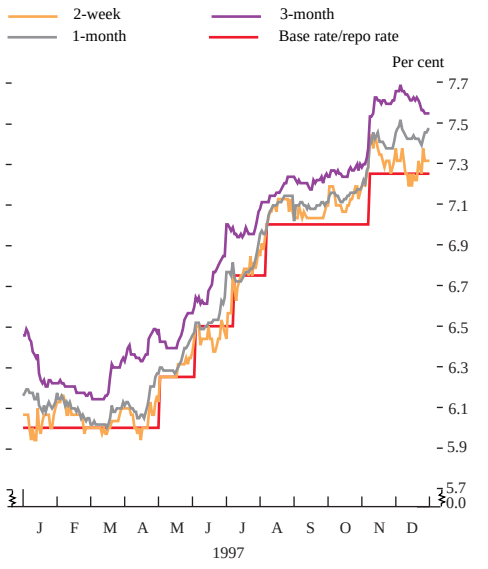
Markets and operations

- *The final quarter of 1997 was volatile for financial markets, in part as the Asian crisis deepened.*
- *Major government bond markets rallied as investors favoured their higher credit ratings. Credit spreads widened for non-government unsecured borrowing, both in bond markets and money markets. Equity markets initially fell sharply in response to the Asian turbulence, but later recovered.*
- *The foreign exchanges were also volatile. The US dollar, commonly seen as a 'safe haven' in times of crisis, rose against most major currencies. The yen weakened, affected both by the crisis in neighbouring Asian countries and by the growing financial problems in Japan.*
- *Against this background, and with further news about the domestic economy, there were sharp changes in expectations of interest rates in UK markets.*
- *The Bank's Monetary Policy Committee raised the Bank's repo rate on 6 November to 7.25%. At the end of the quarter, there was little market expectation that UK official interest rates would rise further.*

Chart 1
Sterling interbank interest rates(a)



(a) Middle-market rates at 4.30 pm.

Overview

Financial markets were volatile in the final quarter of 1997. The turmoil in Asia, which had been building up during the summer, deepened and spread further, and its effects rippled out across the major financial markets. Partly because of this, bond and equity markets in the major financial centres ended the quarter higher than they began it. Measures of credit spreads widened during the quarter, however, and the thin year-end markets were particularly susceptible to swings in sentiment.

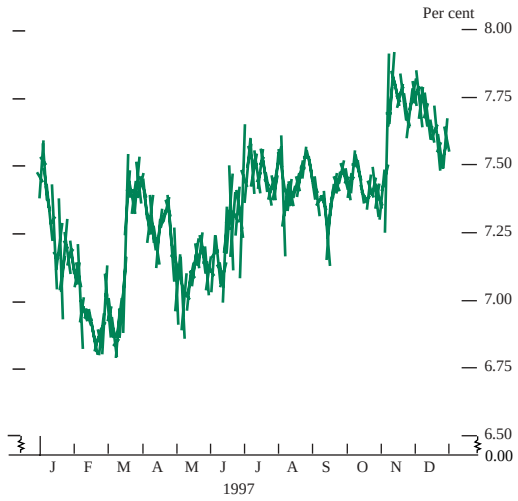
Domestically, the Bank's Monetary Policy Committee (MPC) decided to increase interest rates by 25 basis points on 6 November, taking the Bank's repo rate to 7.25%. Official interest rates in Germany had already been raised; in Japan and the United States, official rates were left unchanged during the quarter. Sterling markets were affected by the Asian turmoil, with gilts rallying at various points as they were seen as attractive assets at times of uncertainty.

Market developments

Short-term interest rates

Short-term interest rates in the United Kingdom were increased by 25 basis points during the final quarter of the year, at the November meeting of the MPC. This was the fifth increase in official interest rates in 1997, taking the Bank's repo rate to 7.25%. Chart 1 shows the path of several short-term market rates and the official repo rate through the year.

Chart 2
Short sterling: March 1998(a)



(a) Three-month Libor rate implied by short sterling futures prices.

Chart 3
Changes between end September and end December in three-month interest rates implied by futures contracts

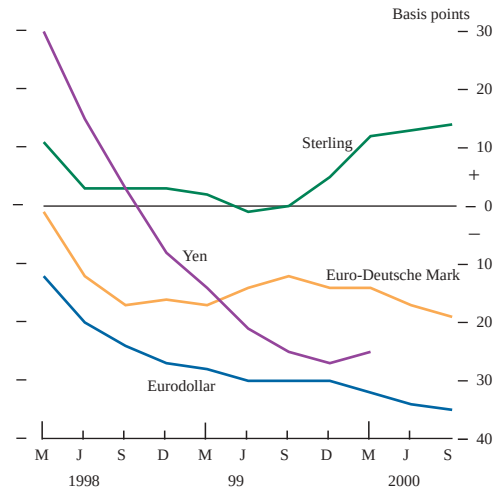


Chart 4
International ten-year bonds

The MPC's decision to raise interest rates in November was not anticipated by financial markets. On the day of the rate rise, the prices of short sterling futures contracts—the most liquid way for market practitioners to take an interest rate view—fell by about 20 basis points across the money-market yield curve. As an illustration, Chart 2 shows the path of the March 1998 short sterling contract. Immediately after the November rate rise, markets became bearish about the interest rate outlook, shown by the rise in implied interest rates for March 1998. Later in the month, short sterling contracts rallied a little, perhaps in reaction to the slowdown in activity forecast in the November *Inflation Report*, perhaps as the markets began to think that sufficient policy action might have been taken. Ahead of the December MPC meeting, the money markets were nervous (though there was little expectation of a further rate rise in December). During the quarter as a whole, expectations about the future level of official interest rates rose, though the short-term money-market yield curve remained downward-sloping.

Official interest rates in Japan and the United States were unchanged in the quarter; in Germany, the Bundesbank increased its repo rate by 30 basis points on 9 October, to 3.3%. In the exchange rate mechanism (ERM), the gap between official short-term interest rates narrowed further. Belgium, France and the Netherlands followed the Bundesbank's lead and immediately raised their key official interest rates to 3.3% on 9 October; Austria raised its official interest rates to 3.2%. By contrast, interest rates in Spain, Portugal and Italy, which were at a higher level, were cut during the quarter. The Bank of Spain reduced its repo rate from 5.25% to 5% on 3 October, followed by a further reduction to 4.75% on 15 December. The Bank of Portugal reduced its repo rate from 5.5% to 5.3% on 18 November, and the Bank of Italy lowered its discount rate by 0.75% to 5.5% with effect from 24 December.

Chart 3 shows the changes in expected three-month market interest rates for the three largest industrialised countries and the United Kingdom. In Germany and the United States, interest rate expectations ended the quarter lower. The financial crisis in Asia was a common factor affecting short-term interest rate markets.

Overall, markets interpreted the Asian crisis as reducing the likelihood that the Federal Reserve would raise interest rates; this change in sentiment also helped to reduce expected interest rates in other major countries. German and Japanese money markets were also affected by domestic factors. German markets were affected by changing views about the level at which European short-term interest rates might converge: toward the end of the quarter, there was a growing market view that interest rates would converge at lower levels than previously expected. Japanese interest rate expectations were affected mainly by the growing financial problems of domestic banks and securities firms. This pushed up expected unsecured borrowing rates, as derived from futures prices, for the first half of 1998, as Chart 3 shows.

Long-term interest rates

Bond markets rallied during the final quarter of 1997, influenced by the crisis in Asia. Government bonds in the industrialised countries were favoured by investors, because of their high credit ratings and

Chart 5
Implied forward inflation expectations(a)

(a) The implied forward inflation rates are annualised six-month rates derived from the yields on conventional and index-linked gilts.

Chart 6
Effective exchange rate indices: United Kingdom, United States, Germany and Japan

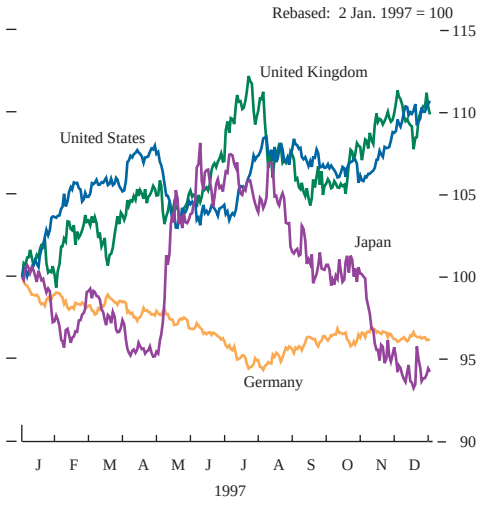


Table A
Exchange rates

	15 Sept. 1992	1 Aug. 1996	31 Dec. 1996	30 Sept. 1997	31 Dec. 1997	Percentage change over quarter
Sterling ERI	99.5	84.7	96.1	100.4	104.4	3.98
DM /£	2.7812	2.2946	2.6373	2.8525	2.9558	3.62
$/£	1.8875	1.5568	1.712	1.6153	1.6453	1.86
DM /$	1.4735	1.4739	1.5405	1.7659	1.7965	1.73
Yen/$	123.80	106.75	116.05	120.71	130.12	7.80

Table B
Selected emerging market currencies against the US dollar

	1 July	30 Sept.	31 Dec.	Percentage change 1 July-31 Dec.
Indonesian rupiah	2432	3269	5402	-55
Thai baht	24.4	36.2	47.0	-48
Korean won	888.0	911.1	1600.0	-45
Malaysian ringgit	2.53	3.43	3.88	-35
Philippine peso	26.4	34.0	39.5	-33
Singapore dollar	1.43	1.53	1.68	-15

liquidity. Chart 4 shows how ten-year yields fell during the quarter, continuing the trend of most of last year.

In the United States, the 30-year long bond yield fell by nearly 50 basis points in the quarter, to 5.93%. US markets were affected not only by the 'flight to quality' during the Asian market turbulence, but also by producer and consumer price data that were interpreted by the market as relatively benign for fixed-interest investments; and by a lower likely supply of bonds as markets focused on the improving federal government budget position.

Gilt-edged market

Gilt yields rose in the first part of the quarter. Gilt prices fell in reaction to lower US bond prices, following comments by Federal Reserve Chairman Greenspan about US employment growth and potential wage pressures. Gilt prices also fell after the release of UK RPI data in October, which were higher than the market expected. Later, as turbulence in Asian equity and currency markets increased, the gilt market benefited from its status as a safe haven at times of uncertainty. During the quarter as a whole, 20-year yields fell by around 30 basis points while five-year yields rose slightly. The gilt yield curve altered from being broadly flat between 5 and 20 years, to being downward-sloping (inverted).

The fall in nominal long-term interest rates did not alter market expectations of inflation, derived by comparing yields on conventional and index-linked gilts. Inflation expectations, as derived, are shown in Chart 5. In both the short and the long term, derived inflation expectations remained at around 3%–3.3% during the quarter.(1) The divergence between short and long-term inflation expectations at the end of September unwound in the following weeks. The institutional and liquidity factors that caused this divergence were described in the 'Monetary operations' article in the November 1997 *Quarterly Bulletin*, pages 329–45.

Foreign exchange

(i) International background

Chart 6 shows the effective exchange rates of sterling and the three major international currencies—the dollar, the Deutsche Mark and the yen. During the fourth quarter, the US dollar and sterling appreciated by 4%. The Deutsche Mark was almost unchanged. The yen fell by more than 6%, partly because of the Asian crisis and concerns about financial fragility. Table A shows that the dollar strengthened against the yen and Deutsche Mark (by around 8% and 2% respectively). In December, it rose above ¥130 for the first time since May 1992.

The turbulence in Asian currency markets, which began in the third quarter after Thailand floated its currency, continued (see Table B). During the fourth quarter, the Korean won and Indonesian rupiah both fell against the dollar by about 40%. Requests by these countries for assistance from the International Monetary Fund (IMF) were accepted. Chart 7 shows that other dollar-bloc currencies, such as the Australian dollar and the New Zealand dollar, also depreciated against the US dollar. Market commentary

(1) These derived inflation expectations may also include an inflation risk premium, and hence may exceed 'true' expectations.

Chart 7
Dollar-bloc currencies versus US dollar

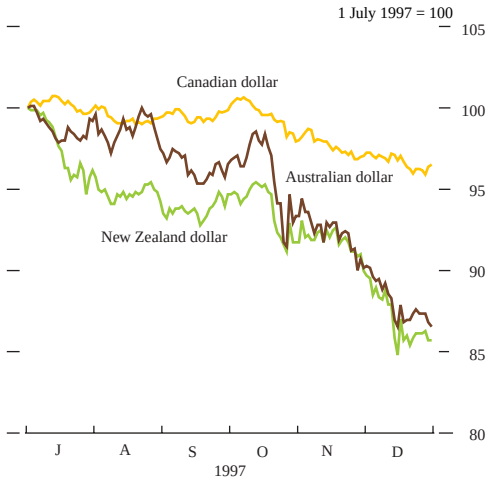
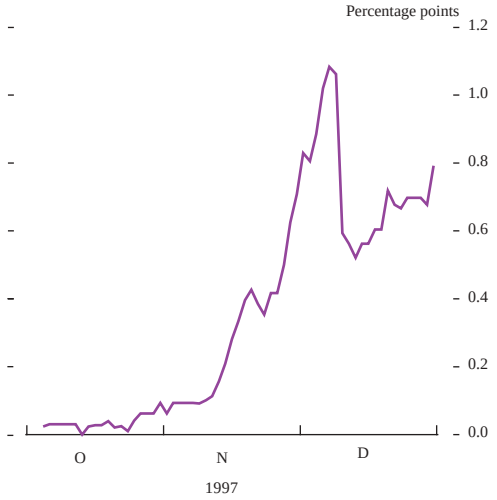


Chart 8
Japanese banks' funding premium over three-month US dollar Libor



Note: The chart takes an average of several Japanese banks' Libor rates over non-Japanese banks' Libor.

Chart 9
Deutsche Mark/dollar exchange rate

suggested that those currencies were partly affected by 'contagion' effects from neighbouring countries' currencies. The IMF's economic forecast, published in December, suggested that GDP growth in Australia and New Zealand was likely to be more than ½% lower in 1998 as a result of the Asian crisis.(1)

The yen's weakness was periodically attributable to concerns about financial fragility in Japan. On 24 November, one of Japan's largest stockbrokers, Yamaichi Securities, ceased trading, leading to a 'flight to quality' in the foreign currency and deposit markets; the Deutsche Mark and Swiss franc strengthened against the yen by 1.5% and 1.9% respectively. Chart 8 shows the funding premium on unsecured three-month dollar borrowing over Libor paid by Japanese banks (the chart shows the average of several banks' rates quoted on screens). The premium rose sharply during the fourth quarter, to an unprecedented level. It lessened subsequently on market comment that the Japanese authorities were providing foreign currency liquidity to support troubled financial institutions. In December, speculation that the Bank of Japan was selling dollars boosted the yen temporarily. It strengthened from ¥131.5 to ¥126 because of reports of intervention by the Bank of Japan on 17 December (which coincided with the announcement of an unexpected one-off income tax cut worth ¥2 trillion). But uncertainty about the yen's future value persisted, and markets perceived this strength as temporary. Implied volatility on $/Yen currency options rose sharply, but dealers were unwilling to pay a substantial premium for put options to sell US dollars against the yen (suggesting that they did not think the yen had much potential to rise in the short term). The yen subsequently weakened to a new five-year low at ¥131.5 before the end of the fourth quarter, partly because of the perception that concerted intervention by a number of central banks was unlikely.

Chart 9 shows that the dollar depreciated against the Deutsche Mark at the start of the quarter. The Bundesbank raised interest rates unexpectedly on 9 October (see section on money markets) and the Deutsche Mark strengthened, as markets saw this as the first move towards interest rate convergence ahead of EMU. Chart 10 shows that the dollar's subsequent recovery against the Deutsche Mark coincided with the US stock market's rally. The US dollar also strengthened against the Canadian dollar. The Bank of Canada tightened monetary policy, raising interest rates from 3.75% to 4.5% in response to currency market developments, but the Canadian dollar subsequently fell against the US dollar to C$ 1.44 on 30 December.

Chart 11 shows that the ERM currencies generally remained close to their ERM central rates. Forward exchange rates suggest that the market attaches a high probability to the present bilateral ERM central rates being used as EMU conversion rates for most countries. As an example, Chart 12 shows that divergence between the Italian lira's twelve-month forward rate against the Deutsche Mark and its bilateral central rate narrowed considerably during 1997. On 2 January 1998, interest rate differentials implied that the Italian lira's exchange rate would be about Lit 994 on 4 January 1999 (after EMU is scheduled to begin), within 0.5% of its present ERM bilateral parity against the Deutsche Mark. The market Ecu was also strong, relative to its theoretical equivalent: it traded at a

(1) The article on 'The international environment' on pages 20–9 covers some of these themes in more detail.

Chart 10
The dollar and the US stock market

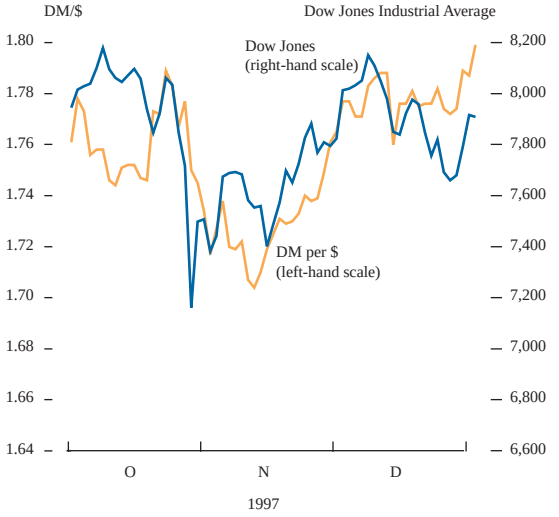


Chart 11
ERM exchange rates: divergence from the Deutsche Mark central rate

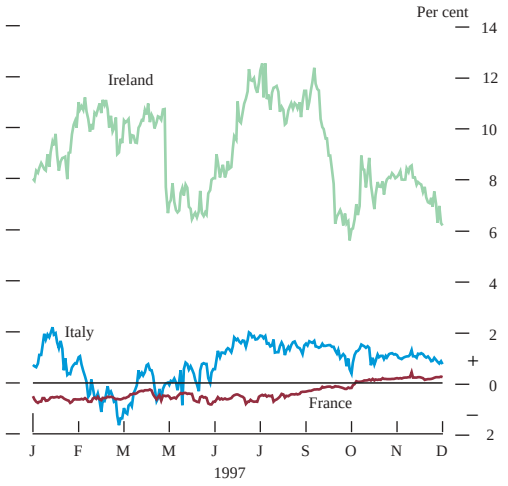


Chart 12
The Italian lira versus the Deutsche Mark

premium to its theoretical value for the first time since September 1992 (when the participation of sterling and the Italian lira in the ERM was suspended).(1) This is consistent with a high probability being placed on eventual one-for-one conversion between the Ecu and the euro. The premium may be related to the presence in the theoretical basket of currencies that may not participate in EMU from 1 January 1999, such as sterling.

The international background was also affected by the weakness of the gold price. It fell by 13% to $289.20, and it 'fixed' at its lowest since August 1979 at $283.25 on 9 December. Gold prices continued to be sensitive to news of further sales by central banks and its likely role in the European Central Bank's reserves.

(ii) Sterling

Sterling rose by 4% to 104.4 on the effective exchange rate index between the end of the third and fourth quarters. It strengthened against the Deutsche Mark from DM 2.85 to DM 2.95, and against the dollar from $1.62 to $1.65 (see Table A). Sterling peaked at $1.71 on 12 November, its highest since January 1997. It peaked at DM 3.00 on 2 December, and reached a five-year high against the yen at ¥219 on 26 December (see Chart 13).

During the third quarter, sterling fell against the Deutsche Mark from its high at DM 3.08 to DM 2.85, partly because of a rise in the probability attached by the market to sterling participating in EMU on, or fairly soon after, 1 January 1999.(2) Specifically, a *Financial Times* report on 26 September suggested that sterling was likely to enter EMU at a lower exchange rate than the prevailing market rate.(3) Chart 14 shows that the expected correlation between sterling and the Deutsche Mark (derived from currency option prices) increased in this period.

But the rise in the expected correlation between sterling and the Deutsche Mark unwound during the early part of the fourth quarter. On 18 October, *The Times* reported that the Government was likely to rule out EMU entry during the current parliament. Sterling strengthened from DM 2.86 to DM 2.89 when financial markets reopened on 20 October. It rose further to DM 2.92 after the Chancellor's statement about EMU to the House of Commons on 27 October, which was widely interpreted in the market as ruling out UK membership before 2002. During this period, sterling's attractiveness to investors may also have benefited from the perception that UK interest rates would not be lowered towards the levels in core ERM countries.

Sterling strengthened further following the MPC's decision to increase the Bank's repo rate on 6 November. Chart 15 shows that the announcement took many market participants by surprise, and sterling rose by 1% on its effective exchange rate index, to 103.3. The international background of a strong dollar and a softer Deutsche Mark (see international section) helps to explain sterling's subsequent movements. It weakened against the dollar in relatively illiquid markets toward the end of December. Traders who follow a chartist approach may have been persuaded to take profits on long sterling positions after sterling failed to rise above its January 1997

(1) The theoretical Ecu is derived from the weighted exchange rates of the component currencies. See *Quarterly Bulletin*, June 1979.
(2) See the article 'Implied exchange rate correlations and market perceptions of European Monetary Union' by Creon Butler and Neil Cooper, *Quarterly Bulletin*, November 1997, pages 413–23.
(3) See the *Inflation Report*, November 1997, page 46.

Chart 13
Exchange rates

Chart 14
Twelve-month implied correlation US dollar/Deutsche Mark versus US dollar/sterling

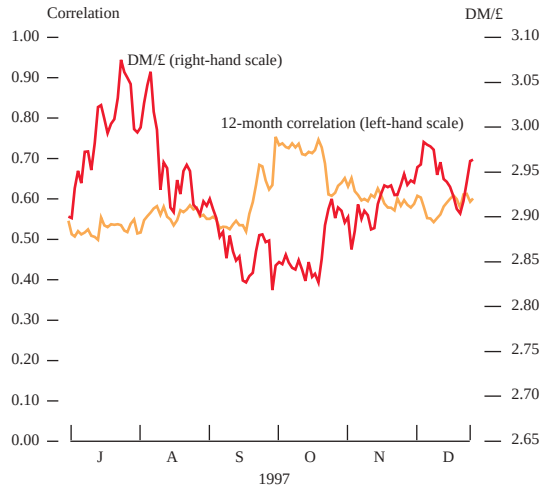
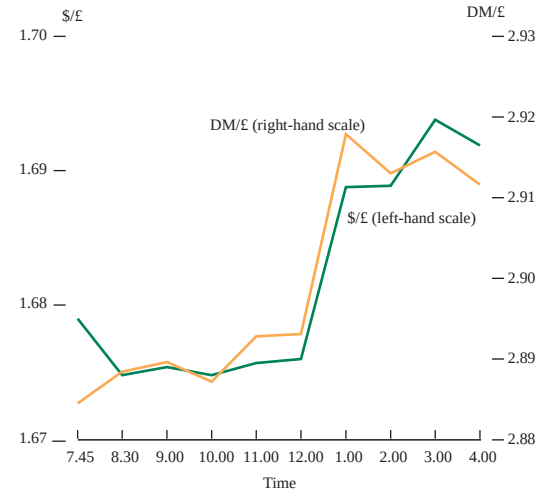


Chart 15
Sterling exchange rates on 6 November 1997



high of $1.72 on 12 November (it reached $1.71 prior to the publication of the *Inflation Report* and closed at $1.70). The failure to establish a new high is often interpreted by chartists as the first indication of a possible trend-reversal. But sterling rose further against the Deutsche Mark in the remainder of the fourth quarter and ended the year at DM 2.96, up 32 pfennigs on a year earlier.

Equities

Much of the quarter was dominated by developments in Asian markets, and the spillover effects to other stock markets. Equity market developments in the major Asian markets are shown in Table C. The steepest fall in the quarter was in South Korea. In the year as a whole, Malaysian and South Korean equity markets fell by 52% and 42% respectively.

Equity indices in the major markets were affected by the falls and volatility in Asian markets, though by the end of December they had regained much of their losses, as Chart 16 shows (Japan was an exception). In the first part of the quarter, major markets fell: between 1 October and 13 November (the date when both the S&P 500 and the FT-SE 100 reached low-points), the S&P 500 index fell by 4.1%, the FT-SE 100 by 11.4% and the German DAX by 13.2%. In the same period the Nikkei 225 fell by 13.6%. During the second part of the quarter, major equity markets regained much of their lost ground. In the quarter as a whole, the S&P 500 index rose by 1.6%, with the FT-SE 100 and the German DAX falling by 3.4% and 0.9% respectively; the Nikkei 225 fell by 14.5%. Chart 17 shows the Nikkei 225 and the yen/dollar exchange rate. The fall in the Nikkei from around mid year was accompanied by a fall in the yen/dollar exchange rate from around ¥110 to ¥130 per dollar.

By the end of the year, the UK and US stock markets were about 20% higher than a year earlier. This suggests that the equity market was not expecting the turmoil in Asia to affect UK and US corporate profitability much. During most of the second half of last year, equity prices were high relative to corporate earnings: by the end of the quarter, the price/earnings ratio for the FT-SE 100 was around 20, its highest for about four years. The price/earnings ratio for the Dow Jones Industrial Average was also at its highest since 1994.

Credit indicators and spreads

The heightened market concern about Asia led to a widening of the spread between Asian countries' bond yields and equivalent US Treasuries. Credit markets in other countries were also affected. Other (non-Asian) emerging market borrowers saw credit spreads widen from around 250 basis points over US Treasuries to about 500 basis points or more. Credit spreads for high-rated borrowers in the industrialised countries also widened. At ten years, typical UK borrowers' bond spreads widened from about 40 basis points over gilts to around 55 basis points.

The interbank market also saw a widening in credit spreads. The gap between (unsecured) interbank three-month rates and (secured) gilt repo rates widened from about 10 basis points to as high as 30–35 basis points, because of the deepening Asian crisis—and especially further concerns about Japan. The spread narrowed a

Table C
Changes in emerging market equity indices

Per cent

	1996	1997	1997 Q4
Hong Kong	+34	-20	-29
Indonesia	+24	-37	-27
Malaysia	+24	-52	-27
Singapore	-2	-31	-22
South Korea	-26	-42	-42
Taiwan	+34	+18	-6

Chart 16
Equity indices

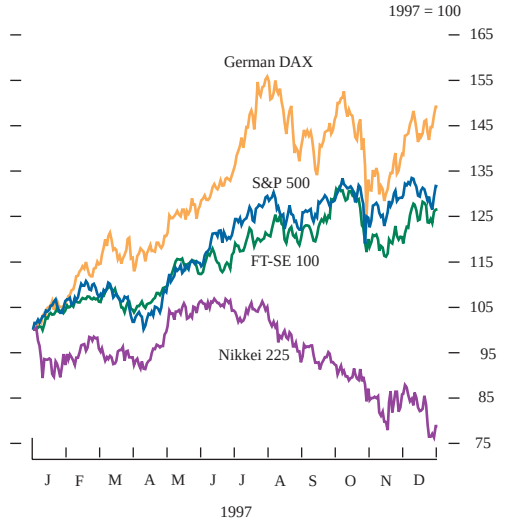


Chart 17
Japanese equity market and yen/dollar exchange rate

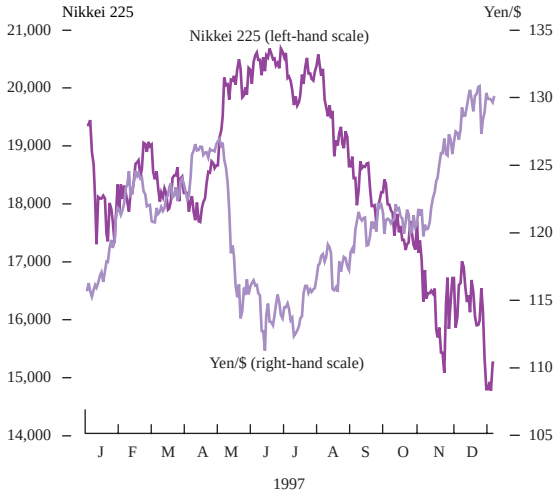


Table D
Average daily money-market shortages

£ millions

1996	Year	900
1997	Year	1200
1997	October	1700
	November	1400
	December	1000

little toward the end of December, as concern about the Asian crisis eased and as Japanese banks had probably completed most of their end-quarter funding. A similar widening in interbank rates relative to government rates occurred in the US dollar and yen markets during the fourth quarter.

Bond market credit spreads generally remained at their wider levels throughout the quarter, suggesting that the bond market continued to be nervous about pricing all types of credit risk. The sterling interbank credit spread was not only affected by credit conditions facing Japanese banks, but also by end-of-year funding pressures affecting a variety of institutions, and technical tightness in the money markets (particularly in October). As some of these factors eased, the spread narrowed.

Open market operations and gilt repo

Operations in the sterling money market

The final quarter of the year was generally smooth for the Bank's sterling open market operations (OMOs), though the daily money-market shortages were volatile. The stock of refinancing was high during October, following the dual gilt auction in September and accompanying seasonal surplus in the CGBR in October. This produced shortages averaging £1.7 billion a day in October, compared with £1.3 billion for the previous six months. In November and December, the shortages fell to £1.2 billion a day (see Tables D and E).

The high stock of refinancing in October put pressure on the short end of the money market. The sterling overnight interest rate average (SONIA) was above the Bank's (two-week) repo rate on 19 days in October, compared with three days in the previous month.(1) At longer maturities, the gap between unsecured interbank and certificate of deposit (CD) rates rose relative to secured gilt repo, as Chart 18 shows. The rise in November and December partly reflected credit conditions in the interbank market (see above). But the spread was also affected by technical money-market conditions. The high stock of refinancing, combined with retail banks' continuing need to hold sterling stock liquidity, meant that gilt collateral was in high demand. That put downward pressure on general collateral (GC) repo rates. Similarly, the need for stock liquidity may have led more clearing banks to issue CDs, pushing up CD rates (CDs may be used to offset some of a bank's retail liabilities in its sterling stock liquidity requirement).

The use of late facilities, through which discount houses and settlement banks may obtain liquidity late in the day from the Bank, was also higher in October than it had been for some months. On average, the use of combined late facilities averaged £115 million a day during October, reverting to the average rate of use in June and July, compared with £40–50 million in August and September.

Chart 19 shows how the Bank's daily refinancing was provided during the quarter. Overall, despite the rise in October, the use of late facilities remained small, at about 5% of the total refinancing. Two-week gilt repo remained the dominant form of refinancing, though there was also an increase in the use of bill repo during the

(1) SONIA is explained in more detail in a box on page 57.

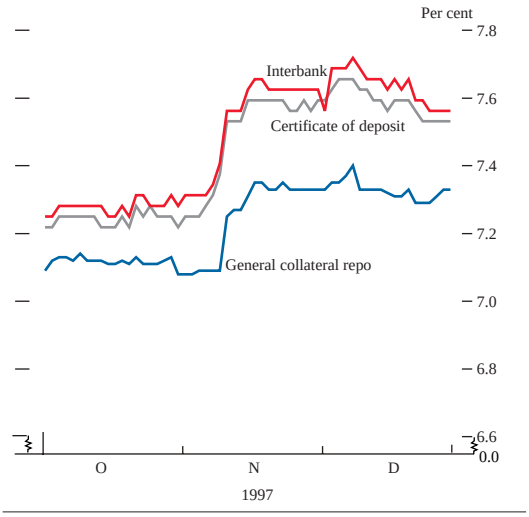
Table E
Influences on the cash position of the money market

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

	1997 Apr.-Sept.	Oct.	Nov.	Dec.
CGBR (+)	10.1	-5.1	3.4	1.0
Net official sales of gilts (-) (a)	-8.6	-1.6	0.3	-2.6
National Savings (-)	-0.7	-0.2	-0.2	-0.1
Currency circulation (-)	1.2	-1.7	-0.5	0.0
Other	-2.4	0.5	1.7	3.9
Total	**-0.4**	**-8.1**	**4.7**	**2.2**
Outright purchases of Treasury bills and Bank bills	-0.5	0.9	-0.3	-0.1
Repos of Treasury bills, Bank bills, and British Government stock and non-sterling debt	-1.1	6.7	-5.3	-2.0
Late facilities (b)	0.3	-0.3	0.4	-0.4
Total refinancing	-1.3	7.3	-5.2	-2.5
Treasury bills: Market issues and redemptions (c)	-1.2	-0.8	-0.4	-0.4
Total offsetting operations	**-0.1**	**8.1**	**-4.8**	**-2.1**
Settlement banks' operational balances at the Bank	-0.5	0.0	0.1	0.0

(a) Excluding repurchase transactions with the Bank.
(b) Since 3 March 1997, when the Bank introduced reforms to its daily money-market operations, discount houses and settlement banks have been eligible to apply to use the late facilities.
(c) 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) and tap Treasury bills.

Chart 18
Sterling three-month interest rates



quarter—to 25% from 17% in the previous quarter. Outright bill sales accounted for 27% of refinancing, suggesting that counterparties still value the ability to obtain shorter-maturity money from the Bank through the use of bills. Since the start of the new money-market arrangements, the average maturity of bills sold to the Bank outright has fallen gradually: by the fourth quarter, more than 60% of outrights were of three-days' maturity or less, illustrating their flexibility in providing shorter-maturity money.

Gilt repo market

The Bank's quarterly market survey showed that there was £72 billion gilt repo outstanding at the end of November, about 6% higher than a year earlier. The survey has been carried out every three months since the start of the market in January 1996. The size of the market reached a peak of £79 billion in May 1997 and activity now appears to have stabilised. Similar consolidation has been reached in reverse repo. Average daily repo turnover fell to £13 billion during the three months ended November, compared with £16 billion during the previous three months. This will in part have reflected the increase in the maturity of repo outstanding during the quarter, especially at maturities over three months (see Table F). By end November, 15% of trades outstanding were for three months or more, compared with 5% at the end of the previous month. That may be an indication that the market in term repo is developing, or it could be that volatile market conditions and uncertainty about interest rates led dealers to use repo to take a view on interest rates at a horizon of three to six months.

The main feature of the specials market has been the tightness of 9% Treasury 2008, the cheapest to deliver stock into the March long gilt futures contract.(1) It has at times attracted a specials premium several percentage points below GC repo rates. Elsewhere, 7¼% Treasury 2007 started trading in 1998 at special rates because of its status as the ten-year benchmark. Its benchmark status puts it in demand by eurobond lead-managers wishing to borrow the stock to short-sell it, to hedge against their exposure to ten-year eurobonds that they are underwriting.

Continuing structural topics in the repo market, such as the *Code of Best Practice*, are covered in the article, 'Gilt-edged and sterling money markets: developments in 1997' on pages 55–69.

Gilt financing

Gilt sales to the end of December amounted to £20.9 billion, more than 80% of the slightly increased sales target of £25.4 billion announced following the *Pre-Budget Report* in November (see Table G). About £16.9 billion was raised by conventional gilt sales, with the rest by index-linked sales. Within conventionals, the distribution of sales was skewed towards short and, to a lesser extent, long-dated gilts, which accounted for 42% and 33% respectively of total conventional issues, compared with 25% for mediums, against Remit targets for the financial year as a whole for 35% each for shorts (3–7 years) and longs (over 15 years), and 30% for mediums (7–15 years). This reflects the pattern of auctions held in the first three quarters of the financial year, with

(1) When a stock is particularly difficult to obtain and its repo rate falls below the prevailing GC rate by more than about 5–10 basis points, it is said to be trading 'special'.

Chart 19
OMOs—instrument overview

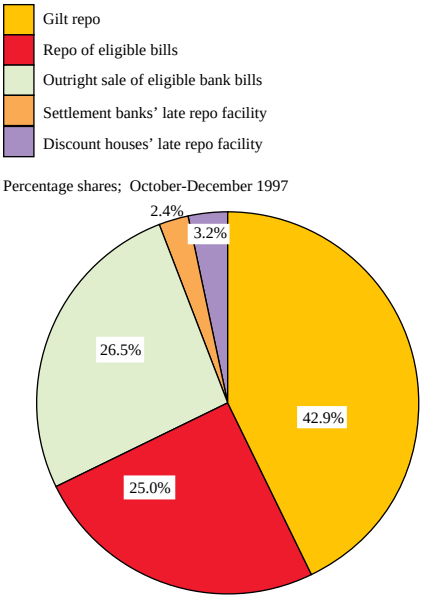


Table F
Maturity breakdown of outstanding repo and reverse repo over time[a]

		On call and next day	2–8 days	9 days to 1 month	1–3 months	3–6 months	Over 6 months	Total Per cent	Total £ billions
Per cent									
Repos									
1996	May	20	34	23	15	7	1	100	35
	Aug.	19	33	33	11	4	1	100	56
	Nov.	19	36	22	19	2	2	100	68
1997	Feb.	20	29	33	15	3	0	100	71
	May	27	23	27	18	4	1	100	79
	Aug.	25	21	24	24	4	1	100	67
	Nov.	22	22	19	22	11	4	100	72
Reverse repos									
1996	May	20	30	20	23	6	2	100	34
	Aug.	22	29	29	14	5	1	100	54
	Nov.	21	34	21	20	3	2	100	60
1997	Feb.	18	32	26	21	3	0	100	67
	May	23	21	30	20	6	1	100	71
	Aug.	17	20	26	26	6	1	100	63
	Nov.	17	25	17	25	11	5	100	71

Note: rows may not sum to total owing to rounding.

(a) From the data reported under the voluntary quarterly arrangements.

four auctions of shorts and three of longs, compared with only two auctions of medium stocks. Taps of conventional stocks are used for market management purposes only, and are now rare; there were none during the quarter. Table H reports gilt issuance by auctions and taps.

Auctions

There were two auctions during the third quarter of the financial year; a medium-maturity in October and a short in December. The December auction was originally scheduled for 26 November, but was postponed to 10 December to avoid a clash with the *Pre-Budget Report*. The auction schedule for the quarter was announced on 30 September, following the usual consultation with market participants.

The auction of £2 billion of 7¼% Treasury Stock 2007 in October reflected strong market demand, expressed at the Bank's quarterly meetings, for a medium stock, in the absence of any medium-dated issuance since June. Market views were divided on whether to reopen 7¼% 2007, or to issue a new ten-year benchmark stock. The prevailing factor in the decision to reissue the existing benchmark was the aim of increasing the amount of the stock outstanding, ahead of the start of the strips market on 8 December. During the unsettled conditions in equity and bond markets immediately before the auction, little attention was focused on the auction itself. In the event, with the GEMMs perhaps taking encouragement from an improvement in equity markets the day before, the auction went well, with cover of 2.39 times, a 1 basis point tail, and an average price of 104–09 (yielding 6.66%), compared with the price of 109–13 in the when-issued market at 10.30 am.

Market participants' views differed on the choice of stock for the November/December auction, with some advocating a further issue of the longest strippable stock (8% Treasury 2021) just ahead of the opening of the strips market. Others, including a majority of GEMMs, preferred a short stock, with many advising the authorities to take the opportunity to open a new five-year benchmark. This view prevailed, and details of the new benchmark, 6½% Treasury 2003, were announced on 2 December, a week ahead of the auction. The maturity date, December 2003, was slightly longer than usual, allowing more time to build up the amount of stock outstanding, in view of the reduced funding requirement forecast for the next two years. Cover was lower (1.77 times) and the tail (2 basis points) longer than usual, given the maturity of stock. The stock yielded 6.53% at the average accepted price, the lowest for a five-year issue since 1993.

On 30 December 1997, following consultation meetings with the GEMMs and representatives of investors in the gilt market, the Bank announced that the auctions to be held in the final quarter of the current financial year would be of a new long stock (maturing in December 2028) on 28 January 1998, and a further issue of 7¼% Treasury 2007, on 25 March 1998 (depending on the date of the Budget). The choice of which two maturity areas to auction was determined by the terms of the Remit issued to the Bank in March 1997. Because the target for shorts had already been reached, the auctions in the final quarter of the financial year had to contain a medium and a long. The decision to auction a new

Table G
Financing arithmetic 1997/98: progress to end December

£ billions

CGBR forecast		11.7
Assumed increase in net official reserves		0.0
Gilt redemptions		19.6
Plus gilt sales residual from 1996/97		-3.9
Financing requirement		**27.4**
Less:	expected net inflow from National Savings	2.0
	expected net sales of Certificates of Tax Deposit (a)	0.0
Gilt sales required		**25.4**
Less:	gilt sales already made (to end-Dec. 1997)	20.9
Further gilt sales required Jan 1998-March 1998		**4.5**

Note: figures may not sum owing to rounding.

(a) Certificates of tax deposit are deposits (CTDs) made by taxpayers with the Inland Revenue in advance of potential tax liabilities. Changes in the level of CTDs act as a financing item for central government.

30-year stock gives investors in gilts the opportunity directly to compare long yields in various government bond markets such as the United States, France and Germany. It also enables investors matching long liabilities the chance to extend the duration of their assets, especially when the new stock becomes strippable (when the amount outstanding reaches £5 billion).(1) The new long stock will also allow fund managers an additional bond to match the over 15 year FT bond index, currently dominated by the £16.5 billion 8% Treasury 2021. The March auction of 7¼% Treasury 2007 will build up the liquidity of the current ten-year benchmark.

The Bank's gilt 'shop window' is on the Bank's information screens and shows the amount of stocks in official portfolios available for resale or switching. There was only a small amount of stock available in the Bank's shop window during the October-December quarter, so turnover in switches remained low, averaging £120 million a month.

Index-linked

Demand for index-linked bonds remained strong for much of the quarter, with real yields approaching 3%.(2) The sector benefited from the strength of conventional bond markets; switching out of equities into bonds, including index-linked, as Asian markets triggered a 'flight to quality'; and limited supply. Weaker equities and a stronger gilt market in October saw index-linked real yields fall significantly below dividend yields for the first time since April. The box on pages 16–17 compares real yields in different countries.

Although the 1997/98 target for index-linked issuance rose slightly to £5.1 billion following the Chancellor's *Pre-Budget Report*, only £2 billion needed to be raised through index-linked sales in the second half of the financial year. The slower pace of funding in the quarter reflected this, with three tap packages issued, two of which were for £150 million of a single stock (see Table H). The £0.9 billion raised in the quarter took cumulative funding to £4.1 billion, more than 80% of the required sales for 1997/98.

Limited supply and a rising market meant that GEMMs tended to be short of stock. Liquidity in the sector was low for much of the period, with institutions having to await supply in order to obtain large amounts of stock. As a result, each of the taps was sold quickly—three of the four stocks were exhausted at the initial tenders—and above their issuance prices, as GEMMs sought to cover their short positions and customer orders.

Sectoral investment activity

The latest ONS data, covering the period from July to September, show total net institutional investment in gilts at £3.7 billion, £1.9 billion lower than the previous quarter. The net fall in investment reflects the effect of the two large redemptions during the period, totalling around £7 billion. Otherwise, underlying investment in gilts remained strong, probably driven by the effect

(1) The Bank decided to delay the strippability of the new long-dated stock, in response to market feedback. If it were immediately strippable, the longest-dated coupon strips would have very small amounts outstanding in cash terms and so might be illiquid, making it difficult for GEMMs to make markets in them.
(2) Because of the indexation lag of eight months on index-linked gilts, we need to make an assumption about the rate of inflation over the remainder of the life of the bond in order to calculate its real yield. The data referred to here uses a 3% assumed inflation rate. Real yields dipped below 3% on a 5% assumed inflation rate.

Table H
Gilt issuance

Date	Stock	Amount issued (£ millions)	Price at issue (per £100 stock) (a)	Yield at non-competitive allotment price (b)	Yield at issue	Yield when exhausted (c)	Average yield (d)	Cover (e) at auctions	Tail (f) at auctions (basis points on yield)	Date exhausted
Auctions of conventional stock: Apr.-Dec.										
23.4.97	7% Treasury Stock 2002	2,000	98.9688	7.24	n.a.	n.a.	n.a.	3.49	1	23.4.97
20.5.97	7% Treasury Stock 2002	1,500	100.2500	6.94	n.a.	n.a.	n.a.	3.03	0	20.5.97
22.5.97	8% Treasury Stock 2021	1,500	108.6250	7.24	n.a.	n.a.	n.a.	1.29	4	22.5.97
25.6.97	7¼% Treasury Stock 2007	2,000	100.8125	7.13	n.a.	n.a.	n.a.	2.71	1	25.6.97
23.7.97	8% Treasury Stock 2021	2,000	113.2813	6.86	n.a.	n.a.	n.a.	2.32	1	23.7.97
23.9.97	7% Treasury Stock 2002	1,500	101.1250	6.71	n.a.	n.a.	n.a.	2.30	1	23.9.97
25.9.97	8% Treasury Stock 2021	1,500	117.0313	6.57	n.a.	n.a.	n.a.	2.33	1	25.9.97
29.10.97	7¼% Treasury Stock 2007	2,000	104.2813	6.66	n.a.	n.a.	n.a.	2.39	1	29.10.97
10.12.97	6½% Treasury Stock 2003	2,000	99.8438	6.53	n.a.	n.a.	n.a.	1.77	2	10.12.97
Tap issues of index-linked stock: Oct.-Dec.										
2.10.97	2% Index-linked 2006	150	201.4688	n.a.	3.22	3.22	3.22	n.a.	n.a.	3.10.97
28.11.97	2½% Index-linked 2016	150	173.3750	n.a.	3.12	3.11	3.11	n.a.	n.a.	28.11.97
12.12.97	2½% Index-linked 2020	100	172.0000	n.a.	2.98	2.97	2.97	n.a.	n.a.	12.12.97
12.12.97	2½% Index-linked 2003	100	192.1250	n.a.	2.99	2.99	2.99	n.a.	n.a.	12.12.97

n.a. = not applicable.

(a) Non-competitive allotment price.
(b) Gross redemption yield per cent based on the weighted average price of successful competitive bids.
(c) Gross redemption yield or real rate of return (assuming 5% inflation) based on the price when the issue ceased to operate as a tap.
(d) Weighted average gross redemption yield or real rate of return (assuming 5% inflation), based on actual price at which issues were made.
(e) Total of bids divided by the amount on offer.
(f) Difference in gross redemption yield between the weighted average of successful competitive bids and the lowest accepted competitive bid.

Table I
Official transactions in gilt-edged stocks

£ billions; *not seasonally adjusted*

	1997 Apr.-Sept.	Oct.	Nov.	Dec.
Gross official sales (+) (a)	16.0	2.4	0.0	2.7
Redemptions and net official purchases of stock within a year of maturity (-)	-7.4	-0.8	-0.3	-0.1
Net official sales (b)	8.6	1.6	-0.3	2.6
of which net purchases by:				
Banks (b)	1.2	-1.2	0.9	0.0
Building societies (b)	0.2	0.2	0.1	0.0
M4 Private sector (b)	5.2	-0.8	-2.3	0.8
Overseas sector	1.6	3.3	0.9	1.8
LAs & PCs (c)	0.3	0.0	0.0	0.0

(a) Gross official sales of gilt-edged stocks are defined as official sales of stock with over one year to maturity net of official purchases of stock with over one year to maturity, excluding transactions under purchase and resale agreements.
(b) Excluding repurchase transactions with the Bank.
(c) Local Authorities and Public Corporations.

of the Minimum Funding Requirement introduced under the *Pension Act* in April, and perhaps also the effect of the Budget changes to ACT tax credits in July. Net investment in gilts by pension funds fell from an unusually high level of £2.8 billion the previous quarter, to £1.5 billion; net investment by long-term insurers also fell.

Data compiled by the Bank for the fourth quarter show that net official gilt sales were £3.8 billion (see Table I). The domestic non-monetary sector—which includes pension funds and life assurance companies—reduced its holdings by around £2 billion, and the overseas sector increased its holdings by £6 billion during the quarter.

Technical developments

Central Gilts Office (CGO) upgrade

The Bank announced in November 1995 that the CGO system was to be upgraded to provide easier handling of gilt repo and strips. The upgraded CGO system was launched on 10 November 1997. The new CGO system has been developed over the past two years; it has retained most of the features of the CREST software on which it is based, but also includes some new features. The new settlement system is discussed in the articles on pages 55–69 and 70–78.

Strips

Successful introduction of the upgrade to CGO allowed the new gilt strips facility to be launched on 8 December 1997. Stripping a coupon-bearing bond involves separating it into its constituent interest and principal payments, which can then trade as zero-coupon instruments. Conversely, assembling coupon and principal strips enables reconstitution of a coupon-bearing gilt. This new facility is available as part of the upgraded CGO system. Gilts held in CGO can be stripped or reconstituted through gilt-edged market makers (GEMMS).(1)

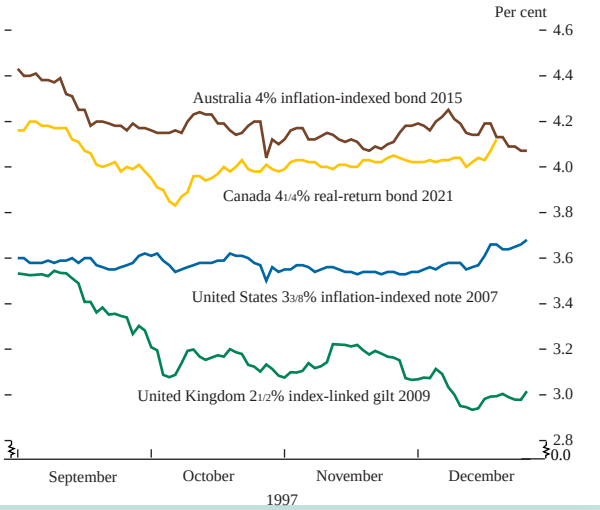
(1) More information on gilt strips is given in the article on page 55–69, in particular pages 58–9.

International real yields

Index-linked bond markets enable us to compare real returns between countries. A box in the November 1997 *Quarterly Bulletin* illustrated the divergence between UK real yields (which had fallen) and US real yields (which had not). The chart below shows that this trend continued in the final quarter of 1997. The chart also shows real yields derived from index-linked bonds in Australia and Canada. These have also remained broadly unchanged recently, in contrast with the UK market. Institutional factors may help to explain the fall in UK yields, particularly the influence of the Minimum Funding Requirement, which became effective in April.

The rest of this box looks at reasons why levels of real yields might differ between countries, concentrating on structural differences—tax, indexation, liquidity and instrument design—between the UK and US markets as an illustration. (There are other reasons why levels of real yields might differ—if, for example, the relative price of the baskets of goods to which different bonds are indexed was expected to change over the life of the bonds.)

Real yields on index-linked securities



Tax treatment

In both the UK and the US markets, nominal coupons (ie coupons uplifted by inflation) on government bonds are taxed. The inflation uplift on the principal is not taxable in the United Kingdom. In the United States it is taxable on an annual basis, though in practice many taxpaying US investors are likely to hold indexed bonds in tax-deferred accounts. With a tax-deferred account, payment of income tax is deferred until the income is withdrawn from the account.

To assess the potential significance of this difference in tax regimes, imagine two hypothetical ten-year index-linked bonds with $3^3/_8$% (gross) real coupons—one subject to the US tax system (but with tax deferral) and the other subject to the UK tax system.(1) Suppose that the after-tax real return on these two bonds is equal. It is then possible to compute corresponding gross real yields. The less favourable US tax regime will tend to make US gross real yields higher than in the United Kingdom. The extent of the difference depends on the 'marginal' investor in each market (who determines the price). If non-taxpayers are driving prices in both markets, tax differences are unlikely to be important.

Table 1
Impact of tax rates on gross real yield differentials

US tax rate (per cent)	UK tax rate (per cent)	Difference in gross yields (basis points)
39.6	40.0	70
28.0	24.0	60
15.0	20.0	6

Note: Calculations assume that future inflation remains constant at 3%.

But if taxpayers are driving prices, tax effects could be large relative to the apparent difference in real yields (see Table 1). For ease, these calculations assume that the marginal investor in both markets has a similar tax status—the differences would be larger if this assumption were to be relaxed.

(1) $3_{3/8}$% is the coupon rate on the first US ten-year indexed note.

UK strips market activity was relatively quiet during December. By 2 January 1998, a little under 1% of the £82 billion of strippable stock was held in stripped form. In the first four weeks of the strips market, turnover in coupon and principal strips was equivalent to 1% of turnover in the rest of the gilts market.

The new strips market provides direct observations of zero-coupon bond yields for the first time. Because coupon strips mature every 7 June and 7 December, there is a wide spread of observations across the yield curve. Zero-coupon curves can be used as an indicator of the market's expectations of future interest rates. Until now, it has only been possible to obtain a theoretical zero-coupon yield curve for the UK gilt market from the prices of

Taxpaying investors are present in both markets. For instance, in April 1995 there were estimated to be more than 50,000 personal investors (ie taxpayers) in UK index-linked gilts, while more recent analysis of the stock register suggests that higher-rate individual taxpayers continue to be important holders up to around the ten-year maturity. But non-taxpayers (such as pension funds) are large investors in both markets, and are likely to be dominant. This view is supported by the UK corporate index-linked market. The inflation uplift on UK corporate index-linked bonds is taxed. Taxpayers would require compensation for this in the gross yield on such debt. But actual differentials between comparable corporate and government index-linked and conventional bonds suggest that in practice there is no such tax effect.

Index problems

The Boskin Commission suggested that the US consumer price index (CPI), to which US bonds are indexed, on average overstates inflation by 1.1%. This could have two effects. First, if the inflation uplift over-compensates for actual inflation, the apparent real return on the bonds will understate the actual real return. Second, bond-holders may demand a premium in the yield, because they are uncertain whether the CPI will be changed and if so, how any change will affect them.

Liquidity

One of the factors most likely to lead to a difference in real rates between the United Kingdom and the United States is a relative liquidity premium. Though the ten-year US bond is much larger than the biggest index-linked gilt, there is still very little secondary-market trading taking place in the US instruments relative to the UK bonds.

Instrument design

There are three key areas where the design of the US bonds differs from that of UK IGs. The US bonds employ a shorter indexation lag (three months, as opposed to eight months for IGs), are strippable and employ an inflation 'floor' on the value of the inflation-adjusted principal (the final repayment will never be less than the price at which the bonds were originally issued). Each of these factors might, in principle, make the US bonds more attractive than IGs. But it seems unlikely that investors would believe that these US design features would currently be worth more than a small price premium relative to the UK bonds. Given the low, stable inflationary environments in both the United Kingdom and the United States, it is unlikely that the shorter US lag will provide the American instrument with significantly better inflation protection than the comparable UK bond. Also, the clause protecting the value of the principal of US bonds is unlikely to have much value. And given that no one has yet stripped the three US indexed bonds, it is unlikely that strippability attracts a significant premium.

Method for computing real rates

Comparisons of real rates are also affected by conventions in the computation of real rates. Because of lags in indexation, real yields are sensitive to the rate of inflation assumed in their calculation. The longer the lag and the shorter the residual maturity, the more impact this inflation assumption will have on the bond's computed yield. Table 2 shows the yields for two index-linked gilts with very different residual maturities under different inflation assumptions. While the UK real yields illustrated in the chart were based on a 3% inflation assumption (the current UK market convention), the figures for the United States are based on the US Treasury's settlement price formula, which ignores the indexation lag altogether. Because of the shortness of the US lag, the difference between 'true' real yields based on 3% inflation and those calculated using the Treasury formula will, however, be small.

Table 2
Computed real yields on index-linked gilts under different inflation assumptions (as at 30 June 1997)

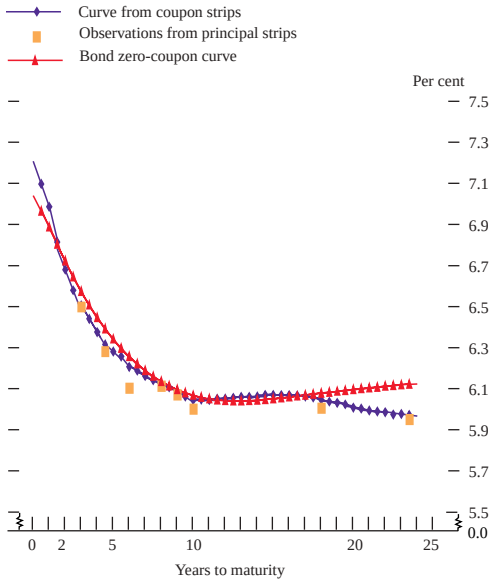
Per cent

Bond (per cent)	Real yield assuming 3% inflation	Real yield assuming 5% inflation
4 5/8% 1998	4.11	2.94
4 1/8% 2030	3.69	3.63

coupon-bearing gilts. The launch of gilt strips means that traded zero-coupon rates can be used as a measure of interest rate expectations. So far, because of the low levels of strip activity and trading, it would be misleading to read much into the interest rate expectations derived from strips prices. As the market develops, the information content should increase.

As zero-coupon instruments, strips bring only one payment. So their duration, the weighted average of their cash flows over time, is much longer than that of coupon-bearing gilts of the same maturity. Given this difference in duration, strips and bonds of the same maturity have different yields: strips' yields will usually be closer to the yields of much longer coupon-bearing gilts than to

Chart 20
UK nominal interest rate spot curves using strip and bond prices on 26 January 1998



those of coupon-bearing bonds of similar maturities. So when the bond yield curve is downward-sloping, strips' yields lie below those of coupon-bearing gilts of the same maturity. Similarly, when the bond yield curve is upward-sloping, the strip curve will lie above it. Currently, the bond yield curve is downward-sloping. So it is possible that the current shape of the yield curve has deterred some strip activity: at equivalent maturities, strip yields lie below bond yields, making strips appear expensive (see Chart 20).

The long duration that investors may obtain through strips can be attractive, depending on their interest rate view. If investors were bullish about the interest rate outlook, believing that rates were likely to fall sharply and bond prices to rise, then long-duration assets would be attractive: they would provide a larger capital gain for the same change in interest rates. So activity in strips may increase as more market participants look for leveraged ways of taking a bullish view on interest rates.

Other issues

HM Government Ecu issues

The United Kingdom continued to hold regular monthly tenders of ECU 1 billion of Ecu Treasury bills during the fourth quarter, comprising ECU 200 million of one-month, ECU 500 million of three-month and ECU 300 million of six-month bills each month. The tenders continued to be oversubscribed, with issues being covered by an average of 4.0 times the amount on offer in the fourth quarter of 1997, compared with the average cover of slightly under 3.0 times during 1996 and the first three quarters of 1997. During the fourth quarter, bids were accepted at average yields of 4–10 basis points below the Ecu Libid rate of the appropriate maturity. There are currently ECU 3.5 billion of UK Government Treasury bills outstanding. Secondary market turnover in the fourth quarter averaged ECU 1.2 billion a month, slightly lower than in the first three quarters of 1997.

On 21 October, at the regular quarterly auction under the UK Government's three-year Ecu note programme, the Bank reopened the Ecu Treasury note maturing in January 2000 with a further tender for ECU 500 million, raising the amount outstanding with the public of this note to ECU 2.0 billion. There was strong cover at the auction of 4.7 times the amount on offer and accepted bids were in a tight range of 5.01%–5.03%. The total of notes outstanding with the public under the UK note programme thus rose from ECU 5.5 billion to ECU 6.0 billion.

Sterling issues

Speculation that the United Kingdom might join EMU at an early stage, suggesting convergence between UK and European interest rates, boosted demand for sterling assets at the beginning of the quarter. Lower yields, an inverted yield curve, and narrowing eurosterling yield spreads over gilts, also encouraged a number of UK companies to lock into cheap long-term funding levels. But investor demand fell in late October, after the Chancellor's statement on EMU quelled speculation. With the turmoil in Asia adding to volatility in bond markets and leading to switches from lower to higher quality credits, spreads began to widen and issuance slowed markedly, resulting in a few planned issues being postponed or cancelled. Nevertheless, towards the end of the

quarter, with issuance and secondary market activity slowing to a trickle ahead of the Christmas holiday period, spreads began to narrow again.

Though the difficult trading conditions for much of the fourth quarter led to fewer issues, total issuance of fixed-rate bonds and floating-rate notes (FRNs) remained high, boosted by large, heavily pre-marketed securitised deals. These included Annington Finance, which raised a further £3.1 billion against rentals on ex-MOD residential properties; Rose II, which securitised a further £1.4 billion of National Westminster Bank corporate loans; Aire Valley Finance, which raised just over £1 billion secured against Mortgage Express mortgage receivables; and Canary Wharf, which raised over £500 million against rental incomes.

Fixed-rate issues in the quarter totalled £5.6 billion, taking total fixed-rate issuance for 1997 to a record £32 billion, compared with £22 billion in 1996 and the previous peak of £26 billion in 1993. Narrower swap spreads reduced arbitrage issuance from its levels earlier in the year and only £0.7 billion of sub-seven year bonds were issued. (Swap spreads allow borrowers to swap fixed-rate borrowing into floating-rate.) UK corporate issues were focused at ten years and were a large share of the £1.1 billion issued within the 7–15 year maturity band. Though there was some corporate funding at longer maturities, including a £300 million 25-year bond for Railtrack, nearly 80% of the £3.8 billion longer-dated issues were part of the securitised deals described above.

Securitisations also boosted floating-rate issuance, with five deals accounting for over 85% of the £4.2 billion issued in the quarter. The EIB's £500 million five-year note was the only other major FRN issue.