the United States and the euro area in Q4. While they were smaller than in the United Kingdom, their existence suggests that the relatively wide sterling futures-surveys disparity cannot be explained by UK-specific factors alone.

The profile of six-month forward rates derived from the interest rate swap market was similar to that projected by short sterling futures (see Chart 15).

Long-term interest rates

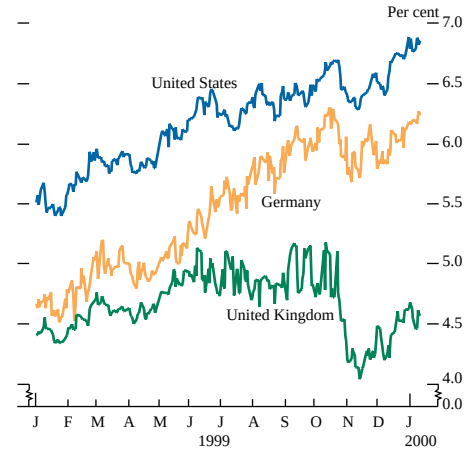
The inversion of the gilt yield curve became more pronounced during the review period (see Chart 16). While five-year par yields rose by some 10 basis points, to 6.3%, due to heightened expectations of further monetary policy tightening, ten-year yields were little changed, at 5.75%, and 25-year yields fell by some 20 basis points, to 4.6%, largely as a result of institutional factors.

The par yield on 6% Treasury Stock 2028, the longest-maturity conventional gilt in issue, fell to a record intra-day low of 4.02% on 5 November. US and European developments had a significant impact on the gilt market at around this time. Nevertheless, between late October and mid-November the decline in medium and long-dated gilt yields exceeded the fall in US Treasury and German Bund yields (see Charts 3 and 17). This suggests that some of the reduction in gilt yields was due to UK-specific factors. For example, at around this time the market increasingly came to anticipate that the Pre-Budget Report (PBR) would confirm lower government borrowing needs and lead to the cancellation of gilt auctions; this added to the downward pressure on yields.

Other factors may also have been influential. Pension funds and life assurance companies hold around 55% of the outstanding stock of gilts. For the purposes of the Minimum Funding Requirement (MFR), the liabilities of pension funds with a mature membership and obligations defined in nominal terms are discounted using long gilt yields. This gives funds an incentive to hold gilts to limit the risk of not matching their liabilities. Life assurance companies' demand to hold gilts is related to their past practice of selling

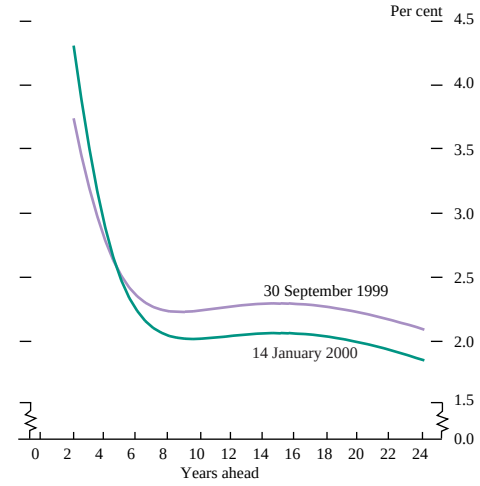
(1) For a more detailed discussion of the differences between these measures of interest rate expectations, see page 335 of the November 1999 *Quarterly Bulletin*.
(2) These include the current upward slope at the front end of the yield curve, a difference between BBA fixings and screen-quoted cash rates, credit risk, and a compounding factor (a two-week repo rate is being compared with a three-month Libor rate).

Chart 17
Nominal 30-year government bond yields(a)



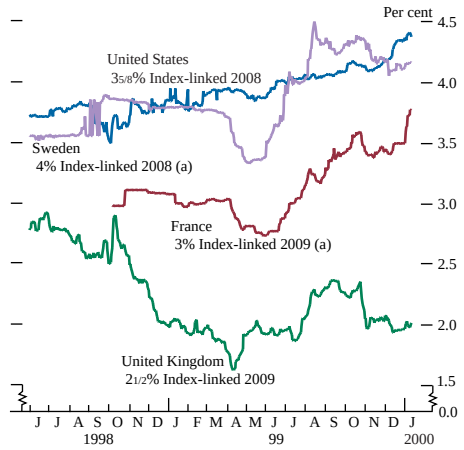
(a) Derived using the Svensson par yield curves.

Chart 18
Real zero-coupon gilt yield curve(a)



(a) Derived using the VRP curve fitting technique.

Chart 19
Real yields on index-linked government bonds



policies with guaranteed minimum annuity rates (as well as writing other long-term nominal liabilities). These minimum rates are now, in many cases, well above current market annuity rates, and the margin has widened as long gilt yields have fallen. This, in turn, has prompted life assurance companies to make further purchases of gilts to limit the losses to which they are exposed.

These factors can sometimes precipitate more gilt purchases when yields decline, thereby adding further to the downward pressure on yields. For instance, the fall in yields in October and November will have taken some pension funds closer to their MFR-based valuation limits. This may have led them to hedge the risk of further erosion in relation to their MFR limits by buying more long gilts. A second example could arise from the hedging activity undertaken by firms that have sold long-dated receivers' swaptions to life assurance companies.(1) These contracts were used by the life assurance companies to hedge their guaranteed annuity exposures. The positions of the options writers would have been hedged when the contracts were written, but the fall in yields would have required them to make further gilt purchases (or to receive fixed in the swaps market) to keep their interest rate exposure constant (known as delta-hedging).

These influences diminished from the middle of November and gilt yields moved higher, broadly in parallel with increases in short-term interest rates and yields on US Treasuries and German Bunds. Two other factors also put upward pressure on gilt yields around this time. First, there was further discussion in the markets about the potential for reform of the MFR, focusing on the possibility of using corporate bonds (in addition to long gilts) to discount nominal liabilities. If realised, this could reduce the demand for long gilts. Second, the financial markets' smooth transition over the century date change led to a further general rise in global interest rate expectations early in the new year.

Index-linked gilts

The real interest rate curve generated from index-linked gilts using the Bank's new variable roughness penalty (VRP) fitting technique (see the box on page 15) inverted further during the review period (see Chart 18), similar to the change in the shape of the conventional yield curve. Long-dated real yields followed conventionals, with a sharp fall in late October to early November. An additional influence on long-dated index-linked yields was the auction of the 2½% Index-linked Treasury Stock 2016 on 27 October which met with stronger-than-expected demand, largely from pension funds and life assurance companies. The change in the shape of the curve also reflected institutional switching from shorter-dated to longer-dated IGs, as portfolio durations were adjusted when the 4⅜% 2004 stock was removed from the benchmark. Long-dated real yields in the United Kingdom remained considerably lower than those overseas during Q4 (see Chart 19).

Gilt auctions

During the course of Q4, the Debt Management Office (DMO) held one index-linked and one conventional gilt auction, and completed

(1) A receivers' swaption gives the buyer the option to receive fixed interest in a swap contract.

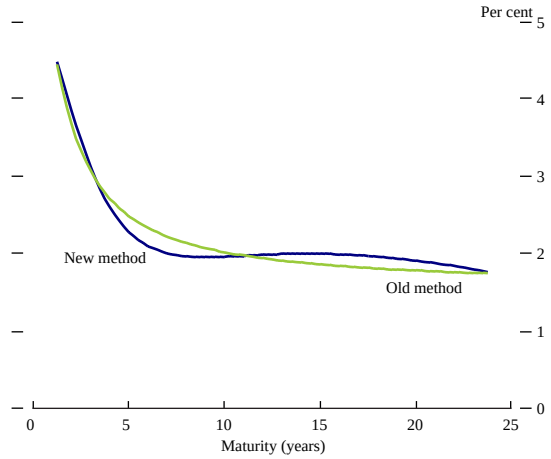
New estimates of the term structure of real interest rates

New estimates of the UK nominal yield curve derived from gilt prices and general collateral (GC) repo rates were presented in the November 1999 *Quarterly Bulletin*.(1) This box briefly outlines how a similar approach can be used to estimate the real yield curve from index-linked gilts (IGs).

The new approach has two main features. First, it uses a smoothing spline approach (rather than the parametric approach used before). And second, it adopts the framework developed by Evans(2) to deal with the fact that IGs are not true 'real' bonds—payments on IGs are indexed to the level of the RPI prevailing eight months previously. This technique has two main advantages over the Bank's previous method of estimating the real and inflation term structures. First, it allows the curve to fit the data more accurately. And, second, the derived yield curves are more stable; small changes in the underlying IG prices do not produce disproportionate changes in the derived curves.

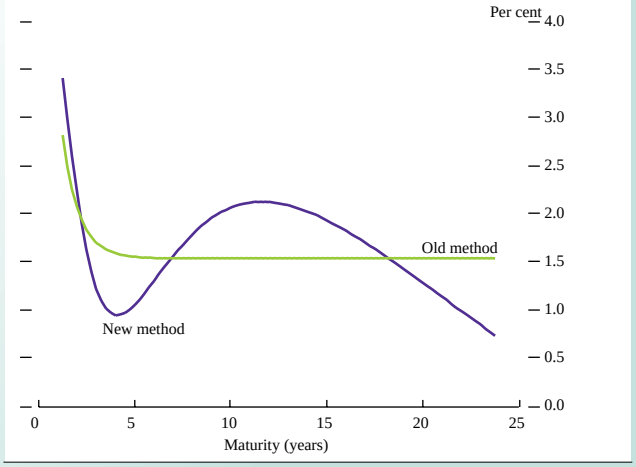
As an illustration of the first point, Chart A shows the new and old estimates of the real zero-coupon yield curve on 10 January 2000. The new method is able to capture more accurately the structure of the underlying curve.

Chart A
Comparison of yield curves on 10 January 2000



Nevertheless, a number of caveats must be placed on the interpretation of the new curve. First, the sparsity of IG issues means that we are unable to estimate the very short end of the curve. Second, the relatively large spacing between IG redemption dates means that the local slope of the yield curve is not particularly well defined; care must therefore be taken when examining forward-rate curves. For example, Chart B shows instantaneous forward rates corresponding to the zero-coupon yield curves of Chart A. First note the upward slope in the five to ten-year maturity range. This reflects the slight increase in the corresponding redemption yields—it is exaggerated simply because of the mathematical relationship between zero-coupon yields and forwards. So though it is difficult to rationalise the shape of the forward curve in economic terms, the new model fits the available data more accurately than the old one. The issue arises because the underlying data themselves are difficult to interpret. Although one of the benefits of the spline methodology is that it attaches relatively low weight to movements in the prices of individual bonds, the sparsity of IGs means that the 'neighbourhood' in which it does so is much larger than for the nominal curve.

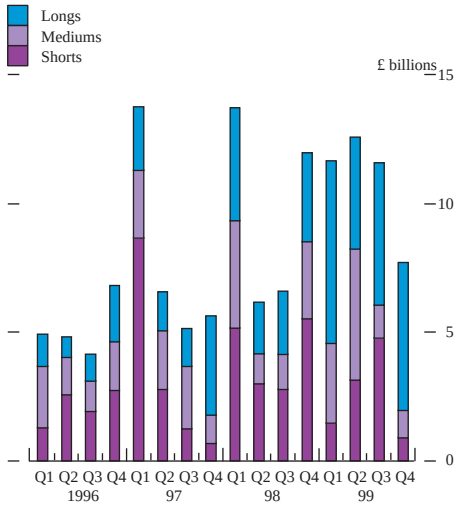
Chart B
Instantaneous real forward rates on 10 January 2000



In summary, the new technique is better able to reflect information in the index-linked gilts market than that used in the past, but the relative scarcity of IGs means that estimates of the real curve, particularly in terms of forward rates, will always be less reliable than those of the nominal curve, irrespective of the method used.

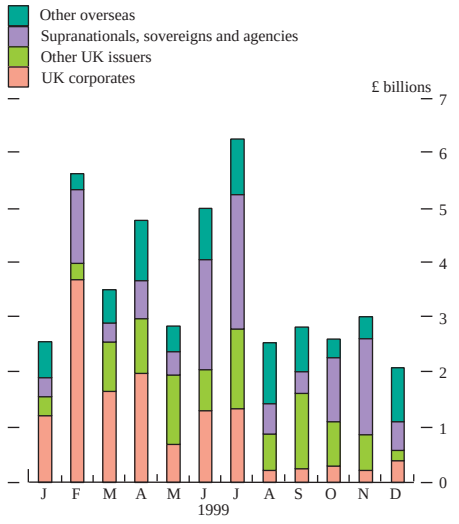
(1) See 'New estimates of the UK real and nominal yield curves', Anderson and Sleath, *Bank of England Quarterly Bulletin*, Vol 39(4), pages 384–92.
(2) Evans, M D D (1998), 'Real rates, expected inflation, and inflation risk premia', *Journal of Finance*, Vol 53.

Chart 20
Sterling non-government bond issuance(a)



(a) By maturity: shorts <7 years: mediums: 7–15 years; and longs: >15 years.

Chart 21
Sterling non-government issuance, by type of issuer



a gilt switch auction (see Table E). The auctions were well-covered, and differences between the highest and lowest accepted yields were relatively small; yields on the sale stocks either fell or held steady after the auctions. There were two auctions in Q1: 2½% Index-linked Treasury Stock 2024 on 26 January 2000 and a switch of 8% Treasury Stock 2015 into 6% Treasury Stock 2028 on 9 February.

The conventional gilt auction scheduled for 29 March was cancelled following the publication of the PBR on 9 November. The gilt sales requirement was reduced by £3.1 billion compared with the April 1999 Budget estimate, reflecting a downward revision to the Central Government Net Cash Requirement. Total gilt sales for the financial year are now planned to be in the range £13.8 billion to £14.6 billion (in cash terms).

Other sterling bond issues

Total fixed-rate sterling bond issuance (other than gilts) was £7.7 billion in Q4, bringing issuance for the year to a record £43.6 billion. The largest part of this Q4 total was of longer-dated maturities (£5.7 billion), with just £1.1 billion in mediums and £0.9 billion in shorts (see Chart 20).

Earlier in the year there had been some concern that market liquidity might deteriorate in Q4 as investors' and traders' risk appetite diminished ahead of the century date change. The heavy issuance in Q2 and Q3 (compared with previous years) may have reflected some borrowers bringing forward their funding plans to avoid uncertain market conditions at the end of the year. Total fixed-rate issuance in Q4 was indeed lower than in the previous four quarters, but it was greater than had been expected, and a fairly steady stream of issuance was maintained until mid-December. Nevertheless, the number of UK corporate issuers did decline in the second half of the year (see Chart 21). In Q4, just eight non-financial firms tapped the bond market for financing, down from 19 in Q2. Furthermore, 80% of the £1 billion of UK corporate issuance in Q4 was raised by only four companies, each with credit ratings of AA or A (see Table F). Issuance by companies rated BBB or below fell to just £0.4 billion, down from £1.1 billion in Q3.

There were large dividend payments on gilt and eurosterling bonds in early December. Consequently, a number of issues were brought in November with settlement dates on or around the dividend

Table E
DMO gilt auctions results

Conventional and index-linked

Date	Stock	Amount issued (£ millions)	Cover	Yield at lowest accepted price	Lowest accepted price
27.10.99	2½% Index-linked Treasury Stock 2016	350	2.65	2.34% (a)	£204.61
24.11.99	6% Treasury Stock 2028	2,000	1.79	4.27%	£129.60
26.01.00	2½% Index-linked Treasury Stock 2024	350	2.54	1.93% (a)	£187.01

Switch

Date	Source stock	Nominal amount purchased (£ millions)	Cover	Destination stock	Total nominal amount created (£ millions)
21.10.99	8% Treasury Stock 2003	1,000	5.129	5% Treasury Stock 2004	1,120

(a) Real yield, assuming 3% inflation.

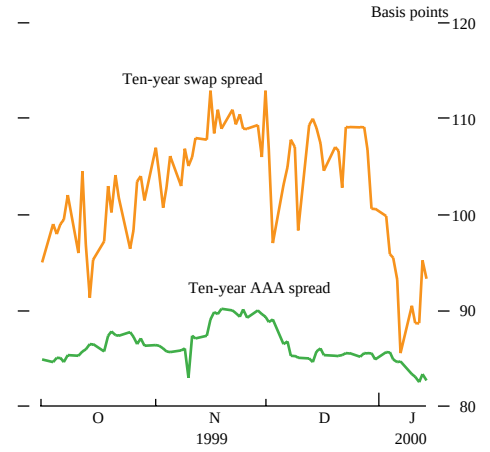
Table F
Sterling bond issuance in 1999 Q4

	Number of companies	Amount (£ billions) Total	By credit rating: AAA	AA/A	BBB and below
Fixed-rate issues					
UK corporates	13	1.6	0.2	1.0	0.4
UK financials	5	0.9	0.0	0.9	0.0
Supranationals	6	2.4	2.4	0.0	0.0
Overseas public sector (a)	9	2.0	1.9	0.1	0.0
Overseas corporates	1	0.3	0.3	0.0	0.0
Overseas financials	2	0.5	0.2	0.3	0.0
Total (a)	**36**	**7.7**	**5.0**	**2.3**	**0.4**
FRNs					
UK corporates	1	0.1	0.1	0.0	0.0
UK financials	7	1.5	1.2	0.2	0.1
Supranationals	0.0	0.0	0.0	0.0	0.0
Overseas public sector (a)	1	0.1	0.1	0.0	0.0
Overseas corporates	1	0.1	0.1	0.0	0.0
Overseas financial	6	1.3	0.6	0.6	0.1
Total (a)	**16**	**3.1**	**2.1**	**0.8**	**0.2**

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

(a) Includes sovereign and government-backed borrowers.

Chart 22
Ten-year credit spreads versus gilts



Source: Bloomberg.

payment dates, to take advantage of the likely re-investment of these dividends by institutional investors.

Securitisation continued to play a part in corporate financing in Q4, although UK banks were mostly restricted to a few small opportunistic issues. The Halifax became the first UK bank to bring a preferred security issue since the Financial Services Authority allowed such bonds to qualify as Tier 1 capital and the Inland Revenue confirmed that interest payments on such issues are to be tax-deductible.(1) Previously, banks have issued debt as Tier 2 capital. Market participants reported that the Halifax bonds were heavily oversubscribed and tightly priced.

The continued inversion of the UK yield curve, combined with the relatively wide spread between AAA-rated bond yields and swap yields (see Chart 22), maintained the incentive for AAA-rated borrowers to issue fixed at long maturities and then use swaps to raise relatively cheap floating-rate sterling, US dollar or euro-denominated finance. With market liquidity reduced, most of these issues were small re-openings by regular borrowers that had been pre-placed and with pre-arranged swap counterparties. Issuance by regular AAA-rated borrowers (supranationals, government-backed agencies and overseas corporates) amounted to £4.8 billion over the quarter, of which £3.4 billion was long-dated.

Both swap and corporate bond spreads declined in late December and early January (see Chart 22). This probably reflected changing perceptions about liquidity conditions around the year-end. In October, investors' increased risk-aversion led to greater demand for liquidity and a preference for government bonds. However, as central banks took action to ensure an ample supply of liquidity over the year-end, concerns about disruptions to financial markets eased. This led both swap spreads and corporate bond spreads to narrow (in the United Kingdom, the United States and elsewhere) before and after the year-end. UK spreads were also affected by market speculation about the likely recommendations of the forthcoming MFR review, with a growing expectation that the result of the review will facilitate hedging in corporate bonds as well as in gilts.

Gilt repo

Developments in the gilt repo market were dominated by considerations relating to the century date change in Q4. Uncertainty about liquidity conditions over the year-end increased the value attached to high-quality collateral (see box on pages 18–19), causing the spot spread between GC repo and Libor rates at the one-month maturity to increase to more than 50 basis points in December. However, once the millennium date change was successfully negotiated, this spread fell back to around 10–20 basis points, slightly below its long-run average level.

The appetite for collateral at the year-end was also seen in the Bank's repo survey figures. While reported repo outstandings increased by £6 billion in the three months to end-November, the stock of reverse repo transactions outstanding rose by £11 billion to £103 billion. This suggests that the core money market

(1) The Basel Committee on Banking Supervision's October 1998 recommendation was implemented by the FSA in March 1999 and the Inland Revenue decided on tax-deductibility in August 1999.

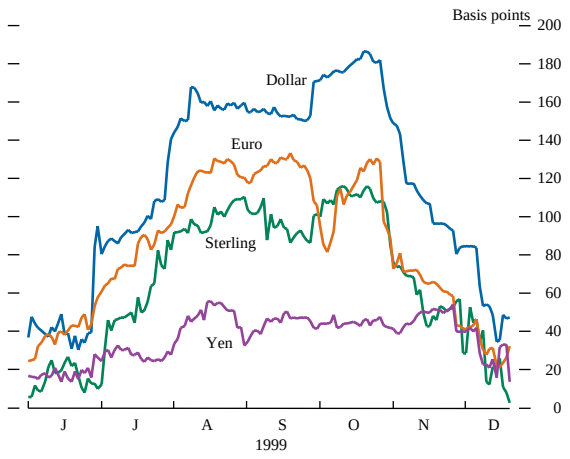
Financial market conditions over the century date change

Money markets

By the second half of 1999, a premium had emerged on unsecured money market lending rates spanning the year-end. This reflected widespread concerns about the potential for computer systems to fail to recognise correctly the date change from 1999 to 2000—the so-called 'millennium bug'—and for market rumours which, even if unfounded, could undermine confidence. This, in turn, generated greater demand for term borrowing and secured lending and a widespread expectation that financial markets would be less liquid than usual around the year-end.

Chart A illustrates one way of examining the premium attached to unsecured money market rates spanning the year-end. The 'one-month spike' measures the cost of year-end liquidity implied by cash rates. This was derived by subtracting the average of the implied one-month forward rates for November and January from the implied one-month forward rate for December (which spanned the year-end). As can be seen, the December premium for borrowing in sterling jumped up at the end of June when six-month cash lending began to mature in early January 2000 for the first time. The one-month spike then continued to increase until early October (rising above 100 basis points) before falling steadily over the rest of the year. These movements were very similar in profile to those observed in other currencies.

Chart A
One-month spike



Sources: Bank of England and British Bankers Association.

In parallel with these developments, a 'negative spike' appeared in some secured lending markets. For instance, by mid-October, the demand for collateral over the year-end had pushed the UK one-month forward general collateral (GC) repo rate implied for December below the one-month forward GC repo rates implied for both November and January. This configuration of forward rates was particularly unusual given the upward-sloping yield curve at that time.

The gradual decline in size of these spikes from October onwards reflected a growing belief that any Y2K disruptions would be relatively minor. This improvement in confidence in the financial markets was partly related to steps taken by central banks in the euro area, Japan, the United Kingdom and the United States to reassure market participants that adequate liquidity levels would be maintained in the money markets in December and January.(1)

In the event, the century date change passed without significant disturbance in financial markets. Y2K-related risk premia in money markets rapidly fell in the last week of December, and although the liquidity of most markets decreased (see the table), turnover volumes were generally higher than had been expected and recovered to close to normal levels within the first two weeks of January. Equity market turnover was in fact relatively high in December.

UK market turnover

December turnover as a percentage of monthly average in rest of year(a)

	1997–98	1999
Short sterling futures (b)	65	32
Long gilt futures (c)	50	29
Broked overnight interbank trades	110	92
FTSE indices: value	79	98
number of bargains	87	127
Sterling bond issuance	81	71

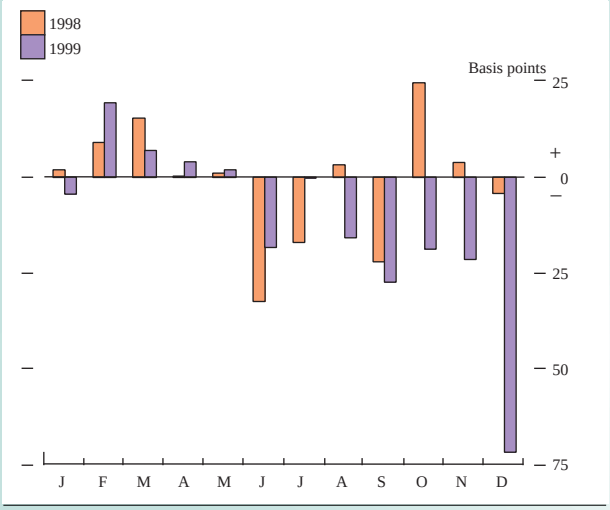
Sources: Bloomberg, Wholesale Markets Brokers Association, London Stock Exchange and Bank of England.

(a) Figures based on value of transactions unless stated otherwise.
(b) Front four contracts.
(c) Front two contracts.

The Bank's long-term repo transactions contributed to market confidence that adverse year-end liquidity conditions would not arise, leading the premium attached to interbank rates spanning the century date change to fall. By reducing the size of the daily money market shortages, the long-term repo transactions were also a factor behind relatively low overnight interest rates in December; the sterling overnight index average (SONIA) typically traded some 70 basis points below the Bank's repo rate during the month (see Chart B). The position of the large retail banks could also have been influential. If these institutions had received sizeable unadvised interbank deposits at the end of the year, such inflows would have necessitated increased holdings of

(1) Details of central banks' Y2K liquidity measures can be found in issues of the Bank of England's *Financial Sector Preparations for the Year 2000* (available on www.bankofengland.co.uk/millennium/y2kintro.htm).

Chart B
Monthly average of SONIA minus the Bank's repo rate



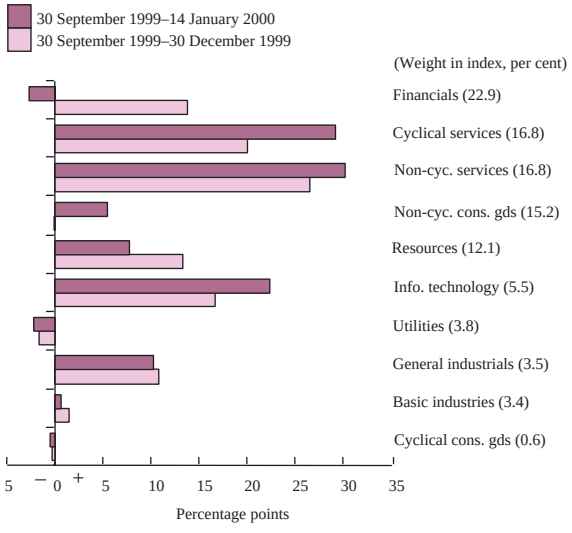
collateral under the Financial Services Authority's stock liquidity requirements at a time when markets were less liquid. The banks therefore successfully agreed limits with their customers before the year-end and discouraged unadvised wholesale deposits by offering low interest rates. Demand pressures in collateral markets also eased at this time, partly because end-investors in gilts did not recall stock out on loan over the year end, as some had feared, and also following the Bank's permanent extension of collateral eligible in its open market operations (announced earlier in the year).

In the United States, the effective Federal funds rate averaged 5.3% for the month of December, and 4.7% for the last week of December, below the official target rate of 5.5%. In contrast, in the euro area, overnight interest rates, were quoted close to 3% during most of December (in line with the ECB's official repo rate). It seems likely, however, that the rate would have been higher had the ECB not decided to increase its supply of liquidity to the market—in October, November, and December, the ECB raised the amount of funds allotted in the monthly longer-term refinancing operations by €10 billion, to €25 billion.

Foreign exchange markets

Although trading in the foreign exchange market was comparatively quiet in the final weeks of the year, markets were more active than many had expected. Market participants generally avoided trading for settlement dates between the end of the year and 10 January 2000. In early January, trading in the interbank market was initially quieter than average, but, in the absence of computer problems, it picked up more quickly than had been expected, as inhibitions about trading for value dates early in the new year diminished.

Chart 23
Sectoral contributions to changes in the FTSE All-Share index



Sources: Datastream and Bank of England.

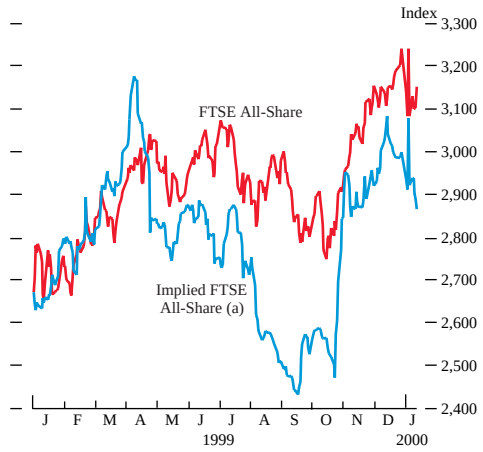
counterparties covered in the survey strengthened their preference to receive high-quality collateral in cash lending operations over the year-end. The amount of stock borrowing fell by more than £6 billion in the same period. There may have been a substitution effect, away from stock borrowing and towards reverse repo transactions, since a large proportion of stock loans are on call and borrowers may have preferred to lock in reverse repo trades for a fixed period. The rise in the use of both conventional repo and reverse repo was most marked for one to three-month maturities. However, the introduction of the Bank's three-month repo facility in October is thought to have had little impact on gilt repo outstandings.

Equities

In line with movements in the other major equity markets, UK share prices rebounded strongly in the fourth quarter, following declines in Q3. Average daily turnover increased in Q4 and, at the end of December, the FTSE 100 index stood at 6930, almost 15% higher than at the end of September. Furthermore, price increases were not restricted to the biggest UK companies; the FTSE 250 and SmallCap indices rose by 13.3% and 15.6% respectively in Q4, leaving the All-Share index 14.7% higher.

As can be seen from Chart 23, positive contributions towards the increase in the All-Share index in Q4 were fairly evenly spread across six of the ten sectors. Taken together, these sectors make up about three quarters of the total index. The strong positive

Chart 24
Influence of real yields on the FTSE All-Share index



Sources: Datastream and Bank of England.

(a) FTSE All-Share implied by current dividend and real yield curve, and risk premium/dividend growth rate as at January 1999.

Table G
Influences on the cash position of the money market

£ billions; *not seasonally adjusted*
Increase in settlement banks' operational balances (+)

	1999 Apr.–Sept.	1999 Oct.	Nov.	Dec.
CGNCR (+)	3.2	-8.9	2.3	9.1
Net official sales of gilts (-) (a)	-2.4	-0.3	-1.1	0.1
National Savings (-)	0.7	0.1	0.0	0.0
Currency circulation (-)	-0.8	-1.7	0.6	-5.9
Other	-1.3	-0.4	1.4	-1.6
Total	**-0.7**	**-11.3**	**3.2**	**1.7**
Outright purchases of Treasury bills and Bank bills	-0.1	0.0	0.2	-0.5
Repos of Treasury bills, Bank bills, EEA bonds, and British Government stock and non-sterling debt	1.9	9.9	-0.5	-2.4
Late facilities	-0.2	0.1	-0.2	0.0
Total refinancing	1.6	9.9	-0.5	-2.9
Foreign exchange swaps	0.9	-1.4	-0.5	-0.3
Treasury bills: Market issues and redemptions (b)	1.9	-2.8	2.1	-1.8
Total offsetting operations	**0.6**	**11.3**	**-3.1**	**-1.4**
Settlement banks' operational balances at the Bank	-0.1	0.0	0.1	0.4

(a) Excluding repurchase transactions with the Bank.
(b) Issues at weekly tenders plus redemptions in market hands. Excludes repurchase transactions with the Bank (market holdings include Treasury bills sold to the Bank in repurchase transactions).

contributions from the IT and general industrials sectors stand out in particular, since they account for only around 5% and 3% of the index respectively; the IT component of the share price index more than doubled in value in Q4.(1)

While the recent strength of IT stocks largely reflects sector-specific considerations (in particular, the rapid expansion of Internet-related business activities), equity prices are also likely to have been influenced by the decline in bond yields in Q4. Between 25 October and 16 November, real yields on index-linked gilts fell by around 40–50 basis points. Using the dividend discount model, and assuming that the expected real dividend growth rate and the equity risk premium remained constant at 2½% and 3% respectively, one can estimate the impact that the decline in real bond yields is likely to have had on the All-Share index (see Chart 24).(2) However, given that actual movements in the All-Share index did not follow the path suggested by the dividend discount model, other considerations must also have influenced equity prices. For instance, market participants may have revised their expectations about the equity risk premium or the real growth rate of dividends. Alternatively, other factors specific to index-linked gilts or to equities may have been influential.

In early January, equity prices fell back, as expectations of near-term increases in official interest rates became more widespread. These price declines were concentrated largely in the Financials and Resources sectors (see Chart 23). By 14 January, the FTSE 100 index had fallen by 3.9% from its 30 December peak, leaving it 10.4% above the 30 September level.

Market operations

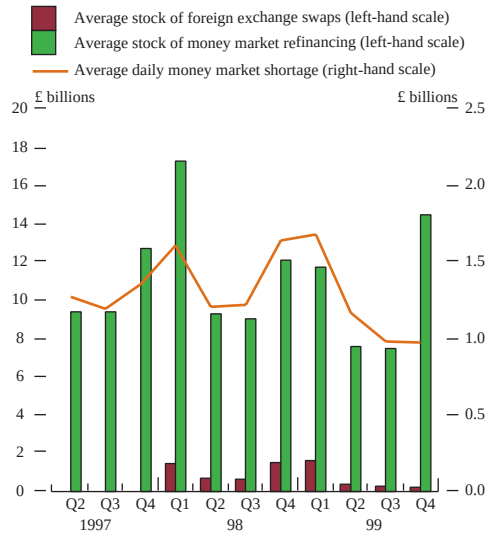
Open market operations and sterling Treasury bill issuance

The stock of money market refinancing held by the Bank is usually high in the fourth quarter of the year, reflecting the seasonality of the government's tax receipts and the rise in the note issue in the run-up to the Christmas holiday (see Table G). Daily money market shortages consequently tend to be larger in the middle of the year (see Chart 25). In Q4, however, the Bank provided almost £8 billion of the stock of money market refinancing at a maturity of three months (see Table H), rather than the usual two weeks. This temporary longer-term repo facility was announced on 20 September and implemented in mid-October in order to help market participants plan their liquidity management over the year-end period and to reinforce market confidence that liquidity provision would be sufficient at that time.(3)

The stock of money market refinancing held by the Bank averaged £14 billion in October; daily money market shortages averaged £1.3 billion, compared with £0.7 billion in September (see Table I). In anticipation of this period of larger shortages, the Bank reduced the size of the one-month Treasury bill tender to £300 million a week from 1 October, and withdrew it as from 15 October (see

(1) It should be noted, however, that this rise includes the effects of the re-classification of Marconi, which was part of GEC in the General Industrials sector until the end of November. See also the box on this subject in the February 2000 *Inflation Report*.
(2) Further details of the dividend discount model can be found on page 330 of the November 1999 *Quarterly Bulletin*.
(3) See 'Sterling market liquidity over the Y2K period', November 1999 *Quarterly Bulletin*, pages 325–26.

Chart 25
Stock of money market refinancing and daily shortages



Source: Bank of England.

Table H
Refinancing provided by three-month repos

Date of facility	Amount, (£ millions)
13 October	3,000
20 October	3,000
27 October	1,315
3 November	600
1 December	50
Total	**7,965**

Table I
Average daily money market shortages

£ millions

1996	Year	900
1997	Year	1,200
1998	Year	1,400
1999	Q1	1,700
	Q2	1,200
	Q3	1,000
	October	1,300
	November	1,000
	December	700

Table J
Size of weekly Treasury bill tenders

	Amount (£ millions)	
Period beginning	One-month tender	Three-month tender
1 October	300 (28 days)	100
15 October	0	100
5 November	300 (28 days)	100
12 November	600 (28 days)	100
19 November	900 (28 days)	100
26 November	1,200 (31 days)	100
3 December	1,200 (24 days)	100
10 December	1,200 (17 days)	100
17 December	1,200 (28 days)	100
24 December	600 (28 days)	100
30 December	0	100

Table J). In November, the stock of money market refinancing was slightly higher at £15 billion. However, the take-up of the Bank's new longer-term repo facility was more rapid than had been expected and half of this refinancing was provided at a three-month maturity. Consequently, daily shortages in November were actually lower than in October. To sustain the daily money market shortages at an appropriate level for the conduct of the Bank's open market operations, the one-month Treasury bill tender was re-introduced from 5 November and gradually increased in size in succeeding weeks; this supported the money market shortages at a daily average of £1.0 billion in November and £0.7 billion in December.

For three weeks from 26 November, the Bank adapted the weekly one-month Treasury bill tender in order to assist its management of the money market's liquidity position on Thursday 30 December, the last trading day of the year, when a large net flow of funds from the market to the Bank was expected. In place of the regular tender for one-month bills, the Bank held three tenders for bills maturing on 30 December, so that the maturing bills would moderate the size of the shortage on that day. The normal tender for one-month bills resumed on 17 December, but was discontinued after Christmas in anticipation of rising shortages in January and February. Demand for Treasury bills continued to be strong over the quarter: cover at the tenders averaged around five times the amount of bills on offer. The average yields were around 17 and 47 basis points below Libid for the one-month and three-month bills respectively.

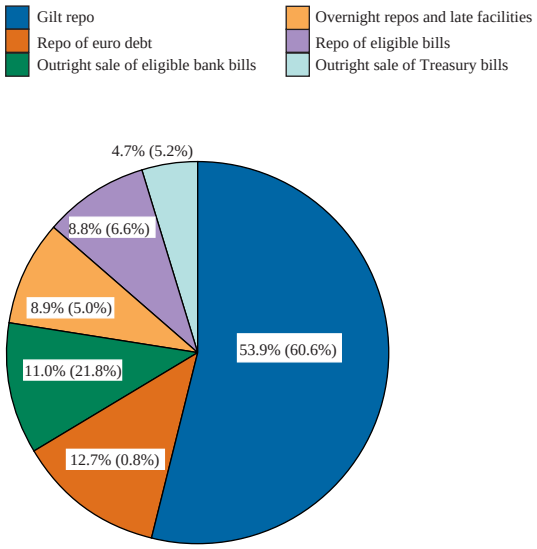
On four days in the quarter, there were money market surpluses—twice in November and twice in December. The Bank's operations on these days involved the sale of short-dated ('mop') Treasury bills to the market. On each occasion, the maturity date of the Treasury bills (which ranged from one to eleven days) was chosen to coincide with a day when a relatively large shortage was otherwise expected (thereby partially offsetting it); on one occasion Treasury bills with different maturity dates were sold in the morning and afternoon rounds. The short-dated Treasury bills were sold at an average of 44 basis points below the Bank's repo rate.

Foreign exchange swaps are also used by the Bank to supply liquidity to the sterling money market (mostly when the money market shortages are large). Only limited use was made of foreign exchange swaps in November and December; a daily average of £0.2 billion was outstanding during the quarter.

Over the past year the Bank has progressively extended the range of collateral eligible to be used in repo operations with the Bank. In the latest step in this process (implemented on 31 August), the pool of eligible securities was enlarged by some £2 trillion—a sixfold increase—to include government securities issued in euro by the European Economic Area countries.(1) The Bank's counterparties made significant use of the new eligible securities during the quarter, principally as collateral for the longer-term repos. For most of Q4 the Bank held around £7 billion in euro-denominated collateral, representing around one half of the

(1) See the open market operations section of 'Sterling wholesale markets: developments in 1999' on pages 38–49. A list of the eligible securities is available on the Bank's web site: www.bankofengland.co.uk/eligsec.htm

Chart 26
OMOs—instrument overview[a]



(a) This chart shows the share of the various instruments in the Bank's daily open market operations in 1999 Q4 (including the longer-term repo facility). Figures in brackets relate to 1999 Q3. Figures may not sum to 100% because of rounding.

Table K
Results of UK gold auctions

Auction	Amount on offer (approx.)	Cover ratio	Allotment price per ounce
29 November 1999	803,600 oz (a)	2.1	$293.50
25 January 2000	803,600 oz (a)	4.3	$289.50

(a) Approximately 25 tonnes.

total value of collateral on the Bank's books. This helped to ease the demand for gilts to be used as collateral. The share of different instruments in the Bank's refinancing during Q4 is shown in Chart 26.

Exchequer cash management

On 6 January 2000, the Debt Management Office (DMO) issued a press notice about the intended timing of the transfer of responsibility of Exchequer cash management from the Bank to the DMO. The DMO assumed responsibility from the Bank for the processing of the weekly sterling Treasury bill tender from 14 January, although the Bank will advise the DMO on the size of the tender and maturity of bills on offer until the final transfer of cash management has taken place. From 14 February, the DMO expects to undertake a limited range of bilateral transactions (potentially including repo, reverse repo and outright purchases and sales) to help smooth part of the Exchequer component of the Bank's money market forecast. The Bank will retain final responsibility for managing the balance of the Exchequer's cash flow until full responsibility for cash management is transferred to the DMO, which is expected to be around the end of March.

HM Treasury and Bank of England euro issues

In Q4, the Bank of England's monthly auctions of euro bills comprised €200 million, €500 million, and €300 million of one, three, and six-month bills. The auctions continued to be oversubscribed, with issues being covered an average of 4 times the amount on offer. During the quarter, bids were accepted at average yields in a range of 8 basis points above to 29 basis points below the euribid rate for the relevant maturity. At the end of December, the amount of Bank of England euro bills outstanding with the public was unchanged from end-September, at €3.5 billion.

On 19 October, the Bank reopened the UK Government euro Treasury note maturing on 28 January 2002 with a further auction for €500 million, raising the amount of this note outstanding with the public to €2 billion. Cover at the auction was 2.5 times the amount on offer and the average yield was 4.3%. Consequently, total UK euro notes outstanding with the public rose from €5.5 billion at the end of Q3 to €6 billion by the end of Q4.

UK gold auctions

The Bank has conducted two further gold auctions on behalf of HM Treasury (see Table K). The remaining auction in the current financial year will take place on 21 March 2000.