Markets and operations

This article reviews developments in global financial markets since the 2008 Q3 *Quarterly Bulletin* up to late November 2008. The article also reviews the Bank's official operations during this period.

Global financial markets(1)

Overview

This article covers a period of exceptional instability in the global financial system. The financial market turmoil intensified in September and October, especially following the failure of Lehman Brothers. Subsequently, a number of other financial firms failed, were rescued by government intervention or merged with other financial institutions.

As a result, trading conditions in many markets became very strained. Market liquidity deteriorated as market makers widened spreads between prices at which they were prepared to buy and sell. This contributed to numerous apparent anomalies in market pricing.

The instability of the global financial system was accompanied by a significant deterioration in the global economic outlook and increased investor risk aversion. Consensus forecasts for economic growth were revised sharply lower in both major and emerging economies. The majority of asset prices fell and there were large increases in realised volatilities and also implied volatilities derived from option prices across markets (**Chart 1**). This asset price volatility also increased the pressure on many financial institutions to reduce the size of their trading positions in order to conserve capital.

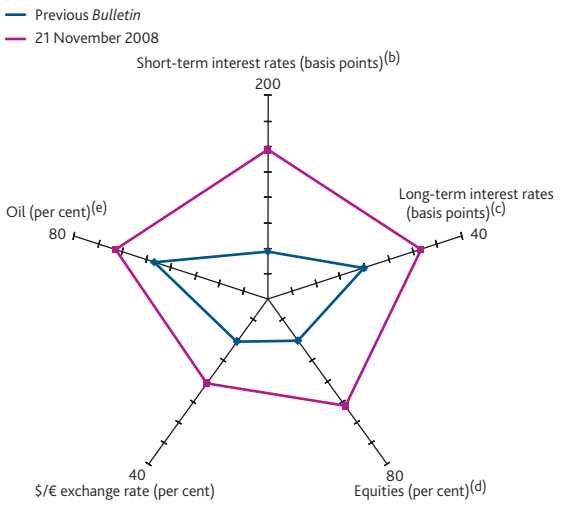
These financial market developments prompted the introduction of various measures by the authorities in many countries to maintain financial system stability. The initiatives helped to bring some level of stability to financial markets from late October. But conditions remained far from normal.

Recent developments in international capital markets

Bank funding markets

Following more than a year of stress in interbank money markets, conditions worsened markedly in September 2008. The cost of interbank borrowing, particularly in US dollars, rose markedly following the failure of Lehman Brothers. The spread of three-month US dollar Libor over expected future short-term interest rates reached a record high of around 370 basis points in October (**Chart 2**). There was also a sharp

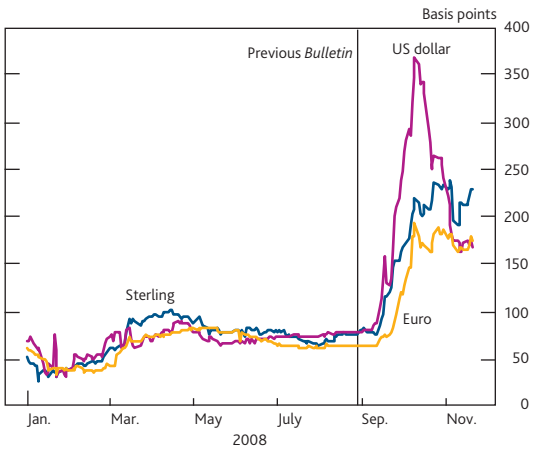
Chart 1 Selected implied volatilities(a)



Sources: Bloomberg, Chicago Mercantile Exchange, Euronext.liffe and Bank calculations.

(a) Implied by option prices on selected instruments. Equal weighting where more than one instrument used.
(b) Options on US dollar, euro and sterling Libor interest rate futures contracts.
(c) US dollar swaptions settling on five-year swap rates, five years forward.
(d) Options on FTSE 100, S&P 500 and Euro Stoxx 50.
(e) Options on West Texas Intermediate crude oil futures.

Chart 2 Three-month Libor relative to expected short-term interest rates(a)



Sources: Bloomberg, British Bankers' Association and Bank calculations.

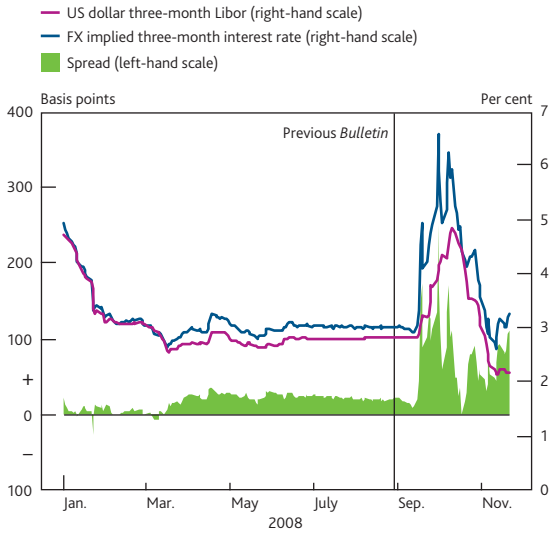
(a) Spread of three-month London interbank offered rate (Libor) to three-month overnight index swap (OIS) rates.

(1) This article focuses on global capital market developments. The data cut-off for this section is 21 November.

decrease in the volumes of money market loans, particularly at maturities beyond a few days. At the same time, contacts reported increased differentiation between rates paid by individual banks to borrow funds.

The strains on bank funding were particularly acute in cross-currency swap markets where the implied rates for US dollars spiked up sharply (**Chart 3**).

Chart 3 Three-month US dollar Libor rates and implied three-month rates from foreign exchange forwards(a)



Sources: Bloomberg, Reuters and Bank calculations.

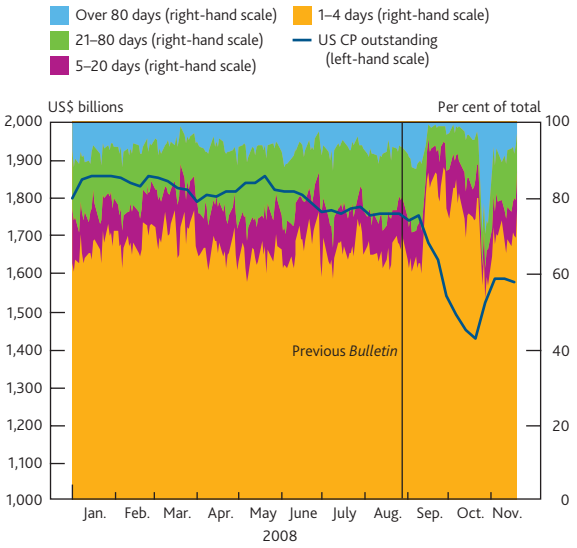
(a) For more details, see 2008 Q2 *Quarterly Bulletin*, page 134, Chart 26 and *BIS Quarterly Review* March 2008, pages 73–86.

In addition, markets for other short-term bank debt remained stressed. In the United States, financial institutions issued commercial paper (CP) at shorter maturities (**Chart 4**), and contacts reported that issuance of certificates of deposit (CDs) decreased markedly in September as secondary markets for these securities became very illiquid. Certain lenders to banks, such as money market funds (MMFs), corporates and asset managers, reportedly ceased to repurchase maturing longer-term paper in favour of overnight paper and deposits (**Chart 4**).

US MMFs experienced a sharp downturn in total assets under management after the value of Reserve Primary Fund's assets fell below the notional value of shares in the fund (ie it 'broke the buck').(1) And there were widespread redemptions from 'Prime' funds, which invest in bank securities, with the proceeds reinvested in government paper-only funds. MMFs themselves shortened the term of their remaining lending to banks (**Chart 5**).

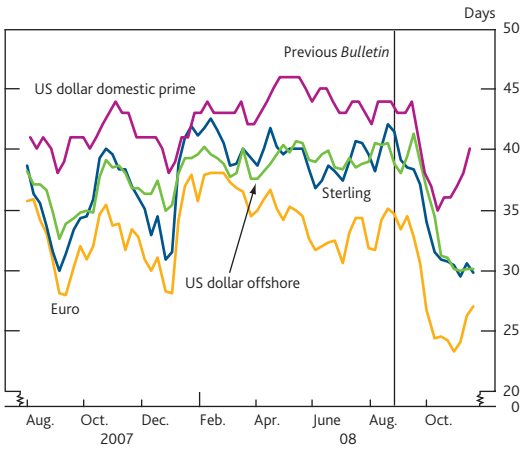
In response to these funding pressures, the US authorities introduced a number of new measures to restore liquidity to short-term funding markets and maintain investor confidence in the MMF industry. The Commercial Paper Funding Facility

Chart 4 US commercial paper outstanding and maturity of daily issuance



Source: US Federal Reserve.

Chart 5 Money market fund assets' weighted-average maturity



Source: iMoneyNet.

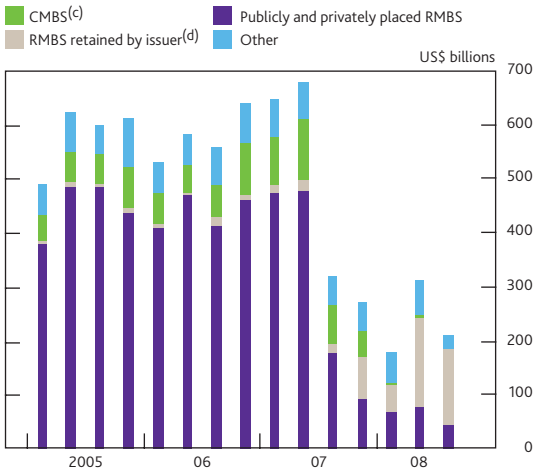
(CPFF) in particular was reported to have supported US dollar CP issuance. In the first few weeks following its introduction on 27 October, the CPFF purchased around $270 billion of CP, which contacts suggested helped the US domestic MMF industry through the turbulence.

The market for asset-backed securities (ABS) — another source of funding for banks and corporates — remained largely closed. Very few ABS were publicly issued, with the majority of issuance retained by the issuer for use as collateral in central bank operations (**Chart 6**). And the inability of banks to access wholesale funding markets via issuance of ABS reportedly affected their ability to provide new lending. On 25 November, the Federal Reserve announced the Term

(1) The value of its assets fell such that it could no longer price its shares at par. 'Breaking the buck' has previously led to suspension of redemptions and the eventual closure of the fund.

Asset-Backed Loan Facility (TALF), which will lend up to $200 billion to holders of highly rated US dollar ABS backed by consumer and small business loans in order to facilitate lending to these sectors.

Chart 6 Global issuance of asset-backed securities(a)(b)



Sources: Dealogic and Bank calculations.

(a) Non-retained residential mortgage-backed security (RMBS) issuance has been proxied by issuance that is eligible for inclusion in underwriting league tables, while retained issuance has been proxied by issuance that is not eligible for inclusion.
(b) Quarterly issuance. 'Other' includes auto, credit card and student loan ABS.
(c) Commercial mortgaged-backed securities.
(d) This includes RMBS used as collateral in central bank operations.

More widely, during October and November the governments of the world's largest economies announced a series of measures to stabilise the international banking system. According to contacts, these measures prompted some modest improvement in market sentiment and helped ease the acute instability across the global banking system.

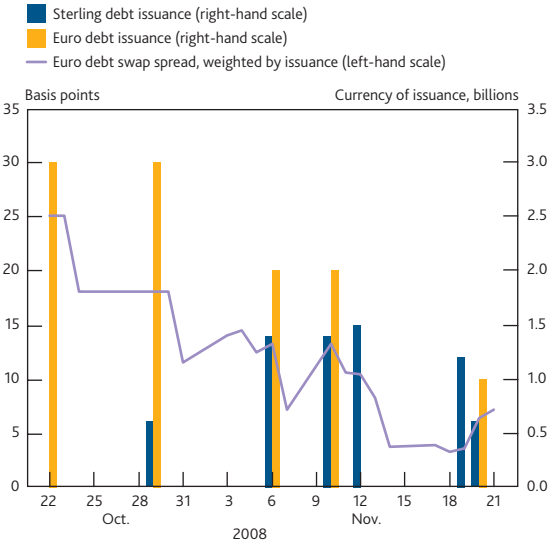
On 8 October, the UK Government announced a set of measures to address perceived weaknesses in banks' capital and funding. Specifically, the UK Government offered to underwrite new equity capital issuance by UK banks. And the Credit Guarantee Scheme allowed UK banks to issue up to £250 billion (in aggregate) of government-guaranteed CDs, CP and senior unsecured paper of up to three years in maturity.(1) In the period up to 21 November, €11 billion and £6.7 billion of two to three-year guaranteed debt was issued publicly (**Chart 7**), in addition to shorter-maturity guaranteed debt by private placement.

Elsewhere, similar measures were adopted, including the Temporary Liquidity Guarantee Programme (TLGP) in the United States and other government-guarantee schemes throughout Western Europe and Australia.

Short-term interest rates

Alongside these government measures, on 8 October central banks in the United States, euro area, United Kingdom, Canada, Switzerland and Sweden took co-ordinated action to ease policy rates by 50 basis points. In all cases this was

Chart 7 UK banks' debt issuance of two to three years' maturity under the Credit Guarantee Scheme



Sources: Bloomberg and Bank calculations.

followed by further reductions to policy rates. The changes in central bank policy rates in different economies are summarised in **Table A**.

Table A Selected changes to official policy rates to 21 November

Country/region	Policy rate 29 Aug.	Date	Move	Policy rate 21 Nov.
United States	2.00%	8 Oct.(a)	-50 basis points	
		29 Oct.	-50 basis points	1.00%
Euro area	4.25%	8 Oct.(a)	-50 basis points	
		7 Nov.	-50 basis points	3.25%
Japan	0.50%	31 Oct.	-20 basis points	0.30%
China	7.47%	15 Sep.	-27 basis points	
		8 Oct.(a)	-27 basis points	
		29 Oct.	-27 basis points	6.66%
United Kingdom	5.00%	8 Oct.(a)	-50 basis points	
		7 Nov.	-150 basis points	3.00%
Canada	3.00%	8 Oct.(a)	-50 basis points	
		21 Oct.	-25 basis points	2.25%
Australia	7.25%	3 Sep.	-25 basis points	
		8 Oct.	-100 basis points	
		5 Nov.	-75 basis points	5.25%
Sweden	4.50%	3 Sep.	+25 basis points	
		8 Oct.(a)	-50 basis points	
		22 Oct.	-50 basis points	3.75%
Switzerland	3.00%(b)	8 Oct.(a)	-50 basis points	
		6 Nov.	-50 basis points	
		20 Nov.	-100 basis points	1.00%

Source: Bloomberg.

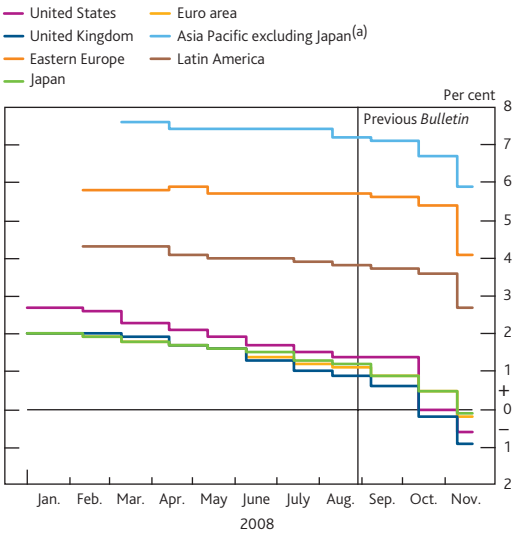
(a) Part of co-ordinated central bank action.
(b) Although the Swiss National Bank's target range for Swiss franc three-month Libor was 2.25%–3.25% at the beginning of the period, the target rate was above 3% immediately prior to the 8 October decision.

Consensus forecasts for economic growth in 2009 were revised down further compared with projections earlier in the year with most major industrial economies expected to

(1) Banks issuing under the Credit Guarantee Scheme will incur a fee equivalent to 50 basis points plus the bank's median five-year CDS spread over the twelve-month period proceeding 7 October 2008.

contract in 2009 (**Chart 8**). Growth projections for emerging economies also fell, suggesting reduced perceptions of emerging markets being 'decoupled' from developed markets.

Chart 8 Expected real GDP growth for 2009

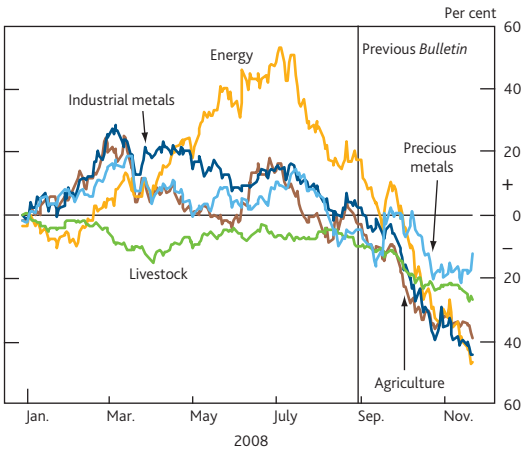


Source: Consensus Economics.

(a) Comprises fifteen countries.

Falls in global growth expectations led to further broad-based falls in commodity prices (**Chart 9**). In particular, the price of Brent crude oil fell below $54 compared with its high of around $147 in July. This helped to ease near-term pressures on retail price inflation.

Chart 9 Cumulative changes in selected commodity price indices(a) since January 2008

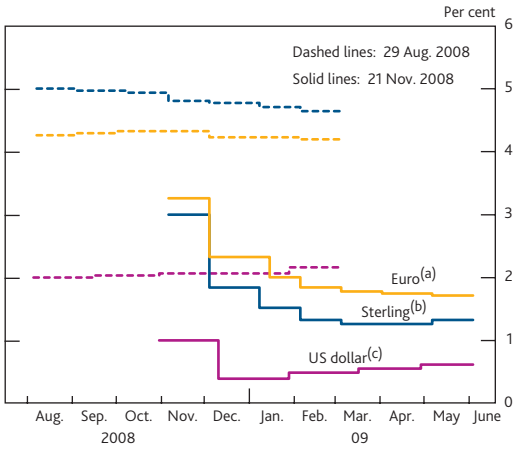


Source: Standard & Poor's.

(a) Series refer to S&P GSCI total return indices.

Looking ahead, implied future paths for short-term interest rates in sterling, US dollar and euro shifted down sharply (**Chart 10**). Economists' expectations of future policy rates implied by surveys also fell.

Chart 10 International forward short-term interest rates

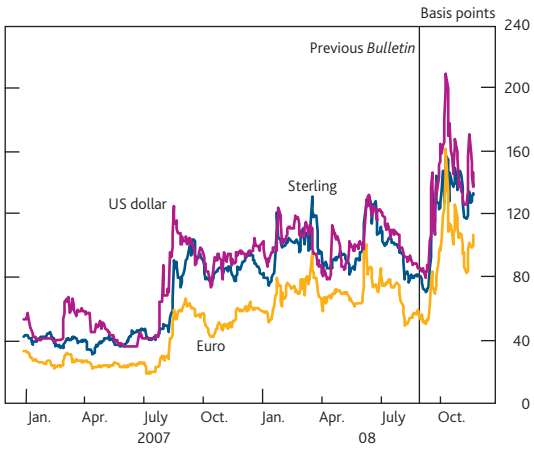


Sources: Bloomberg and Bank calculations.

(a) Derived from euro overnight index average (EONIA) swaps.
(b) Derived from sterling overnight index average (SONIA) swaps.
(c) Derived from overnight swaps that settle on the Fed funds effective rate.

Increased uncertainty about the outlook for short-term interest rates was reflected in measures of implied volatility derived from option prices on Libor futures (**Chart 11**). Implied volatility increased sharply during September, declined a little during October following the co-ordinated monetary easing, but ended the period significantly higher than at the time of the previous *Bulletin*. This could have reflected both increased uncertainty about risk premia in Libor rates as well as uncertainty about the future path of policy rates.

Chart 11 International six-month implied volatility derived from interest rate options

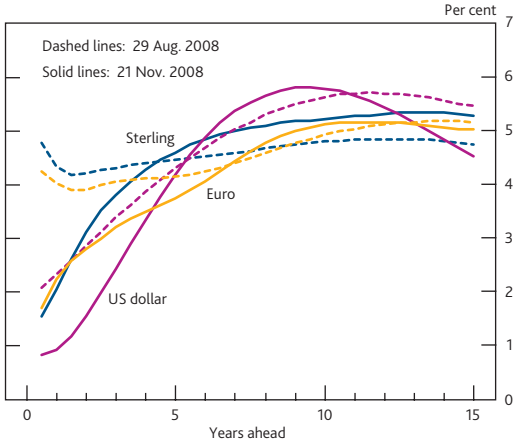


Sources: Bank of England, Chicago Mercantile Exchange and Euronext.liffe.

Long-term interest rates

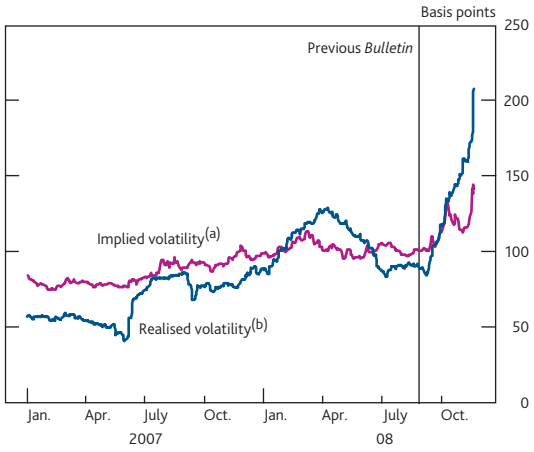
At longer horizons, volatility also picked up in international government bond markets against a general trend of steepening yield curves (as short forward rates fell and long rates increased — see **Chart 12**). In particular, realised and implied long-term US dollar interest rate volatility rose sharply (**Chart 13**).

Chart 12 International nominal forward interest rates(a)



(a) Instantaneous forward rates derived from the Bank's government liability curves.

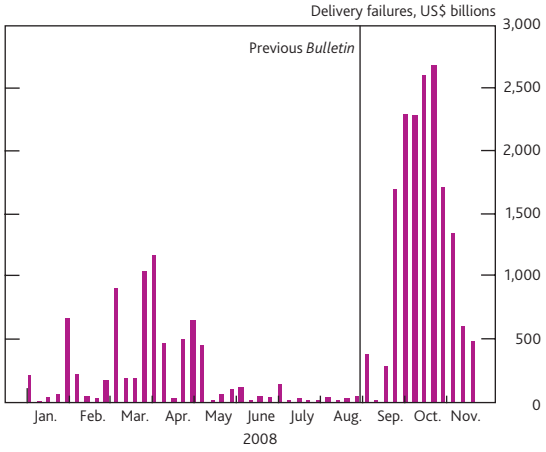
Chart 13 US dollar nominal forward interest rate volatility



Sources: JPMorgan Chase and Co. and Bank calculations.

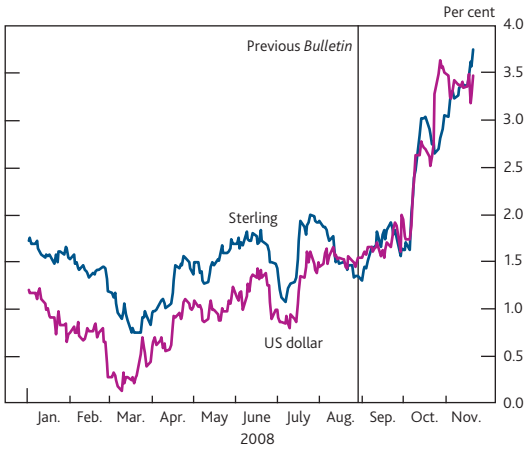
(a) Five-year volatility, five years ahead implied by swaptions.
(b) Annualised volatility over the preceding three-month period of five-year nominal rates five years ahead, derived from the Bank's government liability curve.

Chart 14 Notional value of US government bond repo delivery failures



Sources: Federal Reserve Bank of New York and Bank calculations.

Chart 15 International five-year spot real interest rates(a)



Source: Bank calculations.

(a) Sterling and US dollar spot rates derived from the Bank's government liability curves. Sterling rates referenced to RPI and US dollar rates referenced to CPI.

This rise in volatility was associated with very illiquid conditions and contacts noted that at times the functioning of government bond markets became severely impaired. Associated with that, the number of failed trades on US Treasury repo transactions increased to record levels in October and remained elevated in November (**Chart 14**). As a result, holders of US Treasuries became reluctant to lend in the repo market.

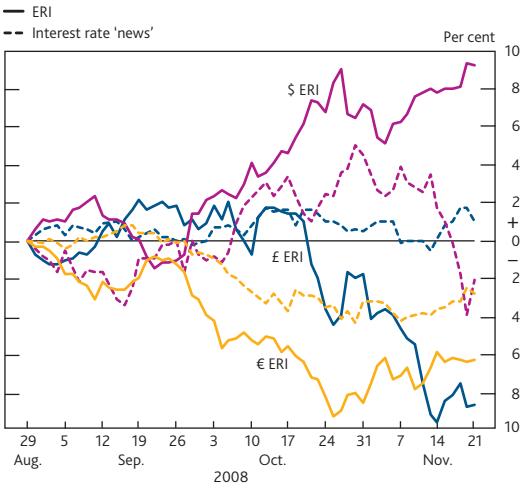
US dollar and sterling real interest rates rose at short to medium-term maturities (**Chart 15**). Contacts suggested that this may, in part, relate to higher prospective government borrowing, which could have prompted higher expected future interest rates and/or a rise in the uncertainty surrounding those expectations (ie term premia).

Foreign exchange

Interest rate developments might account for some of the variations in exchange rates. For example, unexpected falls in euro interest rates (relative to those overseas) coincided with a sharp depreciation in the euro. And at short horizons, relative interest rate developments were consistent with a fall in the value of sterling. However in general, the major currencies seem to have moved by more than would be suggested by interest rate news, especially since late October (**Chart 16**).

Market participants tended to place weight on other explanations for the recent swings in exchange rates. In particular, three interrelated factors were widely cited: a general retrenchment from risky assets as part of the ongoing deleveraging process in financial markets; unwinding of so-called carry trades (which typically involve borrowing in low-yielding currencies to invest in overseas assets with higher

Chart 16 Implied contribution of interest rate 'news' to cumulative changes in selected ERIs since previous *Bulletin*[a]



Source: Bank calculations.

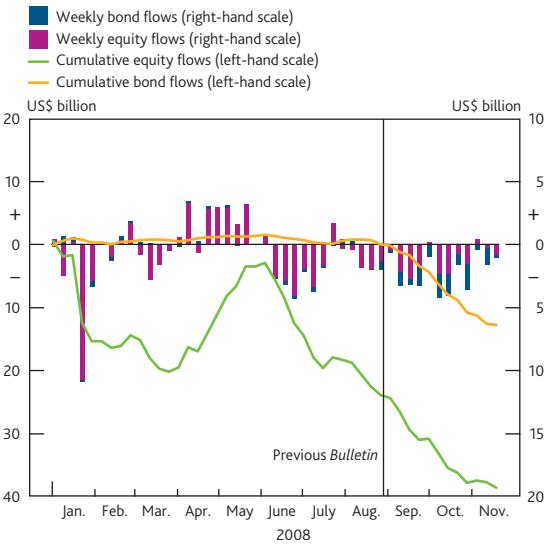
(a) For more information on the analytics required to isolate the impact of interest rate 'news' on exchange rates, see Brigden, A, Martin, B and Salmon, C (1997), 'Decomposing exchange rate movements according to the uncovered interest rate parity condition', *Bank of England Quarterly Bulletin*, November, pages 377–89.

nominal returns); and repatriation of investments (especially to the United States and Japan).

Emerging markets

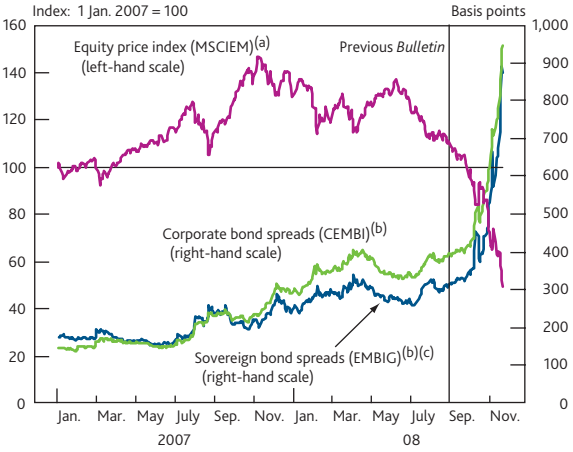
Emerging market economies (EMEs) were particularly affected by this changing pattern of capital flows. There were significant outflows from emerging market debt and equity mutual funds over the review period (**Chart 17**). EME sovereign and corporate bond spreads widened and EME equity markets weakened sharply (**Chart 18**). In contrast to earlier in the year when emerging market currencies were on divergent trends, there were also sharp and broad-based depreciations in the value of emerging market currencies against the US dollar (**Chart 19**).

Chart 17 Net flows into emerging market bond and equity mutual funds



Source: EPFR Global.

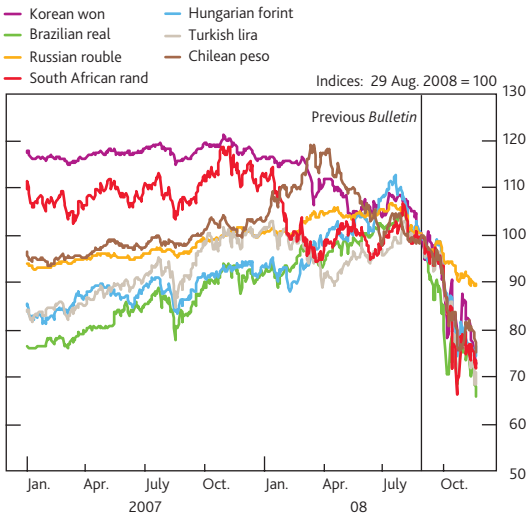
Chart 18 Emerging market bond spreads and equity prices



Sources: JPMorgan Chase & Co., Morgan Stanley and Bank calculations.

(a) In US dollar terms.
(b) US dollar-denominated debt index.
(c) Excludes defaulted bonds.

Chart 19 Emerging market exchange rates[a]



Sources: Reuters and Bank calculations.

(a) Against the US dollar.

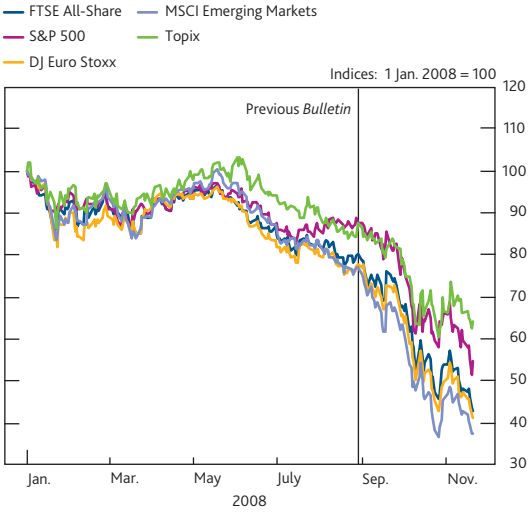
To some extent, these falls in emerging market asset prices reflected the weaker macroeconomic outlook for these economies which would have tended to lower expected returns on EME assets. In addition, against the background of heightened risk aversion and further deleveraging, investors may have demanded greater risk compensation on investments in EMEs.

The decline in commodity prices, especially those for energy and industrial metals, also put further pressure on EME commodity exporters. For example, share prices of Russian energy companies declined by around 60%.

Equity markets

Alongside the falls in EME share prices, equity indices in the major economies also fell, continuing the decline that took hold in the summer (**Chart 20**). The falls in equity prices were broad-based, affecting nearly all the major industrial sectors.

Chart 20 International equity indices (in US dollars)(a)



Sources: Bank of England and Bloomberg.

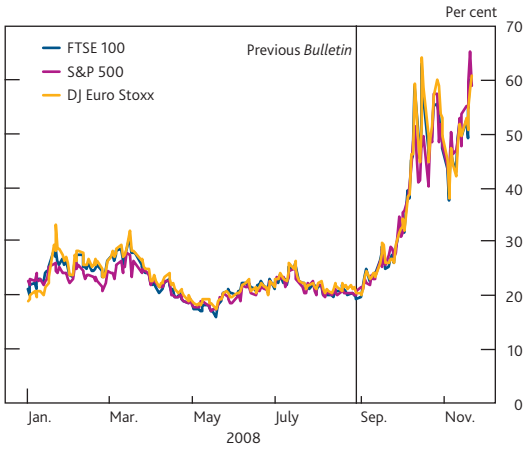
(a) The MSCI Emerging Markets index is a capitalisation-weighted index that monitors the performance of stocks in emerging markets.

The share price declines were particularly sharp in early October, coinciding with the intensification of pressures on the global banking system. Contacts linked some of the price falls to hedge funds liquidating positions to meet increased margin calls on collateral posted with their prime brokers. In addition, actual (and fears of future) redemption requests at hedge funds — including via so-called funds of funds — might also have triggered further equity sales. Data available to the end of September showed a quarterly outflow from equity hedge funds, and according to contacts the outflow accelerated through October.

Forward-looking measures of equity price volatility rose, indicating that investors perceived that the outlook for equity markets remained highly uncertain (**Chart 21**). This heightened uncertainty was reflected in a widening in the implied probability distribution of future equity prices derived from option prices (**Chart 22**). The implied distribution also showed a significant increase in the perceived downside risks to the future levels of the FTSE 100 index.

The continued falls in equity prices and increased volatility occurred at the same time as expectations for company earnings growth were revised down further. Specifically, investment analysts lowered their forecasts for earnings growth in 2008 and 2009 as the macroeconomic outlook worsened (**Chart 23**).

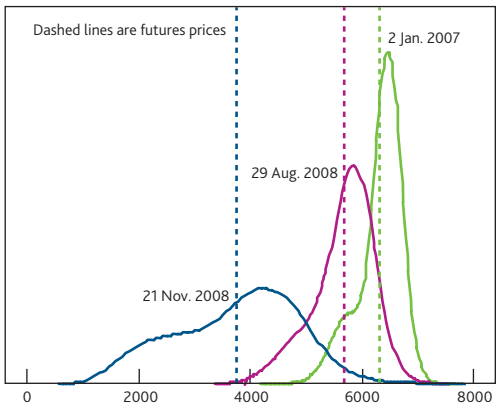
Chart 21 Implied volatilities for international equity indices(a)



Sources: Bloomberg, Euronext.liffe and Bank calculations.

(a) Three-month (constant maturity) implied volatility derived from options.

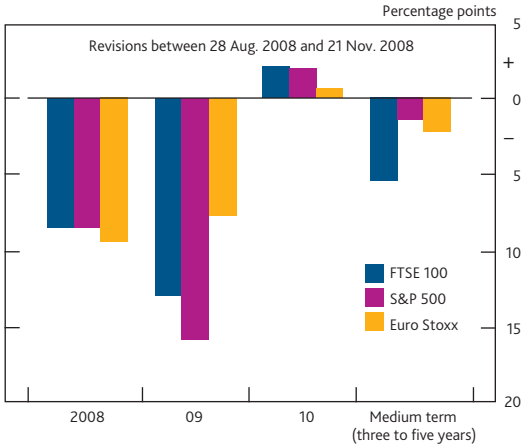
Chart 22 Three-month option-implied FTSE 100 probability density functions(a)



Sources: Euronext.liffe and Bank calculations.

(a) For more details, see Clews, R, Panigirtzoglou, N and Proudman, J (2000), 'Recent developments in extracting information from options markets', *Bank of England Quarterly Bulletin*, February, pages 50–60.

Chart 23 Revisions to company earnings growth forecasts(a)(b)

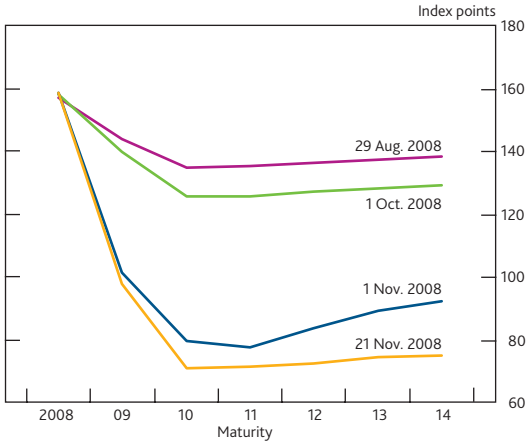


Source: Thomson Datastream.

(a) Based on data from the Institutional Brokers' Estimate System which uses Consensus forecasts of earnings per share growth by sell-side analysts.
(b) 2009 figures capture analysts' forecasts relating to annual results of companies that have a year end between 1 June 2008 and 30 May 2009. Similarly, forecasts for 2009 (2010) relate to those firms whose financial years end between June 2009 (2010) and May 2010 (2011).

An alternative market-based indicator of future company earnings also suggested that corporate prospects deteriorated. The price of dividend swaps — instruments that allow investors to trade future dividend payments in return for fixed cash flows (see the box opposite for more details) — fell sharply since the summer, across all maturities. Most of the falls occurred in October. In principle, the decline in the value of dividend swaps could have reflected a shift down in expectations of future dividend payouts (**Chart 24**). However, the falls could also be consistent with heightened risk premia on these instruments. In particular, contacts reported reduced liquidity in equity derivative markets in recent months, which may have affected the liquidity premium factored into dividend swap pricing.

Chart 24 DJ Euro Stoxx dividend swap prices(a)(b)



Sources: Bloomberg and Bank calculations.

(a) For more details on dividend swaps see the box opposite.
(b) From exchange-traded futures contracts.

Corporate credit

Accompanying the falls in equity prices, corporate credit spreads also widened further. Indeed, some commentators noted that equity and corporate credit market indicators became more consistent over recent months. Previously, over the year to Summer 2008 equity prices had generally remained resilient compared with corporate credit spreads which had widened sharply from July 2007 (**Chart 25**).

Liquidity premia remained a persistent feature in corporate bond markets. The prices of corporate bonds were low compared with premia on credit default swap (CDS) contracts for the same firm. This metric — the so-called CDS/cash bond basis — became considerably more negative. According to contacts, this was predominantly due to a deterioration in funding conditions for corporate bonds, with counterparties demanding more onerous terms when parting with cash in exchange for bonds (**Chart 26**).

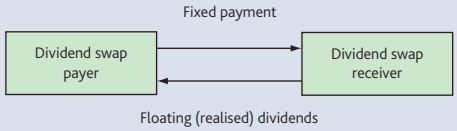
Dividend swaps

Dividend swaps are derivative contracts which are directly linked to the dividends paid by a specific stock or basket of stocks. The final payment between parties to the swap is determined by the actual level of dividends paid over the time period specified by the contract, usually a calendar year.

Trading in the dividend swap market takes place predominantly over-the-counter as private contracts between counterparties. However in June 2008, Eurex introduced exchange-traded dividend swaps that reference the aggregate level of dividends paid by the group of companies included in the Dow Jones Euro Stoxx 50 index.

The mechanics of dividend swaps are similar to fixed-for-floating interest rate swaps. The payer in a swap agrees to make a fixed payment at expiry, which embodies expectations of future dividends. The receiver in the swap agrees to pay the realised dividends accrued over the period (**Figure 1**). Hence, the payer in a dividend swap is 'long' realised dividends (ie the payer makes a profit if the realised dividend is greater than the agreed fixed payment). The swaps that reference dividends paid by a basket of companies (ie indices) are quoted in index point terms.(1)

Figure 1 Indicative structure of a dividend swap

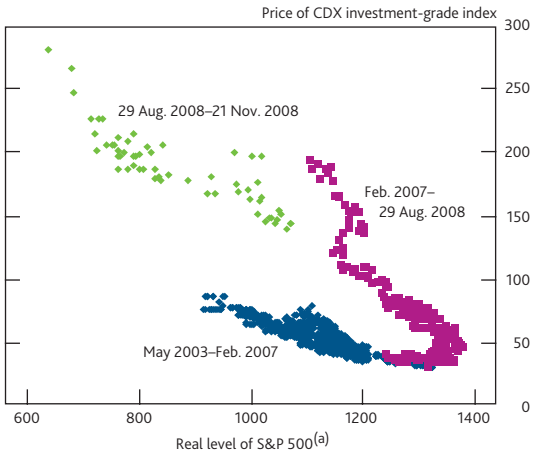


Prior to the swap maturing its price will fluctuate as the present value of cash flows on the contract changes. Since the final payment is uncertain, the appropriate discount rate for future cash flows will include an adjustment for risk. This means that the market price of the swap not only reflects expected dividends but also compensation for the perceived uncertainty around those expectations.

In addition, since this is a relatively new market and the number of active participants is still developing, contacts report that swap prices may also be affected by demand and supply conditions at particular times. That is, liquidity premia can sometimes be a particularly important in the pricing of dividend swaps.

(1) For example, if the dividend swap trades at 120 index points and the index level is at 3500, the swap implies a dividend yield of 120/3500 = 3.4%.

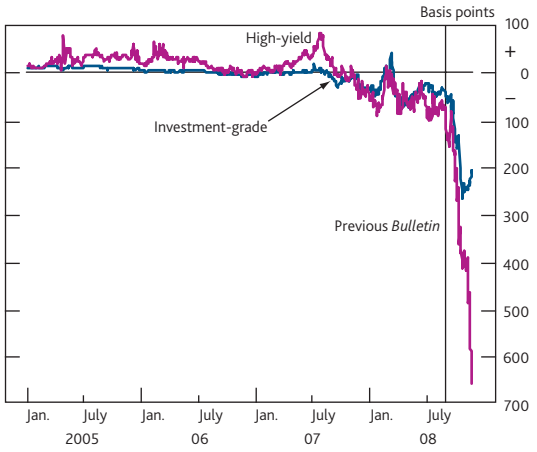
Chart 25 US corporate credit default swap premia and real equity prices



Sources: JPMorgan Chase and Co. and Standard & Poor's.

(a) S&P 500 deflated by US CPI (not seasonally adjusted).

Chart 26 Indicative 'basis' between bond spreads and corresponding credit default swap spreads for US corporates(a)



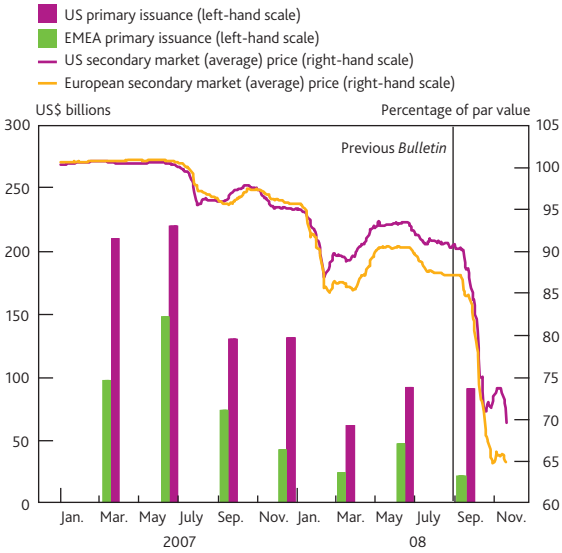
Source: JPMorgan Chase and Co.

(a) Calculated as equally weighted averages of the differences between bond spreads and spreads on the corresponding credit default swaps for US corporates.

Conditions in tradable loan markets also remained subdued. Prices in secondary markets for European and North American leveraged loans fell further, to record lows (**Chart 27**). And primary loan issuance remained low with limited demand for new leveraged buyout deals.

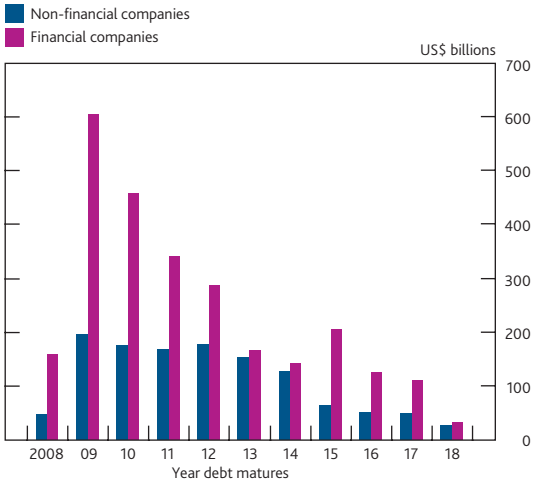
As well as lower prospective turnover and profits, corporates faced significant near-term funding pressures. A large volume of corporate debt matures towards the end of 2008 and over 2009 (**Chart 28**) which presents significant refinancing risks for firms. Similarly, the availability of trade finance reportedly fell over recent months, while demand from firms for such facilities increased, which further strained corporate cash flows.

Chart 27 Primary issuance and secondary market prices of leveraged loans



Sources: Loan Syndications and Trading Association Inc. and Reuters LPC Loan Connector.

Chart 28 Maturity profile of outstanding European corporate debt(a)



Source: Standard & Poor's Global Fixed Income Research.

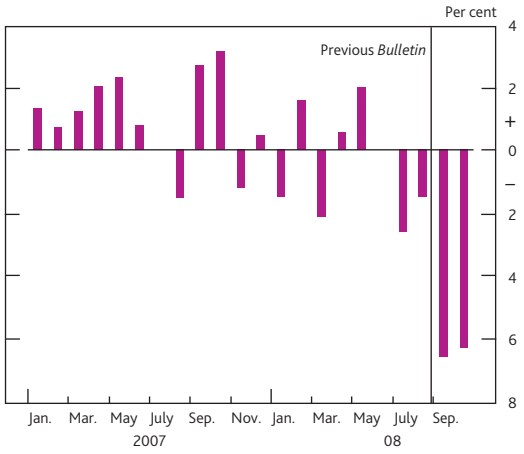
(a) Secured and unsecured instruments including bank loans, notes and bonds (including convertibles). Preferred stock and structured finance securities are not included.

Hedge funds and insurance companies

Against the background of falling asset prices and heightened market volatility, trading losses extended beyond banking sectors. In particular, in aggregate the value of assets under management with hedge funds fell in excess of 6% in both September and October, the biggest monthly losses on record for the sector (**Chart 29**).

Some hedge funds were caught out by the process of rehypothecation of assets whereby prime brokers on-lend collateral posted by hedge fund clients. Specifically, following the failure of Lehman Brothers some funds found they could not realise their assets held with that firm and this added to the liquidity pressures they faced.

Chart 29 Monthly hedge fund performance[a]



Sources: Bloomberg, CSFB/Tremont and Bank calculations.

(a) Monthly percentage change in CSFB/Tremont aggregate hedge fund performance index.

In an effort to stem forced assets sales and halt redemptions, a number of hedge funds reportedly looked to freeze investable funds (via so-called 'gates' which limit the amount of redemptions), or charge fees for early redemptions.

Outside of the speculative community, falling asset prices also affected the asset portfolios of long-term investors such as pension funds and insurance companies. In particular, weaker bond and equity prices reportedly reduced the value of assets held by such investors who typically hold positions on a 'buy and hold' basis.

Bank of England official operations

The Bank undertook a number of exceptional operations during the period of extraordinary tensions in money and funding markets.

In order to address pressures on banks' financing, the Bank:

- increased the size, frequency and collateral eligible in its long-term repo operations;
- extended the drawdown period for the Special Liquidity Scheme until 30 January 2009; and
- introduced a Discount Window Facility to provide liquidity insurance.

To help stabilise market interest rates out to the next MPC date, the Bank:

- held a number of *ad hoc* fine-tuning repo operations to inject extra reserves;
- expanded the range within which reserves were remunerated in order to accommodate the extra reserves;
- held *ad hoc* fine-tuning and scheduled operations to drain the reserves injected through larger extended collateral long-term repo operations; and
- introduced Operational Standing Facilities to absorb frictions in the overnight money markets.

Beyond sterling markets, the Bank joined other central banks in offering to lend US dollars at a range of maturities.

Sterling monetary framework

The Bank's market operations have two objectives, as set out in the Bank's recent consultative document, *The Development of the Bank of England's Market Operations*, released on 8 October (see the box on page 380):[1]

(i) To implement monetary policy by maintaining overnight market interest rates in line with Bank Rate, so that there is a flat risk-free money market yield curve to the next MPC decision date, and there is very little day-to-day or intraday volatility in market interest rates at maturities out to that horizon.

(ii) To reduce the cost of disruptions to the liquidity and payments services supplied by commercial banks. The Bank does this by balancing the provision of liquidity insurance against the costs of creating incentives for banks to take greater risks, and subject to the need to avoid taking risk onto its balance sheet.

The Bank seeks to meet these objectives under normal and stressed conditions.

Maintaining short-dated interest rates in line with Bank Rate

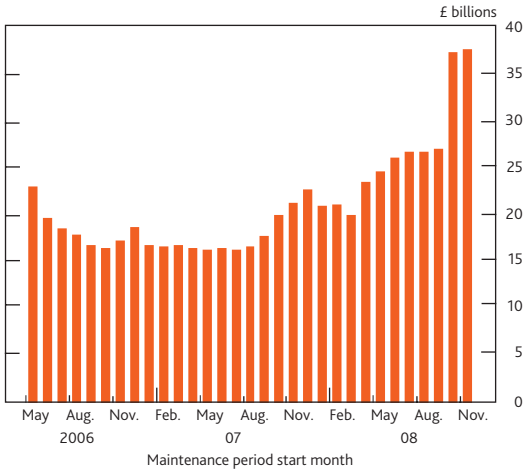
Volatility in short-dated market interest rates rose sharply. The Bank used a number of the contingency measures laid out in its 'Red Book'.[2]

Reserves targets

The Bank seeks to achieve its rate-setting objective by ensuring a net supply of reserves in line with the banking system's demand, as reflected in targets chosen by the banks themselves. Between August and October, reserves banks in aggregate increased their chosen targets from £26.7 billion to £37.4 billion. Ahead of the November–December maintenance period, the aggregate target rose further to £37.7 billion (**Chart 30**).

(1) www.bankofengland.co.uk/markets/money/publications/condococt08.pdf.
(2) See *The Framework for the Bank of England's Operations in the Sterling Money Markets* (the 'Red Book') available at www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.

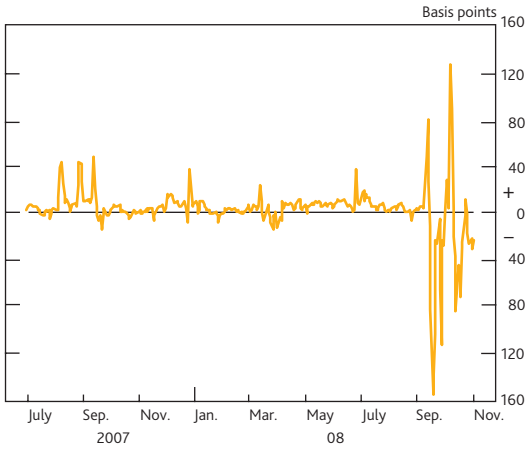
Chart 30 Aggregate reserves targets



Fine-tuning operations

The first shock to money markets in the period occurred following the failure of Lehman Brothers on 15 September. Reserves banks' demand for reserves increased significantly and overnight market interest rates rose relative to Bank Rate (**Chart 31**).

Chart 31 Spread to Bank Rate of secured sterling overnight interest rate since July 2007



Sources: BrokerTec and Bank calculations.

The Bank offered to supply, in two fine-tuning repo open market operations (OMOs) held on 15 and 16 September, additional reserves of £5 billion and £20 billion respectively. The OMOs were oversubscribed and the additional reserves were fully allotted. These reserves were reoffered in the scheduled short-term repo OMO on 18 September. Overnight market rates fell significantly below Bank Rate the following week and the Bank offered to drain reserves through fine-tuning OMOs. Three fine-tuning liquidity draining repo operations were held. Each was offered for £10 billion, with maturity dates set to match the date of the next scheduled weekly OMO (**Table B**). Each was fully covered. The decisions to conduct these operations followed discussions with reserves scheme banks and at the Money Market Liaison Group (see the box on page 381 for a discussion of the work of the Money Market Liaison Group during 2008). Market interest rates remained volatile for the remainder of the maintenance period.

Table B Results of fine-tuning operations[a]

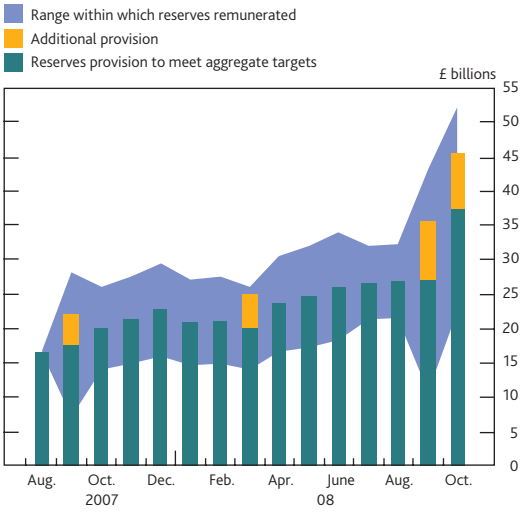
	Term	Offered (£ millions)	Allocated (£ millions)	Type of operation	Impact on reserves
3 Sep. 2008	1 day	4,680	4,422	Scheduled	Add
15 Sep. 2008	3 days	5,000	5,000	Exceptional	Add
16 Sep. 2008	2 days	20,000	19,999	Exceptional	Add
23 Sep. 2008	2 days	10,000	9,999	Exceptional	Drain
24 Sep. 2008	1 day	10,000	10,000	Exceptional	Drain
1 Oct. 2008	1 day	10,000	10,000	Exceptional	Drain
8 Oct. 2008[b]	1 day	43,480	24,950	Scheduled	Drain
13 Oct. 2008	2 days	10,000	10,000	Exceptional	Add
15 Oct. 2008	1 day	5,000	3,700	Exceptional	Drain
17 Oct. 2008	6 days	10,010	10,010	Exceptional	Drain
22 Oct. 2008	1 day	20,000	17,000	Exceptional	Drain
29 Oct. 2008	1 day	9,000	3,600	Exceptional	Drain
5 Nov. 2008	1 day	15,000	850	Scheduled	Drain

(a) Horizontal lines indicate start of new maintenance period.
(b) Fine-tune draining operations held on and after 8 October were conducted by selling Bank of England bills. Prior to that, draining operations were conducted by repo of gilts.

In order to accommodate the extra reserves, the Bank widened the ranges around reserves targets.

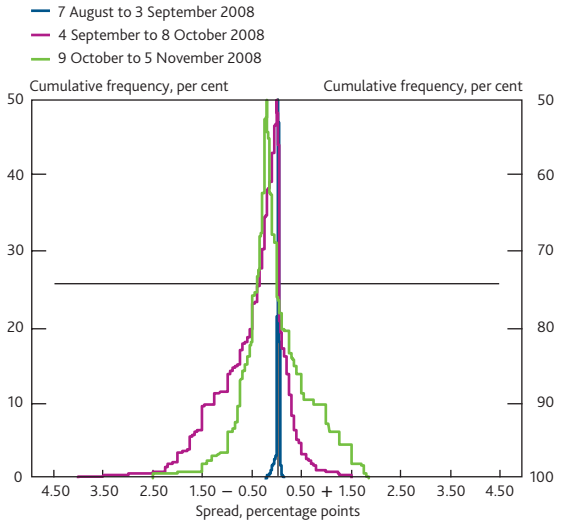
The start of the October–November maintenance period coincided with a period of intensified uncertainty about banks internationally, including those active in the sterling money market. Sterling overnight rates increased sharply once more and the Bank held an exceptional fine-tuning OMO to provide reserves, some of which were drained later in the maintenance period (**Chart 32**).

Chart 32 Aggregate reserves targets and reserves provision



The distribution of sterling overnight interest rates was wider, and more negatively skewed in September and October than observed in August–September (**Chart 33**). Overnight unsecured market interest rates were, on occasions, relatively low compared to Bank Rate. But, judged by the rates on overnight index swaps, market interest rates at one and two-week maturities tended to be closer to Bank Rate (**Chart 34**). Such volatility in short-dated money market interest rates was a global phenomenon (**Chart 35** and **Chart 36**).

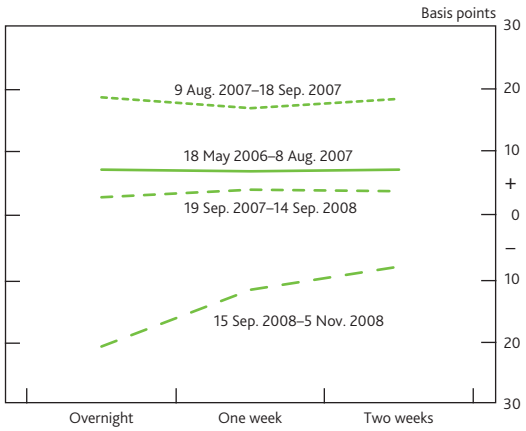
Chart 33 Folded cumulative distribution[(a)] of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate



Sources: BrokerTec and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.

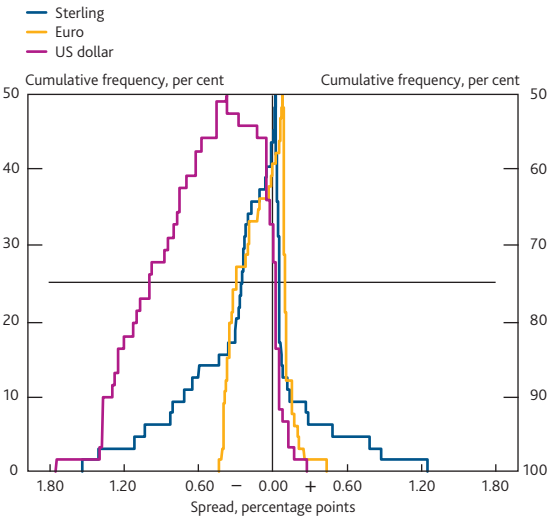
Chart 34 Spread to Bank Rate of overnight index swap rates[(a)]



Sources: Bloomberg and Bank calculations.

(a) One-week and two-week calculations exclude transactions maturing after the next MPC meeting.

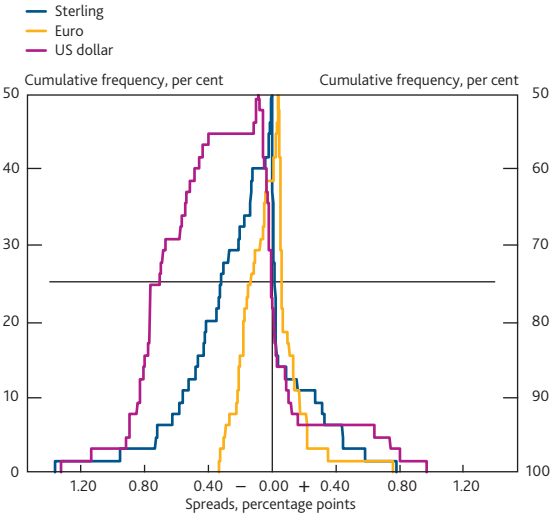
Chart 35 Folded cumulative distribution[(a)] of spread of international secured overnight interest rates to official interest rates for period 7 August–5 November 2008



Sources: BrokerTec and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.

Chart 36 Folded cumulative distribution[(a)] of spread of international unsecured overnight interest rates to official interest rates for period 7 Aug.–5 Nov. 2008



Sources: Wholesale Market Brokers' Association and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.

Provision of liquidity insurance through extended long-term repo OMOs

In December 2007, the Bank widened the collateral eligible in its regular monthly three-month repo OMOs. In the latest period, the Bank increased the size and frequency of these OMOs and further widened the collateral.

On 9 September, the Bank announced that the three-month maturity of the scheduled long-term repo OMOs in September

and October 2008 would be offered against extended collateral.

From 29 September, long-term repo OMOs were held with weekly frequency; and, from 3 October, the eligible collateral was further expanded to cover securities backed by commercial mortgage assets and corporate debt. At the same time, the bidding arrangements for the operations were amended to introduce separate minimum bid rates for bids against collateral routinely eligible in the Bank's short-term repo OMOs and bids against collateral from the wider collateral pool. For bids against collateral routinely eligible in the Bank's short-term repo OMOs, the minimum bid rate would be the equivalent-maturity overnight index swap (OIS) rate. For bids against the wider collateral pool, the minimum bid rate would be 50 basis points higher than the equivalent-maturity OIS rate.

On 8 October, the Bank announced that it would accept as collateral, in all its extended collateral operations, bank debt that is guaranteed under the HM Government bank debt guarantee scheme that was announced by the Government that day.

The results of these operations are shown in **Table C**. Over the review period, the stock of long-term repo OMOs offered against extended collateral rose from £10 billion to £109 billion.

These extended-collateral long-term repo operations provide reserves both for the maintenance period in which they are settled and all subsequent maintenance periods until maturity. This served to reduce the amount of reserves that needed to be supplied in other OMOs, as described in the following section.

Table C Extended-collateral three-month long-term repo operations

16 September 2008	
On offer (£ millions)	5,000
Cover	1.77
Weighted average rate[a]	5.646
Lowest accepted rate[a]	5.340
Tail[b]	30.60
29 September 2008	
On offer (£ millions)	40,000
Cover	1.3
Weighted average rate[a]	5.517
Lowest accepted rate[a]	4.765
Tail[b]	75.20
7 October 2008	
On offer (£ millions)	40,000
Cover	0.77
Weighted average rate[a]	4.557
Lowest accepted rate[a]	4.340
Tail[b]	21.70
14 October 2008	
On offer (£ millions)	40,000
Cover	0.41
Weighted average rate[a]	4.525
Lowest accepted rate[a]	4.179
Tail[b]	34.60
21 October 2008	
On offer (£ millions)	30,000
Cover	0.26
Weighted average rate[a]	4.241
Lowest accepted rate[a]	3.970
Tail[b]	27.10
28 October 2008	
On offer (£ millions)	20,000
Cover	0.45
Weighted average rate[a]	3.683
Lowest accepted rate[a]	3.570
Tail[b]	11.30
4 November 2008	
On offer (£ millions)	20,000
Cover	0.39
Weighted average rate[a]	3.560
Lowest accepted rate[a]	3.400
Tail[b]	16.00

(a) Per cent.
(b) The yield tail measures, in basis points, the difference between the weighted average accepted rate and the lowest accepted rate.

Factors affecting the supply of reserves

The provision of additional reserves was initially offset by reduced provision of funds in the Bank's weekly OMOs, the size of which had fallen to £15 billion by 2 October. Subsequently, it became necessary for the Bank to drain reserves, which it did by selling Bank of England sterling bills (see the box on page 377). The first of these was sold in an overnight fine-tuning OMO to drain reserves on 8 October.

The four weekly OMOs in the October–November maintenance period were conducted to drain reserves; a separate weekly Bank bill was sold for each operation. The sizes offered ranged between £28.5 billion and £47.4 billion, each reflecting the level of reserves balances the Bank sought to maintain following each operation.

Counterparties also made active use of the ability to place funds with the Bank via the standing deposit facilities. During the September–October maintenance period, average deposits of £1.37 billion were placed, draining reserves from the system. During the October–November maintenance period, average deposits were £1.06 billion. Use of Standing Facilities naturally tended to coincide with periods when market interest rates were below Bank Rate (**Chart 37**).

The draining of reserves through operational Standing Facilities, fine-tuning OMOs to drain reserves and sales of Bank of England bills all served to offset the impact of a much larger stock of extended-collateral long-term repo OMOs on the Bank's balance sheet (**Chart 38**).

In October, the Bank reformed its Standing Facilities, as part of a package of wider reforms (see the box on page 380).

The use of central bank bills in the implementation of monetary policy

From October, the Bank has drained substantial quantities of surplus reserves through the sale of Bank of England bills. This box reports on similar initiatives implemented by other central banks, and explains the rationale for the Bank's own bill-sale draining open market operations (OMOs).

Central banks are the monopoly suppliers of central bank money (banknotes and reserves). In most cases, central banks undertake OMOs to supply the amount of reserves necessary to meet demand. However, in response to the extraordinary market conditions and pressure on banking systems, many central banks have conducted operations designed to provide longer-term financing to the banking system. These operations were not designed specifically to supply extra reserves but have that incidental effect. Initially, this could be accommodated by central banks shrinking the size of other short-term repo OMOs. But the provision of financing became so large that they have had to be accompanied by draining operations.

The operational procedures of a number of central banks contain provisions for undertaking such draining operations. For example, the ECB's general documentation provides for the issuance of debt securities as an additional tool outside of the routine framework. The Bank of Japan has also utilised bill issuance as a means of implementing monetary policy.

Recently, the Swiss National Bank and the Swedish Riksbank have introduced OMOs to sell central bank securities to offset the provision of reserves via additional term liquidity. **Table 1** summarises the use of central bank securities as a policy tool across a number of central banks.

Table 1 Central banks with the provision to sell their own securities

Central bank	Instrument	Percentage of balance sheet (October 2008)	Range of maturities
Bank of England	Bank of England bills	19	1–7 days
Danmarks Nationalbank	Certificates of deposit	31	7–14 days
ECB	ECB debt certificates	0	12 months or less
Bank of Japan	Financing bills	1	6 months or less
Riksbank	Riksbank certificates	13	7 days
Swiss National Bank	Swiss National Bank bills	10	7, 14 and 28 days

In a similar vein, the Reserve Bank of Australia (RBA) introduced a term deposit facility under which fixed-term deposits are auctioned via a competitive tender to allow counterparties to bid to place additional reserves on account at the RBA.

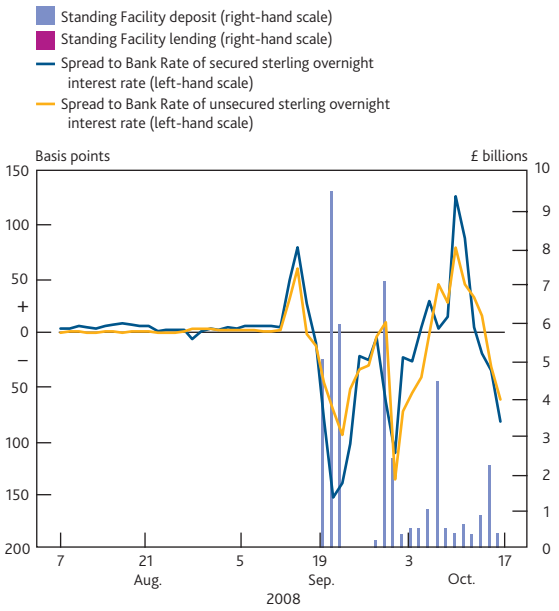
Bank of England OMOs to sell bills

For modest amounts, the Bank conducts fine-tuning operations to drain reserves using repo transactions in which the Bank receives cash in exchange for gilts held on its balance sheet. However, the scale of such operations was limited by the existing size and composition of the Bank's balance sheet. To drain large quantities of reserves, the Bank needed to expand its balance sheet by issuing a non-monetary liability. Bank of England bills perform that role.

Bank of England bills are marketable, short-term securities issued by the Bank and provide a means to conduct large-scale short-term operations to drain reserves. The bills are discount instruments, sold at Bank Rate and usually have a maturity of one week matching that of the Bank's short-term repo operations. They are separate from the UK Treasury bills issued by the Debt Management Office as part of the Government's debt and cash management portfolio.

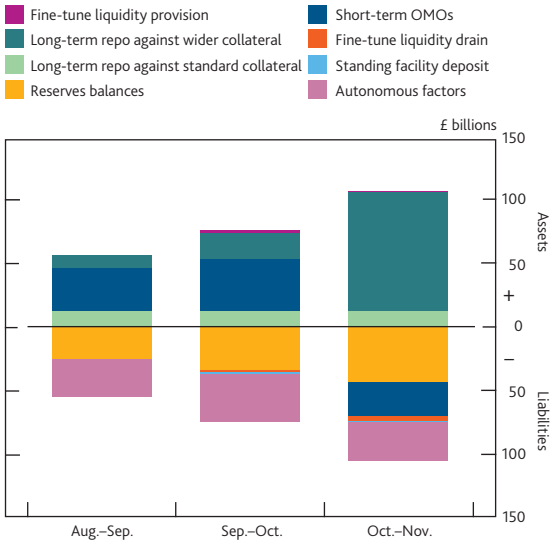
Sales of Bank of England bills are conducted via OMOs using the same format and with the same group of counterparties as the Bank's more usual OMOs to supply reserves. Counterparties receiving the bills may use them as collateral in the repo market, including within certain categories of delivery by value as well as in the Bank's other reserves providing operations. The bills are eligible for the Financial Services Authority sterling stock liquidity regime, and have a zero regulatory capital weighting.

Chart 37 Standing Facility usage and spread to Bank Rate of secured and unsecured rates



Sources: BrokerTec, Wholesale Market Brokers' Association and Bank calculations.

Chart 38 Factors affecting the supply of reserves (maintenance period averages)



Other market operations

Special Liquidity Scheme

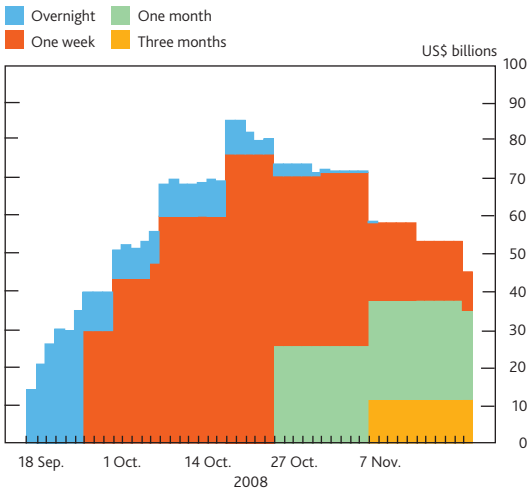
Another financing facility available to eligible institutions since April 2008 has been the Special Liquidity Scheme (SLS). The SLS allows participating institutions to exchange mortgage assets for UK Treasury bills.

On 17 September, in view of the disorderly market conditions prevailing at that time, the Bank announced an extension of the drawdown period for the SLS from 21 October to 30 January 2009. The Bank will publish the total outstanding value of bills lent under the Scheme after the end of the drawdown period.

US dollar repo operations

In co-operation with other central banks, since 18 September, the Bank has offered dollar financing to the UK banking system funded by a swap with the Federal Reserve. Maturities have included overnight, one week, one month and three months. The profile of the stock of dollar financing is shown in **Chart 39**.

Chart 39 US dollar repo operations: stock outstanding by maturity(a)



(a) Stock outstanding is shown from settlement date.

Bond-purchase OMOs

The Bank maintained its regular OMOs to provide reserves for long periods by buying bonds. Over the review period the Bank conducted three such OMOs, in accordance with screen announcements made on 1 July and 1 October. All three operations were fully covered (**Table D**).

The Bank intends, in due course, to begin providing reserves by holding OMOs to purchase high-quality foreign-currency denominated bonds, with the cash flows swapped into fixed-rate sterling.

The Bank's foreign currency reserves

There have been no significant developments in the Bank's holdings of foreign exchange reserves over the review period. Because of exchange rate movements, the reserves now comprise around £2.5 billion of assets. These are funded by two $2 billion three-year issues, under the Bank's programme of annual bond issuance, which commenced in March 2007. The Bank's reserves are scheduled to reach the currently planned steady-state level of around £3 billion in early 2009.

Facilitating the provision of payment services

In May, as previously reported, the Bank ceased to be a direct member of TARGET, the euro-area wholesale payments system. Prior to this, to facilitate UK participation in TARGET, the Bank held euro-denominated assets that were lent out

Table D Issue Department gilt-purchase OMOs

	Amount purchased (£ millions)	Sector cover ratio	Weighted average accepted price	Highest accepted price	Lowest accepted price	Tail[a]
1 September 2008						
Short		4.76				
UKT 4.75% 07/09/15	132.43		101.936	101.970	101.889	0.034
UKT 8% 07/12/15	86.53		121.357	121.390	121.327	0.033
Medium		3.21				
UKT 4% 07/09/16	129.00		97.338	97.432	97.250	0.094
Long		5.79				
UKT 5% 07/03/25	45.97		104.066	104.098	104.040	0.032
UKT 6% 07/12/28	45.89		117.776	117.779	117.769	0.003
Total purchased[b]	439.82					
22 September 2008						
Short		2.47				
UKT 9% 12/07/11	183.94		111.757	111.849	111.660	0.092
Medium		6.60				
UKT 4.75% 07/03/20	76.83		99.435	99.440	99.400	0.005
UKT 8% 07/06/21	47.14		129.690	129.698	129.688	0.008
Long		6.04				
UKT 4.25% 07/12/27	56.94		93.167	93.200	93.150	0.033
UKT 6% 07/12/28	34.96		115.541	115.590	115.430	0.049
Total purchased[b]	399.81					
27 October 2008						
Short		2.40				
UKT 5% 07/09/14	90.22		105.431	105.460	105.410	0.029
UKT 8% 07/12/15	128.70		122.440	122.500	122.370	0.060
Medium		2.84				
UKT 8.75% 25/08/17	128.92		131.386	131.420	131.320	0.034
Long		2.31				
UKT 5% 07/03/25	45.90		103.136	103.150	103.120	0.014
UKT 6% 07/12/28	45.92		116.916	116.948	116.890	0.032
Total purchased[b]	439.66					

(a) The tail measures the difference between the highest accepted price and the weighted average accepted price.
(b) Figures may not sum to total due to rounding.

each day by the Bank to generate intraday liquidity. These assets were funded by a series of Euro Notes of which the final one, for €3 billion nominal, will mature on 27 January 2009.

Capital portfolio

The Bank holds an investment portfolio that is approximately the same size as its capital and reserves (net of equity holdings, for example, in the BIS and ECB and the Bank's physical assets) together with aggregate cash ratio deposits. The size of the Bank's 'free' capital and cash ratio deposits did not change much over the period. These funds are invested in a portfolio of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity; nevertheless sales may be made from time to time, reflecting for example, risk management, liquidity management or changes in investment policy.

The bond portfolio currently includes around £3 billion of gilts and £1 billion of other debt securities. Purchases are generally made each month, with purchase details announced in advance on the Bank's wire service pages. Over the current review period, gilt purchases were made in accordance with the announcements on 1 July and 1 October: £20 million each in August, September and October.

The remainder of the Bank's capital and reserves are normally invested in short-term repos, which are conducted as part of the Bank's OMOs.

Consultative document on the Development of the Bank of England's Market Operations

On 16 October 2008, the Bank published a consultation document, *The Development of the Bank of England's Market Operations*. This set out plans for three major reforms.

1. Operational Standing Facilities

The Bank's existing Standing Facilities were replaced on 20 October by Operational Standing Facilities (OSFs). OSFs have the clear purpose of absorbing technical problems and imbalances in the operation of money markets and payments, and so help to stabilise the overnight rate. For that reason, the rate applied to OSFs is ±25 basis points relative to Bank Rate. Overnight market rates approaching the plus and minus 25 basis points range to Bank Rate would reflect a market friction and so would obviously be a legitimate rationale for using OSFs.

To avoid stigma, the Bank reduced disclosure so that the average use of OSF would be disclosed after the end of the relevant maintenance period; previously disclosure of aggregate usage had occurred on the following working day. For the lending facility, the eligible collateral will remain those instruments that are eligible in the Bank's short-term repo OMOs.

2. Discount Window Facility

The Bank also launched a Discount Window Facility (DWF), which enables banks to borrow UK government securities against a wide range of collateral, at any time, at fees reflecting the type of collateral and the size of drawing.

The facility is intended to provide liquidity insurance to banks in the event of stress. Drawings will not be permitted for banks with fundamental solvency or viability problems.

The Bank retains discretion to extend the maturity of Discount Window borrowing beyond 30 days; and to lend cash rather than gilts, which might prove necessary in rare circumstances where, as recently, the government bond repo markets failed to function properly during a period of acute stress.

Collateral is classified into four groups (or levels), broadly defined as follows:

- Level A: high-quality sovereign and supranational bonds.
- Level B: other quality debt that is tradable in liquid markets.
- Level C: debt, and other transferable instruments, that are not tradable in liquid markets.
- Level D: 'own name' instruments, ie where a bank borrowing from the DWF itself originated (or has some close financial link to) the assets comprising the collateral.

The list of eligible collateral will be developed over time.

Average use of the DWF over a quarter is to be disclosed at the end of the subsequent quarter.

3. Long-term repos against wide collateral

Finally, the Bank intends to maintain permanently long-term repo operations against broader classes of high-quality private sector securities.

The Bank is consulting on a proposed auction structure that would involve counterparties bidding separately against different types of collateral. The proportion of each auction allocated to borrowing against different types of collateral would depend on the spread between the relevant bids.

Consultation process

The Bank is consulting on these and other more technical measures.

The work of the Money Market Liaison Group in 2008

The Money Market Liaison Group (MMLG), chaired by the Bank of England, was established in Summer 1999. It provides a high-level forum to discuss and, where appropriate, respond to developments affecting UK money markets and related infrastructure. It comprises senior representatives from key money market participants, infrastructure providers and the UK authorities.

The Group typically meets quarterly, but during the period of stressed money market conditions it communicated more frequently (daily over some periods of acute stress) through teleconferences to facilitate information sharing between money market participants on both market developments and the actions of authorities.

On 16 October, the Bank published a consultation document on the development of its framework for operations in the sterling money markets (see the box on page 380). MMLG discussed the consultation document collectively in its quarterly meeting on 20 October, and members of MMLG have submitted and discussed individual responses with the Bank.

MMLG operations subgroup

The MMLG operations subgroup provides a forum to discuss and facilitate important structural developments affecting trading, clearing, payments and settlement infrastructure in money markets.

A major element of the subgroup's agenda over 2008 has been to assist in designing a series of sterling market tests sponsored by MMLG to test banks' ability to trade and settle from disaster recovery sites (DRSs), the first conducted in May 2007.

A second, desktop, exercise was undertaken on 13 March, which included banks, infrastructure providers and the official sector. The objectives of the exercise were to give MMLG a more informed understanding of how a major operational disruption could impact maintenance of market operations, give participants an opportunity to test their own planning assumptions collaboratively, explore contingency measures and identify and understand any practical issues that may not have been highlighted in the first, 'live', test.

MMLG members agreed that a third, more challenging, exercise should be considered by the operations subgroup for 2009 Q1. It will test the ability of participants to transact from DRSs using the Bank of England's electronic tendering system for open market operations, BTender.

Other initiatives of MMLG and the subgroup

CREST has used MMLG as a forum to develop potential contingency measures to ensure outstanding trades could be unwound in an orderly manner in the event that a major disruption late in the trading day meant that CREST was unable to close 'normally'.

Together with the Securities Lending and Repo Committee, the Group jointly drew up an updated version of the Gilt Repo Code. The Code sets out, for guidance, a summary of the basic procedures which UK-based participants in the gilt repo market observe as good practice. The Code was published on the Bank's website in May.(1)

The Group also continued to monitor progress and contribute views on LCH.Clearnet's initiative to act as central counterparty clearer for gilt repo transactions to deliveries of gilts through CREST's delivery-by-value service, which was launched in March 2007. The launch occurred with no technical or procedural problems and trading volumes have continued to grow.

The British Bankers' Association has used the Group as an arena to keep the market informed on its annual review of the governance and definition of Libor and the consultative paper on strengthening Libor for the future.

(1) www.bankofengland.co.uk/markets/gilts/giltcode.pdf.