

Markets and operations

This article reviews developments in global financial markets since the 2009 Q2 *Quarterly Bulletin* up to end-August 2009. The article also reviews the Bank's official operations.

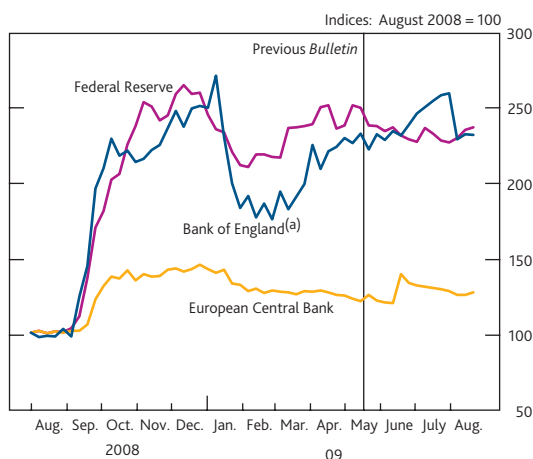
Global financial markets⁽¹⁾

Overview

Most prices of risky assets rose further, continuing the recovery that began in March. This appeared to reflect increased confidence by market participants that, while economic activity had contracted by more than previously anticipated, the prospects for future economic growth had improved and the downside risks to financial markets had diminished.

The actions of governments and central banks remained an important factor underpinning this recovery in financial markets, through policies aimed at boosting nominal demand, injecting liquidity to strengthen financial system stability and through measures to support improved market functioning. At its August meeting, the UK Monetary Policy Committee (MPC) extended the size of its asset purchase programme to £175 billion. In addition, the Bank widened the scope of its Asset Purchase Facility to include secured commercial paper. Elsewhere, the European Central Bank (ECB) implemented its plan to purchase covered bonds and offered unlimited one-year refinancing operations. And the US Federal Reserve and the Bank of Japan continued with their respective programmes of asset purchases and other refinancing facilities.

Chart 1 Central bank total liabilities



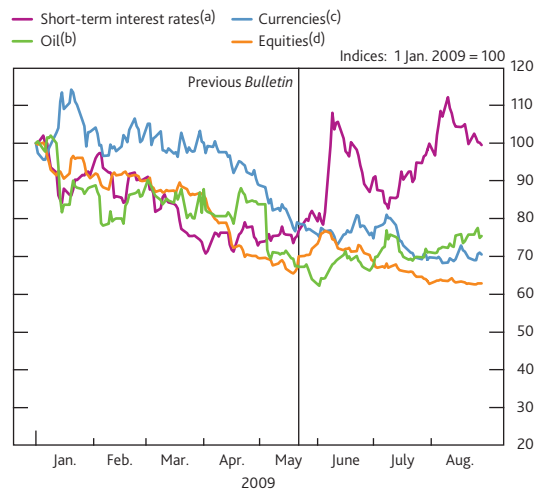
Sources: Bank of England and Bloomberg.

(a) Excludes loans and associated deposits in course of settlement.

These operations contributed to sustained increases in the size of central bank balance sheets (**Chart 1**), and accompanied a significant expansion in government balance sheets of many major economies, reflecting fiscal support measures.

Uncertainty about the future path of risky asset prices generally fell further over the quarter. However, implied volatilities on short-term interest rates rose (**Chart 2**), which could reflect increased uncertainty about the timing and pace at which accommodative monetary policy measures might be withdrawn.

Chart 2 International twelve-month option-implied volatilities



Source: Bloomberg.

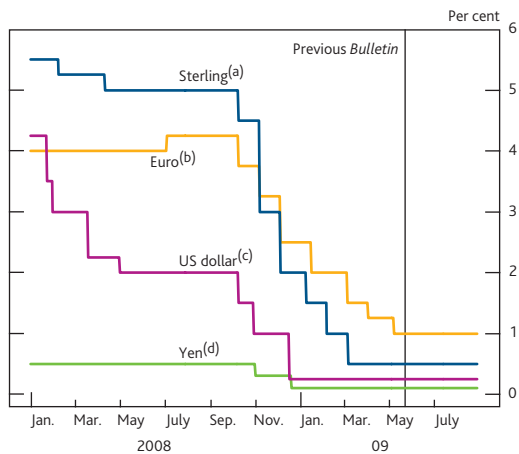
- (a) Average for sterling Libor, Euribor and US dollar Libor.
- (b) WTI crude oil.
- (c) Average for euro-US dollar, euro-sterling and sterling-US dollar exchange rates.
- (d) Average for FTSE 100, DJ Euro Stoxx 50 and S&P 500 indices.

Recent developments in international capital markets

Monetary policy implementation

Monetary policies in most major economies remained stimulative. Given their forecasts for, and continued uncertainties about, the macroeconomic outlook, many central banks maintained official interest rates at low levels (**Chart 3**).

(1) The data cut-off for this section is 28 August.

Chart 3 International official interest rates

Source: Bloomberg.

- (a) Bank Rate.
 (b) ECB main refinancing rate.
 (c) Federal funds rate. From December 2008 the series is the upper bound of the Federal Reserve's current 0%–0.25% target range.
 (d) Bank of Japan uncollateralised overnight call rate.

In addition, central banks continued to undertake unconventional monetary policy measures. The wide range of policies adopted since the failure of Lehman Brothers in 2008 reflected differences in the objectives of each policy measure. These included supporting market functioning, injecting liquidity to strengthen financial system stability and increasing the supply of money to boost nominal demand.

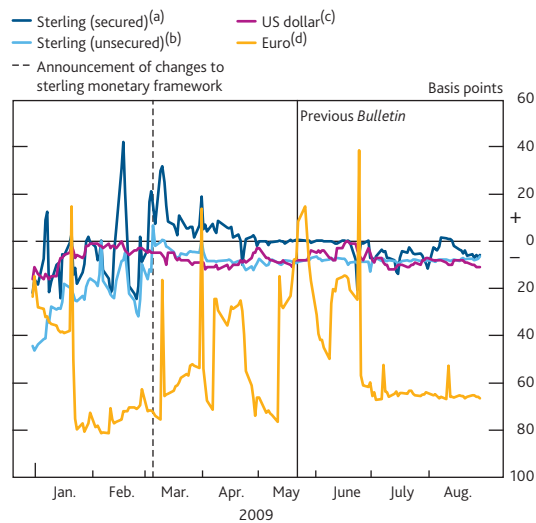
In the United Kingdom the MPC voted at its meeting on 6 August that it would further extend its programme of asset purchases from £125 billion to a total of £175 billion, to be completed by the time of its November meeting. More details of these asset purchases are provided on pages 168–71.

The ECB, following their pre-announcement on 7 May, began its purchase programme of covered bonds, the aims of which were to ease funding conditions, encourage lending and improve market liquidity. And on 24 June the ECB offered its first unlimited twelve-month refinancing operation, in which it lent €442 billion. In the United States and Japan, the respective central banks continued their programmes of asset purchases.

Short-term interest rates

The implementation of unconventional monetary policy initiatives, particularly those injecting extra central bank reserves, tended to push down overnight market interest rates. These rates typically traded below policy rates in the United Kingdom and the euro area and within the US Federal Reserve's target range of 0–25 basis points (**Chart 4**).

In the United States, asset purchases injected reserves in excess of required reserve balances and contractual clearing balances. Over the period, the Federal Reserve banks paid interest of 0.25% on depository institutions' balances.

Chart 4 Spread of overnight interest rates to policy rate

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

- (a) Spread of weighted average secured overnight rate to Bank Rate.
 (b) Spread of weighted average unsecured overnight rate to Bank Rate.
 (c) Spread of weighted average unsecured overnight rate (Fed funds effective rate) to the rate at which the Federal Reserve remunerates reserves holdings (also the upper bound of the Federal Reserve's 0% to 0.25% target range).
 (d) Spread of weighted average unsecured overnight rate (EONIA) to policy rate.

However, not all money market participants were eligible to be paid interest by the US Federal Reserve and overnight interest rates tended to trade below 0.25%.

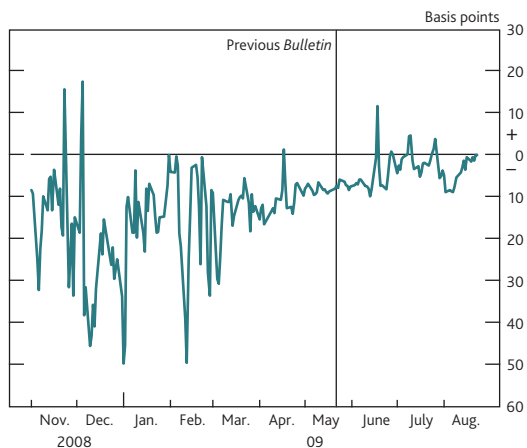
In the euro area, the ECB's twelve-month refinancing operation injected considerable excess reserves. This resulted in overnight market interest rates tending to trade between the ECB's policy rate and the rate paid on the marginal deposit facility where the excess reserves were placed.

In the United Kingdom, where since 5 March all reserves balances held by commercial banks at the Bank were remunerated at Bank Rate, sterling overnight interest rates generally traded close to Bank Rate. But have mostly been lower since mid-June.

For most of the period, sterling unsecured overnight interest rates continued to be lower than corresponding secured overnight interest rates (**Chart 5**). Banks might usually be expected to charge a premium for the credit risk associated with unsecured interbank lending compared to a secured transaction of equivalent maturity. However, as noted in previous *Bulletins*, money markets are to some extent fragmented. For example, some institutions are generally only able to participate in the secured repo markets, while other institutions may predominantly be active in unsecured markets. This may mean that there are in practice a number of market participants unable to utilise the unsecured market to finance secured lending and so earn a 'risk-less' spread.

Near-term expectations of future overnight rates, as indicated by overnight index swap (OIS) rates, fell reflecting perceptions

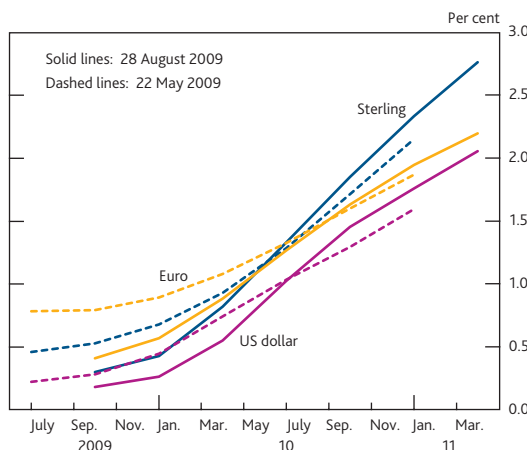
Chart 5 Spread between secured and unsecured sterling overnight interest rates



Sources: BrokerTec and Bank calculations.

that central banks would maintain official interest rates at low levels at least into 2010 Q1. However, expectations for the latter part of 2010 and for 2011 rose, and so OIS curves steepened internationally (Chart 6). At least in part this was likely to reflect expectations for quicker increases in future policy rates once central banks in the major economies start to withdraw their monetary stimulus. Similarly, against the background of surveys suggesting upward revisions to GDP growth forecasts for 2010 (Chart 7), Reuters' surveys indicated that the future paths for expected policy rates steepened, although by less than implied by the profile of market interest rates.

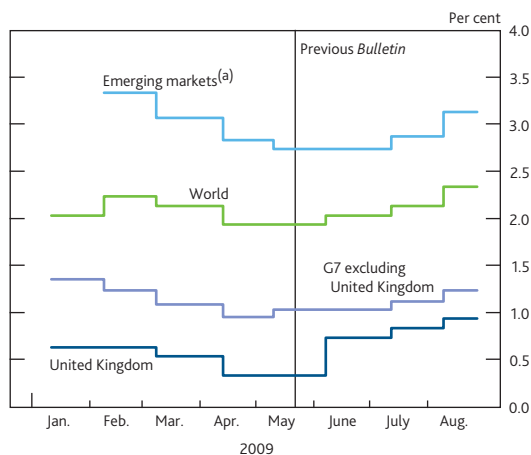
Chart 6 OIS forward rates



Sources: Bloomberg and Bank calculations.

One possible explanation for the larger increase in market interest rates may have been increased uncertainty about future official rates and hence greater term premia, possibly linked to uncertainty about the timing and execution of policy tightening. Perhaps consistent with that, short-term interest rate option-implied volatility generally rose at horizons of six and twelve months (Chart 8).

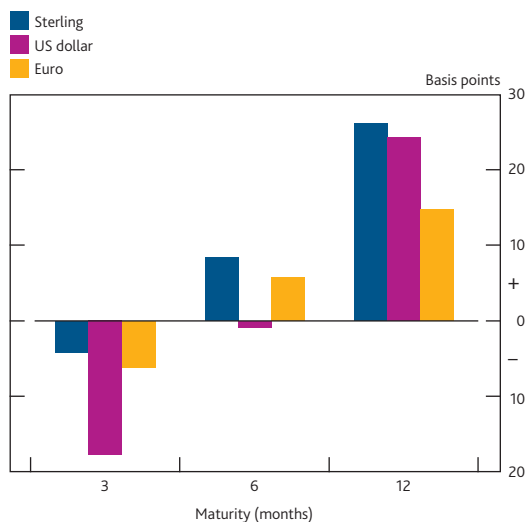
Chart 7 Expected real GDP growth for 2010



Source: Consensus Economics.

(a) Simple average of GDP forecasts for Asia Pacific excluding Japan, Eastern Europe and Latin America.

Chart 8 Changes in short-term interest rate implied volatility since previous Bulletin



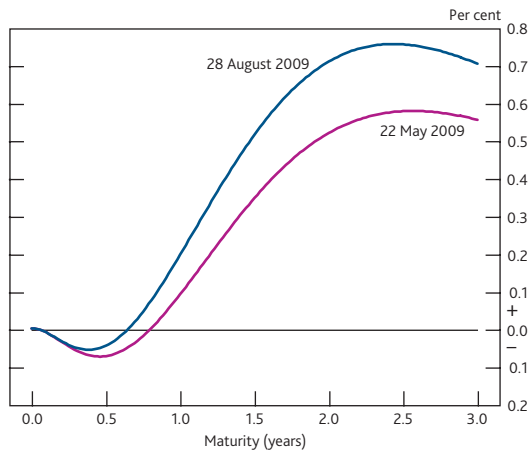
Sources: Bloomberg and Bank calculations.

These short-term interest rate options reference London interbank offered rates (Libor), however. This means the pickup in implied volatility could be due to uncertainty about the Libor-OIS spread (ie the additional risk premia embedded in Libors) rather than uncertainty about expected future policy rates. One way to gauge uncertainty about future policy rates is to employ a model-based decomposition of the yield curve at short horizons.⁽¹⁾ Such a decomposition would seem to indicate that term premia on sterling short-term OIS rates may indeed have risen over recent months (Chart 9).

Another factor influencing the steepness of the OIS curve may have been a positively skewed distribution of possible future

(1) For information on empirical term structure models, see 'Recent advances in extracting policy-relevant information from market interest rates', 2008 Q2 Quarterly Bulletin, pages 157–66.

Chart 9 Model-derived term premia for sterling short-dated interest rates^(a)

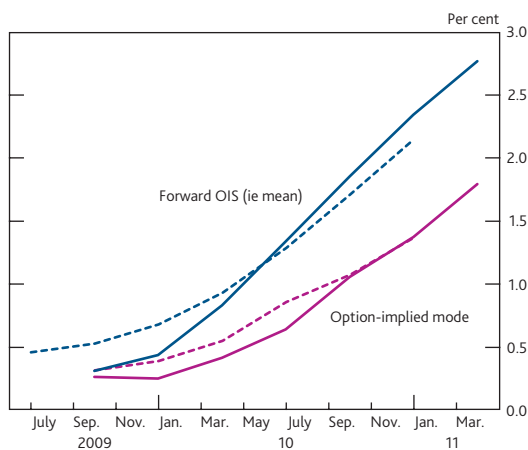


Source: Bank calculations.

(a) For more details on how term premia can be estimated, see Joyce, Lildholdt and Sorensen (2009), 'Extracting inflation expectations and inflation risk premia from the term structure: a joint model of UK nominal and real yield curves', *Bank of England Working Paper no. 360*.

policy rates given that in practice nominal rates are likely to be constrained to be at least zero. Indeed, an estimated modal expectation for sterling OIS rates (Chart 10), which reflects the most likely outcome, was some distance below the mean expectation (see box on pages 158–59 for more details on deriving probability distributions for OIS rates). Moreover, the degree of skewness of the indicative implied distribution for twelve-month OIS rates increased somewhat over the quarter.

Chart 10 Sterling OIS forward and option-implied modal interest rate curves^(a)



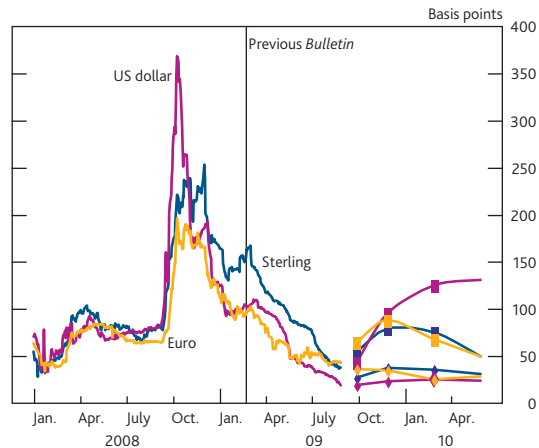
Sources: Bloomberg and Bank calculations.

(a) Solid lines refer to data as at 28 August. Dashed lines refer to 22 May.

Bank funding markets

Conditions in domestic interbank funding markets reportedly continued to improve over recent months. Libor fixings (the most widely used benchmark for interbank rates) fell further and the spread between term Libors and equivalent-maturity OIS rates narrowed to their lowest levels since March 2008, prior to the collapse of Bear Stearns (Chart 11).

Chart 11 Three-month Libor-OIS spreads^{(a)(b)}



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

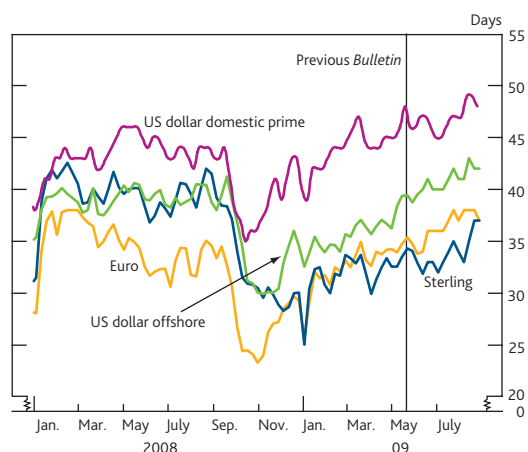
(a) Forward spreads derived using data as at 28 August.

(b) The squares are implied forward spreads using forward Libors derived from spot Libor rates. The diamonds are implied forward spreads using forward Libors derived from forward rate agreements.

Forward spreads implied by derivatives settling on Libor (forward rate agreements) suggested that three-month Libor-OIS spreads were expected to stay close to their end-August levels. However, forward spreads inferred from spot Libor rates of different maturities continued to suggest otherwise, implying that term premia on longer-term Libor fixings remained elevated (Chart 11). This indicates that banks wishing to borrow for longer maturities were not necessarily benefiting in full from the reductions in expected three-month Libor fixings.

Moreover, contacts suggested that interbank lending volumes remained low, even relative to levels seen prior to the failure of Lehman Brothers in September 2008. And though money market funds increased the maturities at which they were prepared to lend (Chart 12), contacts said that lending at maturities greater than three months remained patchy.

Chart 12 Money market funds' assets weighted average maturity



Source: iMoneyNet.

Contacts suggested that one possible driver of the reductions in Libors related to improved perceptions about the

An indicative decomposition of the option-implied probability distribution for Libor

Forward overnight index swap (OIS) rates are typically thought to provide the best estimates of the mean expectation for Bank Rate. In fact, OIS forward rates represent the mean of the risk-neutral probability distribution of possible outcomes for future unsecured overnight interest rates, which typically trade close to Bank Rate. This distribution will differ from that actually held by market participants to the extent that investors demand compensation for uncertainty surrounding future outturns for overnight rates. That is, OIS rates may include term premia.

Moreover, if the perceived distribution of possible outcomes is skewed such market-based estimates of mean expectations will not coincide with expectations of the most likely outcome, ie modal expectations. In particular, if nominal rates were in practice constrained to be at least zero per cent, then the distribution of future possible overnight rates is likely to be positively skewed, with the mode some distance below the mean.⁽¹⁾

While maintaining a risk-neutral set-up, this box sets out a way of using financial prices to provide an indicative market-based measure of the probability distribution around future overnight rates and hence Bank Rate.

Option prices can often be used to infer market participants' views about the distribution of possible outcomes for future asset prices. But unfortunately options on OIS rates are not available. Instead, short-term interest rate options refer to the London interbank offered rate (Libor). And that means that the implied probability distributions that the Bank regularly produces will reflect both market expectations of future Bank Rate and the premium which compensates investors for the credit and liquidity risk associated with interbank lending.

Nevertheless, options on Libor can still be informative. Libor can be thought of as comprised of two parts: the OIS rate and the Libor-OIS spread. That is, $Libor = OIS + (Libor-OIS)$. In a similar way, a probability distribution for Libor can be seen as combining the distributions for these two components.

The following process can be used to produce a simple, indicative decomposition of the option-implied probability distribution for Libor, into distributions for OIS rates and the risk premia in Libor (ie the Libor-OIS spread).

Step 1 — choose candidate underlying distributions for the OIS rate and the Libor-OIS spread. This requires an assumption about their functional forms. In practice, these distributions should be bounded below by zero. For simplicity they are both assumed to be independently log-normally distributed, with means equal to the forward OIS rate and the forward Libor-OIS spread.

Step 2 — aggregate together the OIS rate and Libor-OIS spread distributions assumed in step one to give the distribution of the sum:

$$OIS + (Libor-OIS).$$

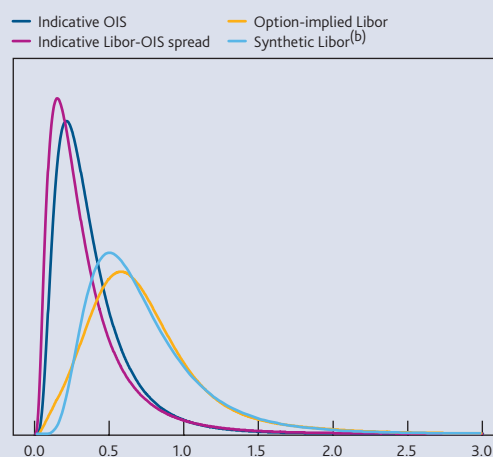
This uses a mathematical operation called a convolution.

Step 3 — compare the aggregate distribution from step two to the option-implied Libor distribution.⁽²⁾

Step 4 — iteratively search through different combinations of the distributions for OIS rates and Libor-OIS spreads, to find the combination that best replicates the option-implied Libor distribution.⁽³⁾ That combination comprises the indicative distributions for OIS rates and Libor-OIS spreads.

Chart A shows the decomposition for three-month Libor in December 2009 on 28 August. The dark blue line represents the indicative OIS rate distribution. The positive skew means that the modal OIS expectation was approximately 5 basis points below the mean expectation. The magenta line shows the indicative distribution for the Libor-OIS spread.

Chart A Option-implied probability distributions for three-month Libor, OIS rates and Libor-OIS spreads^(a)



Source: Bank calculations.

(a) Based on options on the December 2009 Libor futures contract.

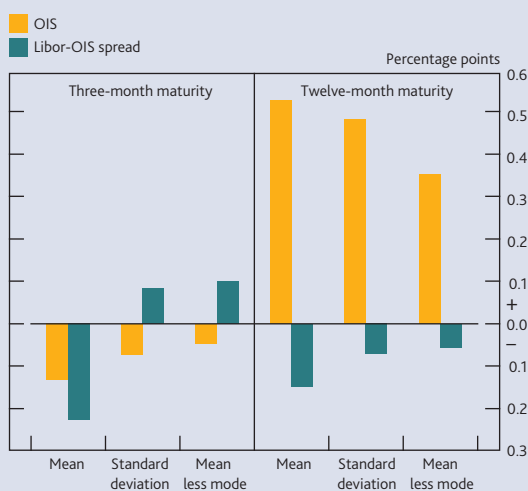
(b) Aggregate of indicative distributions for OIS rates and Libor-OIS spreads.

The light blue line is the synthetic Libor distribution formed by aggregating the dark blue and magenta lines. This seems to broadly mimic the usual option-implied Libor distribution, shown by the yellow line in the chart.⁽⁴⁾ But the fit is clearly not perfect and as a result any inferences about the estimated probability distribution can only be indicative.

Although only indicative, this decomposition can potentially provide a useful framework for apportioning the amount of uncertainty around future interbank interest rates into that driven by the uncertainty around Bank Rate and that driven by the uncertainty around the Libor-OIS spread. It also provides a consistent framework for measuring the difference between mean and modal market expectations of Bank Rate (a measure of the skewness of the implied distribution for future OIS rates), and how that difference has evolved over time.

Chart B compares the change between 22 May and 28 August in the estimated three-month and twelve-month distributions for sterling OIS rates and Libor-OIS spreads. It suggests that while the falls in sterling three-month Libor over this period were driven by falls in both OIS rates and Libor-OIS spreads, the shapes of the estimated probability distributions for three-month OIS rates and Libor-OIS spreads were both broadly unchanged. In contrast, the pickup in twelve-month forward Libors and OIS rates was accompanied by a widening and an increase in skew of the estimated distribution for OIS rates, while the distribution of the Libor-OIS spread was little changed. This perhaps suggests investors became more uncertain about future Bank Rate at that horizon than about the additional risk compensation embedded in Libors.

Chart B Changes in the implied distributions for OIS rates and Libor-OIS spreads since previous *Bulletin*

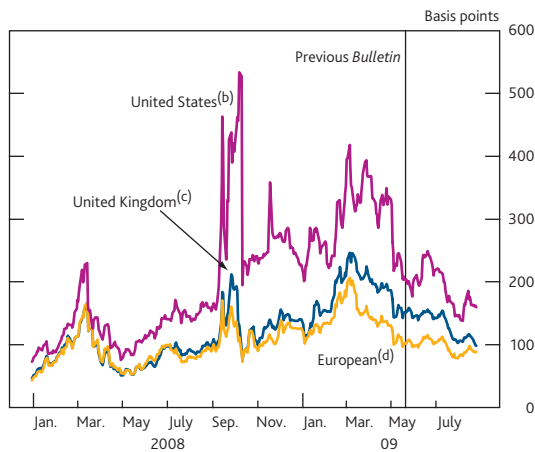


Source: Bank calculations.

- (1) This issue was discussed in the box 'Assessing expectations of Bank Rate' in the August 2009 *Inflation Report*, page 41.
- (2) Distributional similarity is measured here using the Kolmogorov-Smirnov statistic.
- (3) Because each log-normal distribution is defined with two parameters, and there are two restrictions, this iterative search represents a constrained optimisation over the two remaining degrees of freedom.
- (4) As is true here, the convolution of two density functions can look quite different from each individual density function. For example, if one knew that both the OIS rate and Libor-OIS spread in three months' time would lie between 0.25% and 0.75%, this would imply a Libor rate between 0.5% and 1.5% — that is, the Libor distribution would be twice as wide as the individual OIS and Libor-OIS spread distributions, and have a possible maximum (1.5%) twice as big.

creditworthiness of financial institutions, as evidenced by falls in international banks' credit default swap (CDS) premia (Chart 13), and hence lower required risk compensation for interbank lending.

Chart 13 Major international banks' credit default swap premia^(a)



Source: Markit Group Limited.

- (a) Unweighted averages of five-year CDS prices.
 (b) Average of BBVA, BNP Paribas, Cr dit Agricole, Credit Suisse, Deutsche Bank, Santander, Soci t  G n rale, UBS and UniCredit.
 (c) Average of Barclays, HSBC, Lloyds, RBS and Standard Chartered.
 (d) Average of Bank of America, Citi, Goldman Sachs, JPMorgan and Morgan Stanley.

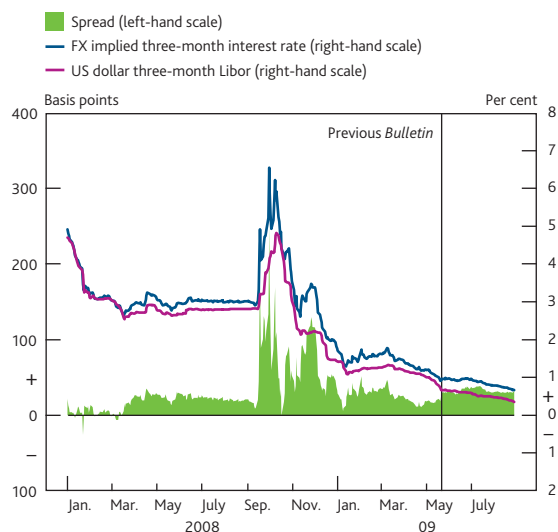
But falls in CDS premia do not seem to explain fully the falls in Libor fixings. Market contacts suggested central bank asset purchases and refinancing operations possibly contributed to lower Libor fixings. Though an imperfect substitute for interbank lending, the recent increase in banks' holdings of central bank reserves may have led to an easing in banks' required funding through interbank markets.

Conditions in cross-currency swap markets also remained more stable than during the acute period of stress in interbank funding markets that occurred towards the end of 2008. This improvement coincided with reduced demand for the Bank's US dollar refinancing operations. But the spread between the implied interest cost of borrowing US dollars via cross-currency swaps and US dollar domestic Libor remained elevated compared to historical levels (Chart 14).

As well as reflecting a residual risk premium linked to the possibility of future US dollar funding shortages, contacts also suggested an increase in the supply of euros (perhaps as a result of official operations) may have contributed to the continued relative high cost of swapping euros into US dollars. In addition, balance sheet constraints among financial institutions still reportedly prevented them exploiting the apparent arbitrage opportunity to eliminate or at least narrow the relative cost of offshore and onshore US dollar funding.

Conditions in banks' longer-term funding markets continued to improve. In the United Kingdom, the volume of unguaranteed

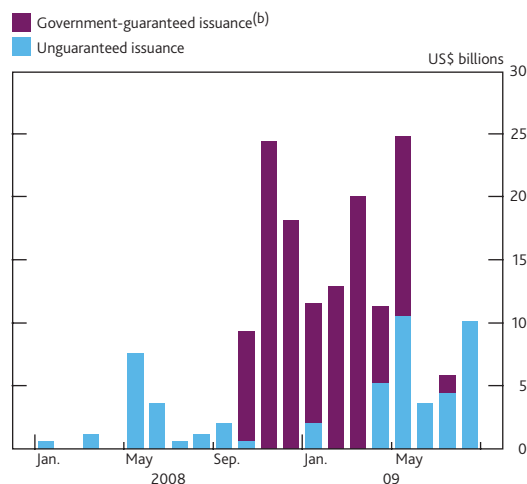
Chart 14 Three-month US dollar Libor rates and implied three-month rates from exchange rate forwards^(a)



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.

Chart 15 UK bank senior debt issuance^(a)



Source: Dealogic.

- (a) Issuance with a value greater than US\$500 million equivalent and original maturity greater than one year.
 (b) Senior debt issued under HM Treasury's Credit Guarantee Scheme.

debt issuance increased, reflecting reports of improved investor demand for unguaranteed debt (Chart 15).

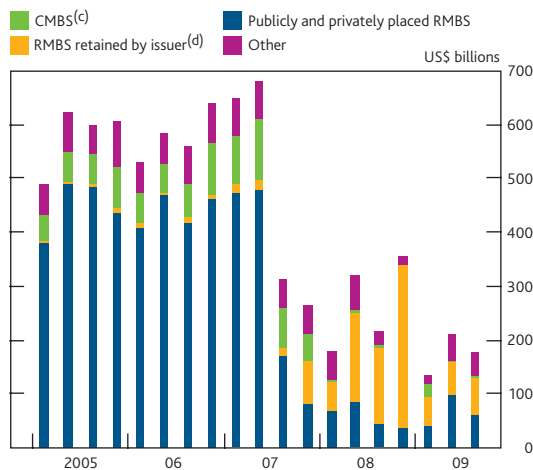
Robust investor demand helped narrow spreads for unguaranteed bank debt, reducing the cost of issuance. Contacts also suggested banks may have preferred to issue unguaranteed debt as a signal of financial soundness and to issue at maturities beyond those allowed under Credit Guarantee Scheme rules.

A number of European banks successfully completed subordinated debt issues. In addition, some banks continued to buy back or exchange subordinated capital instruments that

were trading below par, to boost core capital ratios. However, prospects for hybrid subordinated debt issuance were more uncertain. Contacts said this reflected concerns about future regulatory changes and speculated that going forward, hybrid debt would be less important in banks' capital structures.

In other bank funding markets, global issuance of asset-backed securities (ABS) remained low by historical standards (Chart 16). But this was partly offset by private issuance to be used in the various official schemes to provide short-term liquidity in securitisation markets. In the United States, ABS issuance under the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF) continued to make up the majority of US ABS issuance.

Chart 16 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 loans ABS.
 (c) Commercial mortgage-backed securities.
 (d) This includes RMBS used as collateral in central bank operations.

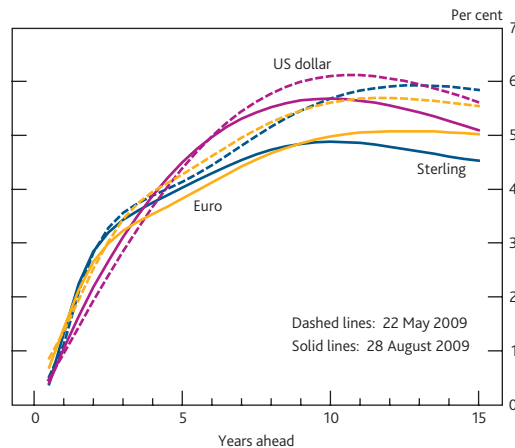
In the United Kingdom in August, the Bank launched a secured commercial paper facility as part of its Asset Purchase Facility (APF), in which the APF would stand ready to buy qualifying asset-backed commercial paper in both primary and secondary markets. And in the euro area, by the end of August the ECB had purchased 15% of its planned €60 billion of purchases of covered bonds, which market contacts thought was helpful in encouraging primary issuance and contributed to the narrowing of spreads on covered bonds.

Besides the various official policy actions to directly support ABS markets, contacts also highlighted a number of other factors, which might help foster recovery in demand for securitised instruments. These included the adoption of simpler securitisation structures, increased credit enhancement, and better-quality loan pools.

Long-term interest rates

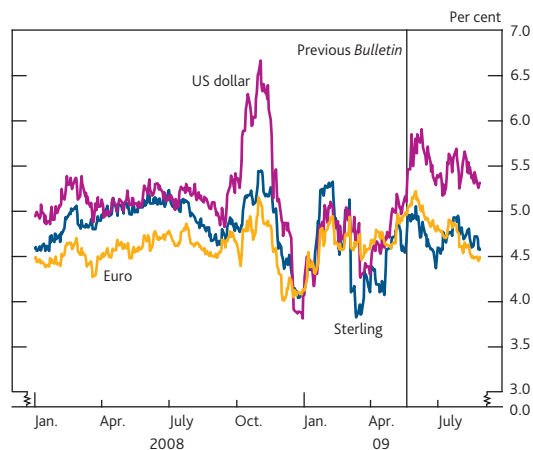
International government bond yields generally ended the period lower, particularly at longer maturities (Chart 17). However, long-term forward rates continued to be volatile (Chart 18). Contacts said this reflected the impact of various factors at different times, including news about economic activity, changes in investor risk appetite and policy announcements.

Chart 17 International nominal forward interest rates^(a)



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

Chart 18 International five-year nominal interest rates, five years forward^(a)



(a) Derived from the Bank's government liability curves.

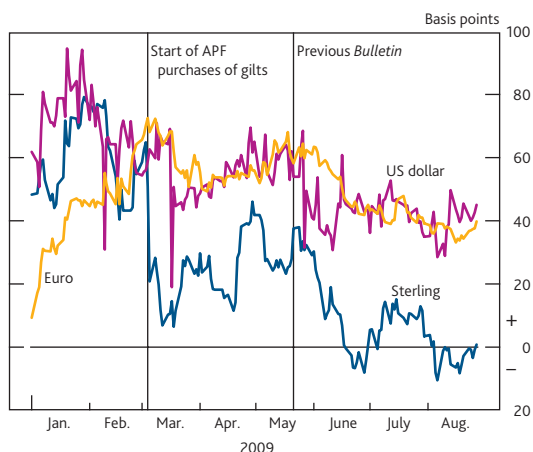
For example, yields were affected by central bank actions, such as the purchases of US Treasuries by the US Federal Reserve and gilts by the Bank of England. In the United Kingdom, gilt yields fell following the MPC's announcement on 6 August that it would extend its purchase programme by £50 billion. Gilt yields fell again following the publication of the MPC minutes on 19 August, which revealed that some members voted for a larger increase.

Official purchase schemes could be thought to affect government bond yields by inducing investors to rebalance

their asset portfolios. Specifically, central bank purchases may, in the absence of substitute assets, encourage investors to pay more for particular bonds, which, other things being equal, would reduce their yields.

Since this factor should not affect OIS rates, its impact may be evident from moves in the spread between bond yields and equivalent-maturity OIS rates (to the extent that the latter proxy default-free rates). Indeed, **Chart 19** shows that since the MPC's asset purchase programme was announced, gilt-OIS spreads have narrowed. The fact that these spreads fell further than equivalent spreads in other currencies may reflect the relatively large size of the Bank's gilt purchase programme. The MPC's £175 billion purchase programme represents around 30% of the outstanding stock of gilts, while the US Federal Reserve's intended purchase of \$300 billion of US Treasuries represents less than 5% of the outstanding stock.

Chart 19 International ten-year bond yields^(a) less OIS rates



Sources: Bank of England and Bloomberg.

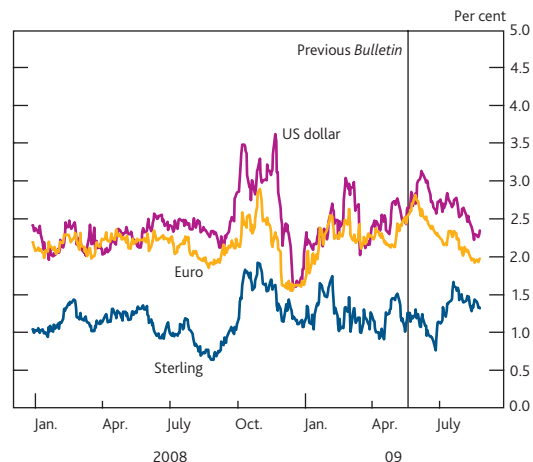
(a) Nominal ten-year spot yields.

Moves in government bond yields may also reflect changes in investors' perceptions of macroeconomic prospects (which themselves could be affected by policy announcements about the scale of asset purchases). However, contacts suggested that, in general, perceptions of the macroeconomic outlook improved over the period, which, all other things being equal, would have tended to increase bond yields.

International long-term real forward rates ended the period slightly higher in sterling and a little lower in US dollar and euro (**Chart 20**). More generally, long-term real interest rates remained relatively stable across currencies and there were few signs that the projected sharp increases in fiscal deficits in a number of countries had materially pushed up the long-term real cost of government borrowing.

Similarly, despite the significant expansion in central bank balance sheets and associated increases in base money,

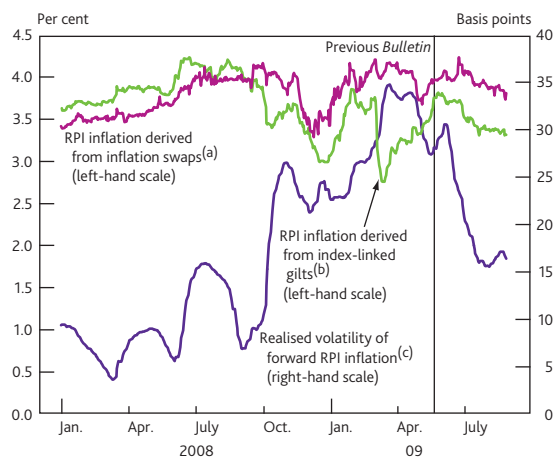
Chart 20 International five-year real interest rates, five years forward^(a)



(a) Derived from the Bank's government liability curves.

long-term inflation forwards remained broadly stable internationally. Indeed, sterling inflation forwards — as implied by both index-linked gilts and inflation swaps — fell slightly over recent months. Sterling inflation forward rates were also less volatile than in previous periods (**Chart 21**), which market contacts attributed to improved liquidity conditions in inflation-linked bond markets. And a forward-looking measure derived from options prices suggested that the implied probability of extremely low or high future RPI inflation in the United Kingdom generally fell. (See box on page 163 for more discussion of this measure.)

Chart 21 Sterling five-year inflation, five years forward



(a) Derived from the Bank's inflation swap curve.

(b) Derived from the Bank's government liability curve.

(c) Rolling standard deviation of forward RPI inflation derived from the Bank's government liability curve, based on a three-month estimation window.

EME and corporate credit markets

Yields on bonds issued in emerging market economies (EMEs) and by firms in industrial economies also fell, and generally by more than interest rates on government bonds issued by the major economies. As a result, spreads on EME sovereign and both investment and non-investment grade corporate bonds

UK RPI inflation options

Options which have pay-offs linked to the level of the UK retail price index (RPI) or year-on-year RPI inflation outturns have existed for some time. But they typically trade between private counterparties (ie are 'over-the-counter') rather than on a recognised exchange and as a result, information on their prices have not been widely available. Recently, however, some investment banks have started to publish indicative prices for these types of options. This box reviews these data and what they imply about investors' views about future developments in retail prices in the United Kingdom.

RPI inflation options are the most frequently traded and take two forms: inflation caps, which pay out when annual inflation is above a pre-determined level, or 'strike'; and inflation floors, which pay out when inflation is below a pre-determined level. Prices for caps and floors are normally quoted for maturities of 3 to 30 years, with strike prices for floors typically from 0% to 3%, and for caps from 3% to 6%. In exchange for an upfront premium, the purchaser of a cap at 5% will receive an interest payment on the notional value of the option that is the maximum of zero, and the annual rate of RPI inflation minus 5%. So if the purchaser bought an option worth a notional amount of £100 million and inflation was 6% in the first year, the payout for that year would be £1 million, ie $(6\% - 5\%) * £100 \text{ million}$.

According to contacts, the majority of trading in RPI inflation caps and floors arises from the need for pension funds to hedge their liabilities. Specifically, a large proportion of UK pension funds' liabilities must be revalued each year by the annual RPI inflation rate — to compensate pension scheme members for any erosion in the real value of the payouts — up to a maximum of 5%. At the same time, the value of future pension liabilities cannot typically be reduced in the event that RPI inflation turns negative (ie the aggregate price level falls over any one-year period). This process of annual revaluation of liabilities is known as limited price indexation (LPI).

Pension funds will typically look to hedge their exposure to inflation indexation using regular RPI-linked financial instruments, such as index-linked gilts and inflation swaps. But these instruments offer an imperfect hedge should inflation increase above 5% (since the uplift in their liabilities are typically capped at that level) or if annual RPI inflation is negative (in which case their liabilities do not fall but they will have to pay out on a swap or lose principal on a bond). Hence caps and floors can be used to achieve an improved hedge against the effects on indexation of their liabilities.

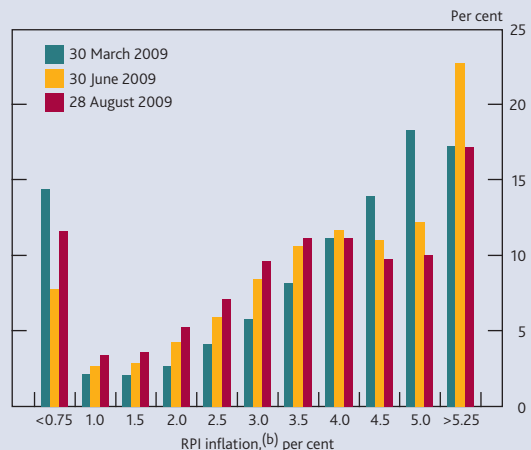
There are some institutions/organisations that are natural suppliers of RPI inflation protection, such as the UK government and utility companies, whose revenues are often linked in some way to RPI inflation. But in contrast there are

few natural providers of protection against some form of constrained RPI inflation (ie LPI) and therefore no natural supply of RPI inflation options. Instead, the supply of RPI floors has largely relied upon the ability of the sellers of those options to absorb the risk (given they are exposing themselves to inflation volatility). Relatedly, market activity in UK inflation caps and floors has typically been low compared to other inflation-linked products and options on other measures of inflation; notably euro-area CPI.

The general reduction in risk-taking in inflation-linked markets, particularly through 2008, reportedly led to a fall in activity in inflation option markets. This reduction in activity was exacerbated when RPI inflation became more volatile. Trading in inflation floors was also affected once it became clear that RPI inflation would turn negative in 2009 leading to losses for some market makers.

Despite the low level of market activity, prices of RPI inflation caps and floors were still quoted. Hence it is possible to use these to obtain an illustrative average implied probability distribution for annual RPI inflation. One method of achieving this is by comparing the prices of caps and floors for different strike prices at different maturities to create histograms which show the indicative (risk-neutral) probabilities attached to inflation being within the different ranges. **Chart A** shows the development of such an average indicative market-implied probability distribution for RPI inflation over 2009 at the five to seven-year horizon. In general the distribution suggests that the average probability attached to high RPI inflation outcomes fell compared with earlier in the year, while the probability attached to outcomes less than 4% generally rose. However, these developments may not solely reflect changes in the true probabilities attached to particular inflation outcomes but could arise from changes in investors' desired compensation for bearing inflation risk.

Chart A Average probability distribution of annual RPI outturns for 5–7 years ahead implied from options^(a)



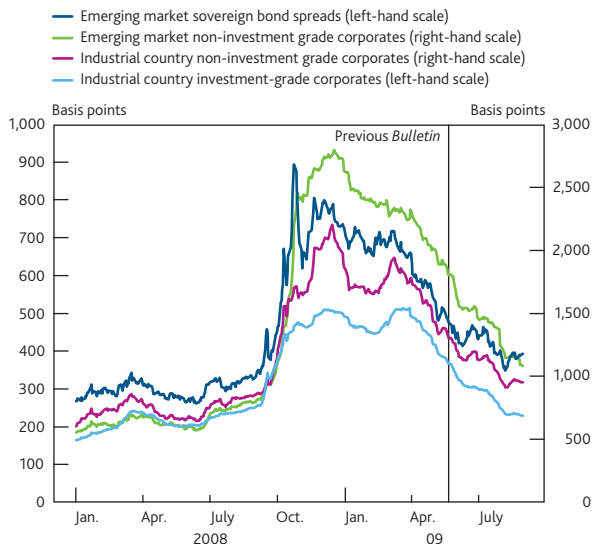
Sources: RBS and Bank calculations.

(a) Implied from prices of options on UK RPI inflation.

(b) Probability that RPI inflation will fall within a 0.5% range, centred on x-axis value (except for the distribution tails which extend for noted value onwards).

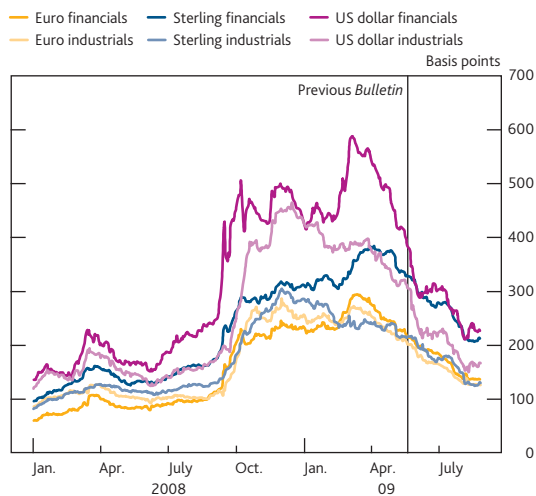
narrowed further (Chart 22). Among investment-grade companies, the narrowing in spreads was similar on securities issued by financial and non-financial companies (Chart 23).

Chart 22 International bond spreads



Sources: JPMorgan Chase and Co. and Merrill Lynch.

Chart 23 Investment-grade corporate bond spreads^(a)



Source: JPMorgan Chase and Co.

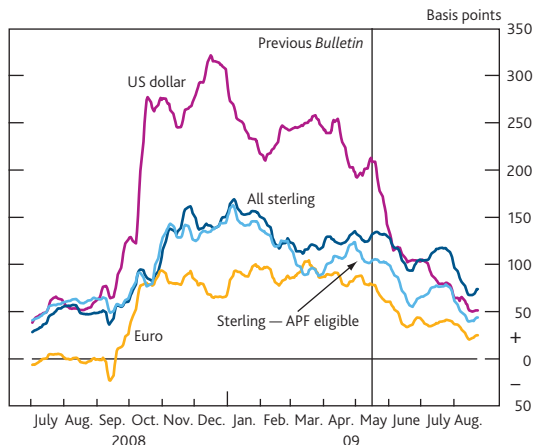
(a) Spreads of corporate bond yields over equivalent-maturity swap rates.

According to contacts, the narrowing in credit spreads reflected perceived improvements in the macroeconomic outlook, some pickup in investor risk appetite as well as an improvement in market liquidity. Indeed, a simple model decomposition suggests that the narrowing in EME sovereign bond spreads since Autumn 2008 was more than accounted for by increased risk appetite and improved market liquidity (see box on page 165).

Consistent with improved liquidity conditions in corporate bond markets, the difference between corporate bond spreads

and CDS premia — the CDS-bond basis — implied a reduction in illiquidity premia in corporate bond spreads, particularly for corporates that had issued in US dollars (Chart 24).⁽¹⁾ More generally, contacts reported improved functioning in corporate bond markets, with some increase in market-making activity.

Chart 24 Non-bank corporate bond-CDS basis^(a)



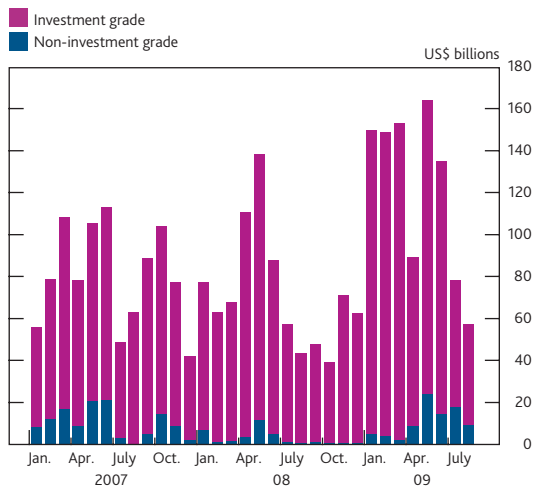
Sources: JPMorgan Chase and Co., UBS Delta and Bank calculations.

(a) Five-day moving average. Note that the US dollar series is not strictly comparable to the sterling and euro series. The sterling and euro measures are constructed as asset swap spreads less CDS premia for the median non-bank investment-grade corporate bond, whereas the US dollar series is the median of eleven different sectoral bond-CDS basis indices.

In the United Kingdom, the improvement in corporate credit conditions was aided by APF purchases of corporate bonds, with contacts noting that the reduction in gilt yields had also made corporate assets more attractive for investors.

Coinciding with stronger investor demand for corporate debt, gross bond issuance by non-financial companies remained robust into the third quarter (Chart 25). There was also a

Chart 25 Global non-financial corporate gross bond issuance



Source: Dealogic.

(1) See the box, 'Liquidity in corporate bond markets', August 2009 *Inflation Report*, page 16.

What might lie behind the recent narrowing in EME bond spreads?

Credit spreads on emerging market economies' (EMEs) sovereign bonds have narrowed markedly since Autumn 2008, and approached levels last seen prior to the collapse of Lehman Brothers. This box uses a simple regression model to investigate how much of this can be attributed to a better economic outlook for EMEs (and hence lower compensation for default risk) and how much reflects an improvement in the investment environment linked to an increase in risk appetite and overall market liquidity.

A model of EME bond spreads

In an earlier *Bulletin*,⁽¹⁾ a simple econometric model of monthly EME sovereign bond spreads was presented. This model related aggregate sovereign EME bond spreads movements to three explanatory variables:⁽²⁾

- EME economic fundamentals measured by country-weighted sovereign credit ratings (*RAT*).
- A forward-looking measure of equity price volatility (*VIX*) to proxy for investors' risk appetite.
- A measure of financial market liquidity — the short-term US interest rate.

Since then the model has been revised to include instead a broader measure of liquidity (*LIQ*).⁽³⁾ Importantly, the revised model was better able to capture movements in EME bond spreads during the marked turbulence in financial markets witnessed since last autumn.

More formally, the 'new' regression model on the (log of the) EME bond spread (*LSP*) can be written as:

$$LSP_t = \alpha + \beta_1 RAT_t + \beta_2 LIQ_t + \beta_3 VIX_t + \xi_t$$

(-)
(-)
(+)

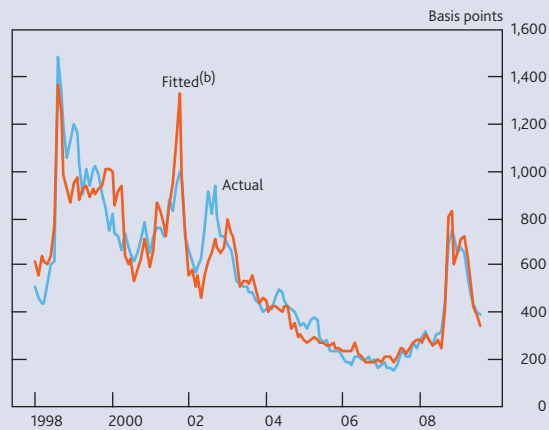
where the terms in brackets represent the expected signs of the coefficients and ξ_t captures random disturbances that cannot be accounted for by the model.

Chart A shows that over the past ten years this simple model can explain movements in EME bond spreads reasonably well, including during the period of marked turbulence last autumn. Indeed the three explanatory variables accounted for 92% of the variation in spreads over this period.

Accounting for the change in EME bond spreads

This regression model is a reduced form rather than a structural relationship, which means that it is difficult to attach a causal link between spreads and the various potential explanatory variables. That is, the model will capture the statistical comovement between variables, but will not necessarily explain why they move together. Moreover, in

Chart A EME bond spreads:^(a) actual and fitted



Sources: Bloomberg, IMF, JPMorgan Chase and Co. and Bank calculations.

(a) Refers to the composite JPMorgan Emerging Markets Bond Index Global excluding defaulted bonds.

(b) The fitted values are based on a regression of log values of EME sovereign bond spreads on ratings, a measure of market liquidity and the VIX index over the January 1998 to August 2009 period.

practice the interaction between spreads and indicators of EMEs' credit standing and financial market conditions may be more dynamic than this simple parsimonious equation would suggest. So the model should be thought of as representing the long-run or 'equilibrium' relationship between the variables.

Nevertheless, based on past empirical regularities, the model may be helpful in assessing the extent to which movements in spreads reflect changes in economic fundamentals and market conditions.

Table 1 provides the model-based decomposition of the narrowing in EME spreads since their local peak last November. It suggests that the narrowing of spreads is consistent with the increase in investor risk appetite and, to a lesser extent, in market liquidity. According to the model, these factors have more than offset the effects of the apparent deterioration in economic fundamentals over the period as indicated by ratings changes, which, other things being equal, would have tended to widen bond spreads. The role of increased risk appetite and improved market liquidity was also reflected in bond spreads narrowing most for lower-rated sovereigns.

Table 1 Accounting for the change in EME spreads, November 2008–August 2009

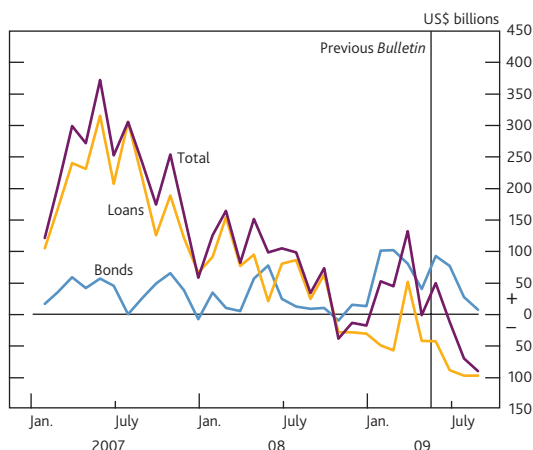
Basis points contribution of:	
Credit rating (<i>RAT</i>)	+105
Market liquidity (<i>LIQ</i>)	-175
Risk appetite (<i>VIX</i>)	-405
Unexplained	+115
Total change in actual bond spreads	-360

(1) See the box 'A simple model for emerging market bond spreads' on pages 14–15 of the Spring 2006 *Quarterly Bulletin*.

(2) The index for EMEs used in the estimations is JPMorgan Chase and Co.'s Emerging Market Bond Index Global excluding defaulted bonds.

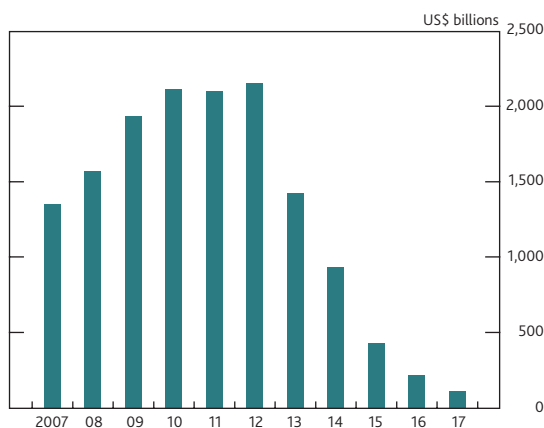
(3) The index is an unweighted average of eight liquidity measures. See 'Financial market liquidity', *Financial Stability Report*, April 2007, page 18.

Chart 26 Global non-financial corporate net debt financing



Source: Dealogic.

Chart 27 Maturity profile of global loans to non-financial corporates



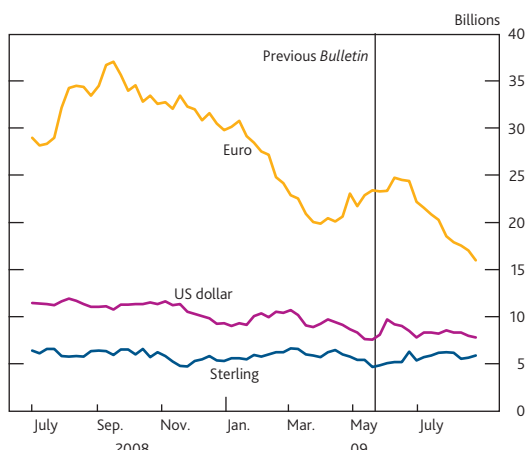
Source: Dealogic.

pickup in issuance by non-investment grade corporates, a market which effectively closed from end-2008 until recently.

Some of the recent issuance of corporate bonds was reported to have been used to repay bank loans. Overall, firms' net total debt external financing turned negative in 2009 Q2 (Chart 26). Some of this balance sheet deleveraging by corporates could be linked to reduced supply of long-term bank credit. But it could also be that companies wanted to decrease the risk that they might find it difficult to refinance some of their loans maturing over the next few years (Chart 27).

Commercial paper issuance by non-financial firms in Europe was relatively muted (Chart 28), despite the reported limited availability of short-term bank credit. This could perhaps reflect continued low business activity and the impact of de-stocking on the need for working capital. It may also be related to corporates having improved access to the corporate bond market to raise longer-term funds.

Chart 28 Total European non-financial corporate commercial paper outstanding

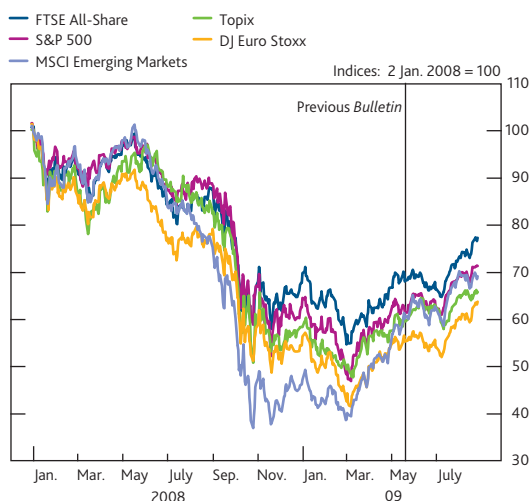


Source: Dealogic.

Equity markets

Accompanying the pickup in corporate bond issuance, firms' issuance of equity capital remained strong. This occurred against the backdrop of further increases in global equity indices (Chart 29), with the recovery in equity prices being relatively broad-based across countries. Despite the recent rally, however, equity prices remained well below their levels prior to the failure of Lehman Brothers in September 2008.

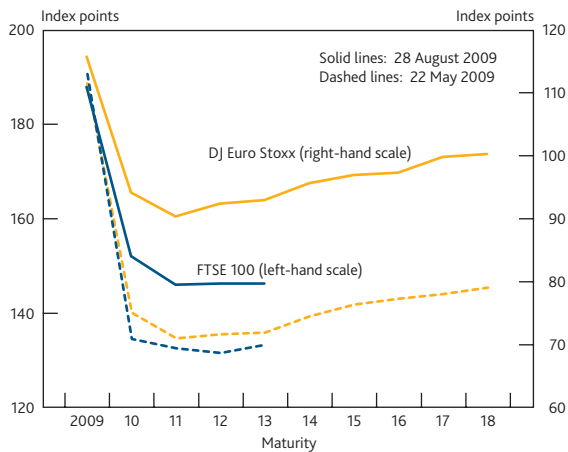
Chart 29 International equity indices (in US dollars)^(a)



Source: Bloomberg.

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

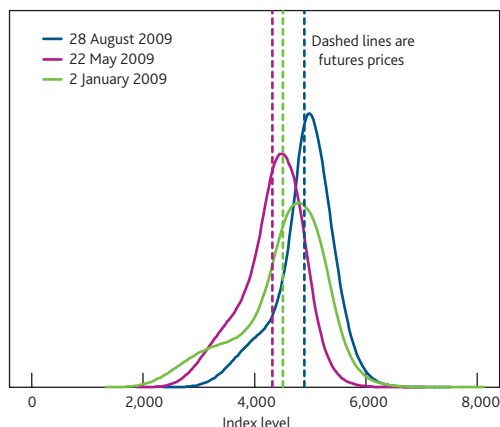
Recent increases in equity prices coincided with investment analysts starting to revise upwards their expectations for near-term corporate earnings, given signs of some improvement in the macroeconomic outlook. The August Bank of America/Merrill Lynch survey suggested that global fund managers believed that global corporate earnings could rise by at least 10% over the next year. Similarly, dividend yields inferred from dividend swap prices rose markedly across all maturities from 2010 onwards (Chart 30).

Chart 30 Dividend swap prices^{(a)(b)}

(a) From exchange-traded futures contracts.
 (b) For more details on dividend swaps, see box on 'Dividend swaps', *Bank of England Quarterly Bulletin*, 2008 Q4, page 371.

However, the increases in implied dividends could be partly related to reduced compensation for uncertainty surrounding future dividends rather than a shift up in expectations of future payouts. More generally, to the extent that investors' perceptions about macroeconomic uncertainty have fallen, perhaps linked to the various policy stimulus packages put in place, the recent continued pickup in global stock prices could reflect further reductions in required equity risk premia.

Consistent with lower compensation for risk, information from options prices indicated that the implied distribution of future equity prices narrowed and became slightly less negatively skewed, implying that investors were less concerned about large future falls in equity indices (**Chart 31**).

Chart 31 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.

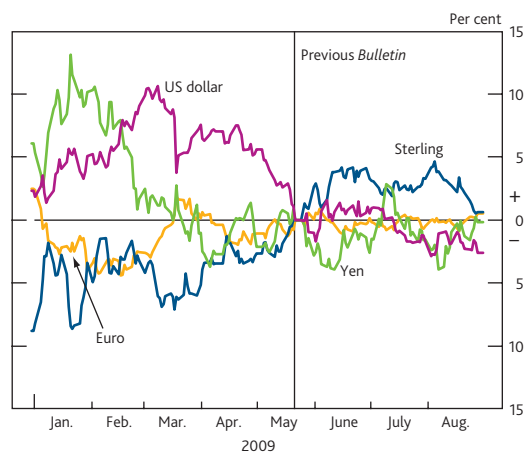
Foreign exchange

Information from options prices indicated that investors' perceptions of uncertainty surrounding future exchange rates

also declined further (**Chart 2** on page 154). This was true for currencies of industrialised and emerging market countries.

Accompanying the falls in currency volatility, liquidity conditions in foreign exchange markets reportedly continued to improve over recent months. In particular, in the interdealer segment of the market, transaction costs (as measured by bid-ask spreads) drifted lower, further unwinding the increases in late 2008.

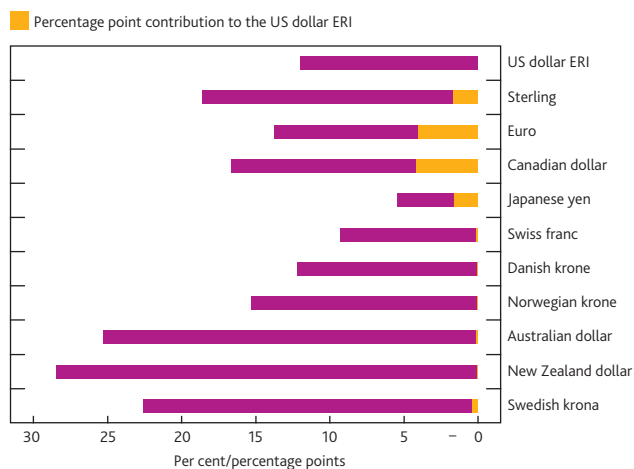
In terms of the levels of exchange rates, the major currencies ended the period little changed. The sterling effective exchange rate (£ERI) had appreciated through June and July but this was reversed in August. The most persistent move over the quarter was the depreciation of the US dollar, continuing a trend that began in early March (**Chart 32**).

Chart 32 Cumulative changes in international ERIs since 2 January 2009

According to contacts, the US dollar's continued depreciation was partly linked to the revival in global risk appetite that might have underpinned the pickup in corporate bond, equity and other risky asset prices. They noted further unwinds of the US dollar inflows witnessed in late 2008, when the US dollar was said to have benefited from 'safe haven' flows and the repatriation of funds back to the United States.

The depreciation of the US dollar since March was especially marked against the Australian and New Zealand dollars (**Chart 33**), with market contacts noting that the inflows into these currencies partly reflected the resurrection of so-called carry trades (involving borrowing in low-yielding currencies to invest in overseas assets with higher nominal returns, see box on pages 206–07 of this *Bulletin*) as investors' appetite for risk recovered further.

Chart 33 Changes in US dollar bilateral exchange rates and the US dollar ERI since 9 March 2009^(a)



Sources: Bloomberg and Bank calculations.

(a) 9 March 2009 was the local peak in the US dollar ERI.

Bank of England operations

Asset purchases⁽¹⁾

In the week prior to the August MPC meeting, the Bank completed the programme of private and public sector asset purchases financed by the issuance of central bank reserves that had been announced on 5 March and extended to £125 billion on 7 May. On 6 August, the MPC voted to continue with this programme of asset purchases and to

Table A Asset purchases by type (£ millions)

Week ending ^(a)	Commercial paper	Gilts	Corporate bonds	Total ^(b)
21 May 2009 ^{(c)(d)}	2,240	63,994	625	66,859
28 May 2009	701	6,501	48	7,250
4 June 2009	85	6,509	41	6,635
11 June 2009	458	6,388	10	6,856
18 June 2009	263	6,476	26	6,765
25 June 2009	130	6,500	24	6,654
2 July 2009	80	6,500	49	6,629
9 July 2009	34	6,505	48	6,587
16 July 2009	186	4,500	21	4,707
23 July 2009	25	4,498	0	4,523
30 July 2009	0	4,004	0	4,004
6 August 2009	0	0	0	0
13 August 2009	75	4,197	3	4,275
20 August 2009	166	4,200	10	4,376
27 August 2009	399	4,200	19	4,618
Total financed by Treasury bills	–	–	–	–
Total financed by central bank reserves ^(d)	1,573	134,971	938	137,482
Total asset purchases ^(d)	1,573	134,971	938	137,482

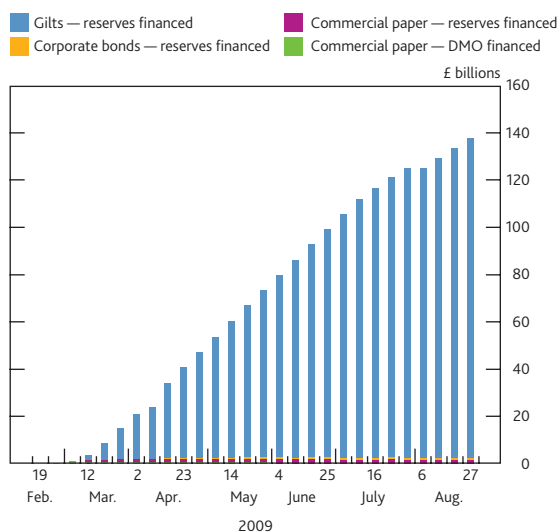
(a) Week-ended amounts are in terms of the proceeds paid to counterparties, on a trade-day basis, rounded to the nearest million. Data are aggregated for purchases from the Friday to the following Thursday.

(b) Weekly values may not sum to totals due to rounding.

(c) 21 May 2009 measured as amount outstanding as at 21 May 2009.

(d) In terms of proceeds paid to counterparties less redemptions at initial purchase price on a settled basis. Amounts outstanding may be less than total purchases due to assets maturing during the period.

Chart 34 Cumulative APF asset purchase by type^(a)



(a) Amounts are in terms of the proceeds paid to counterparties, less redemptions valued at initial purchase price, rounded to the nearest million. Data based on settled transactions.

increase its size by £50 billion to £175 billion. **Table A** and **Chart 34** summarise asset purchases by type of asset.⁽²⁾

Gilts

Gilt purchases financed by the issuance of central bank reserves began on 11 March. Initially, the Bank offered to purchase conventional gilts with a minimum residual maturity of five years and a maximum residual maturity of 25 years.

Following the MPC's decision on 6 August to purchase an additional £50 billion of assets over the subsequent three months, the Bank announced that it would extend the range of gilts eligible for purchase to include all conventional gilts with a minimum residual maturity of greater than three years. In addition to conducting auctions to purchase gilts on Monday and Wednesday each week, the Bank would hold an additional auction, normally on Tuesday. The Bank would normally offer to purchase gilts with a residual maturity of 10–25 years on Mondays, of greater than 25 years on Tuesdays and 3–10 years on Wednesdays. The Bank also announced, in a joint statement with the Debt Management Office (DMO), an arrangement for a significant amount of the gilts acquired by the Bank via the APF to be made available for on-lending to the market by the DMO through the DMO's normal repo market activity (see box on page 169).

As of 27 August, £135 billion of gilts had been purchased, of which £65.6 billion were in the 3–10 year residual maturity range, £65.2 billion in the 10–25 year maturity range and £4.2 billion with a maturity greater than 25 years (**Chart 35**).

(1) The data cut-off for this subsection is 27 August.

(2) The objectives and operation of the APF are described in more detail in the 2009 Q2 *Quarterly Bulletin*.

Gilt lending

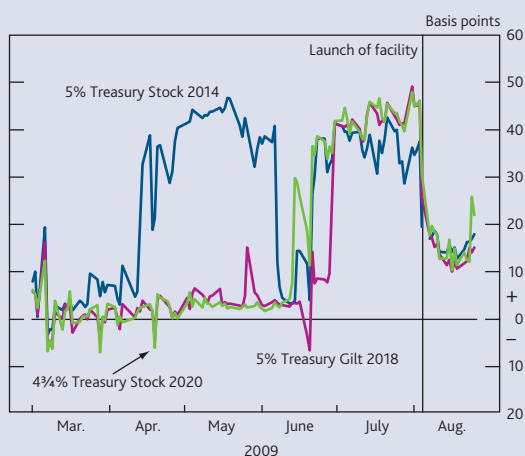
On 6 August, the Bank and the Debt Management Office (DMO) announced that, from 7 August, the Bank would make available to the DMO a significant amount of the gilts purchased via the Asset Purchase Facility (APF) for on-lending to the market through the DMO's normal repo market activity.

The purpose of this arrangement is to relieve any frictions in the functioning of the market in specific gilts arising from the Bank's purchases. The DMO may lend the gilts for a term of up to one week. In return for the loan of specific APF gilts, the DMO delivers to the Bank UK government securities of equivalent value, so that the APF's holdings of UK government securities are unaffected. There is no net impact on the DMO's cash management operations.

The amount available is at least 10% of the APF's holdings of each stock, and more where the APF's holding is greater than 50% of the 'free float'.⁽¹⁾ In addition, the Bank is prepared to make the APF's gilts available for use in the DMO's Standing, and Special Repo Facilities.⁽²⁾

Market participants suggested that the impact of the lending facility could be seen in the repo rates for the three bonds that had been eligible for the DMO's Special Repo Facility (the 5% 2014, 5% 2018 and 4.75% 2020). For each of these three bonds, the spread between its weighted average overnight repo rate and the general secured overnight repo rate was consistently over 30 basis points in July and early August. This meant that to obtain any of these specific bonds, market participants would in return have had to lend cash at a rate significantly below the general secured overnight rate. On the first day this facility was available, spreads on these bonds fell below 20 basis points and subsequently remained below the levels seen in July and early August (**Chart A**).

Chart A Spread to GC overnight rate of gilts available in Special Repo Facility



Source: BrokerTec.

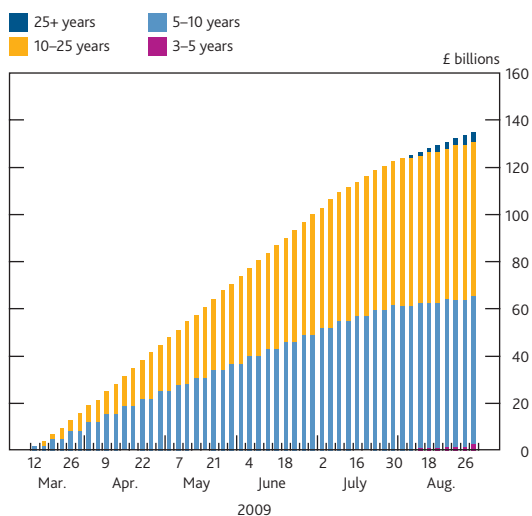
A further consequence of the launch of this facility has been the fall in usage of the DMO's Standing and Special Repo Facilities. Between 1 July and 6 August, the average total daily use for these facilities had been around £2 billion, with over 95% of the usage involving the three bonds highlighted in the chart. Since the launch of this facility, there was no use of either facility, as market participants were able to access the bonds via the new facility at rates closer to the secured overnight rate, thus reducing the spread. On 28 August, the DMO announced the suspension of the Special Repo Facility.

The Bank will publish the daily average aggregate value of gilts lent by the APF to the DMO during each calendar quarter, on the second Wednesday after the end of the quarter at 10 am.

(1) Total issue size of the gilt minus government holdings.

(2) The Standing Facility allows any gilt to be borrowed overnight at a current rate of 0.10%, with a simultaneous reverse repo trade executed at Bank Rate. In the event of persistent dislocation, the DMO may establish a Special Repo Facility. This operates in a similar way, but certain terms (eg maturity or repo, price and/or eligible gilts) may vary.

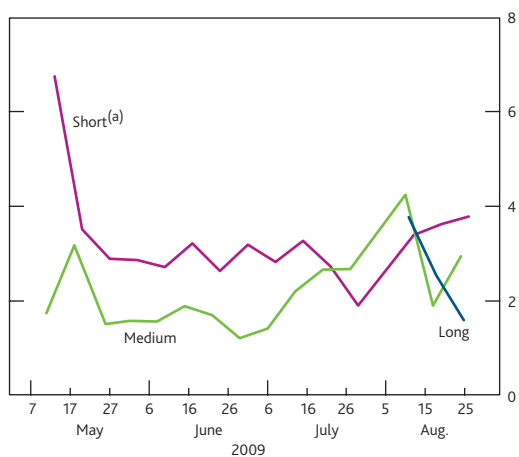
Chart 35 Cumulative gilt purchases^(a) by maturity



(a) Data based on settled transactions.

These gilt purchases took place over 50 auctions, which varied in size up to a maximum of £3.5 billion. The auctions following the 6 August MPC decision were reduced in size to £1.4 billion. Cover in the auctions varied, but averaged 3.3 in the 3–10 year auctions, 2.4 in the 10–25 year auctions and 2.6 in the auctions for gilts with a maturity greater than 25 years (Chart 36).⁽¹⁾

Chart 36 Cover ratios in APF gilt auction



(a) On 6 August, the short-maturity bucket changed from 5–10 years to 3–10 years. The medium and long-maturity buckets are 10–25 years and greater than 25 years respectively.

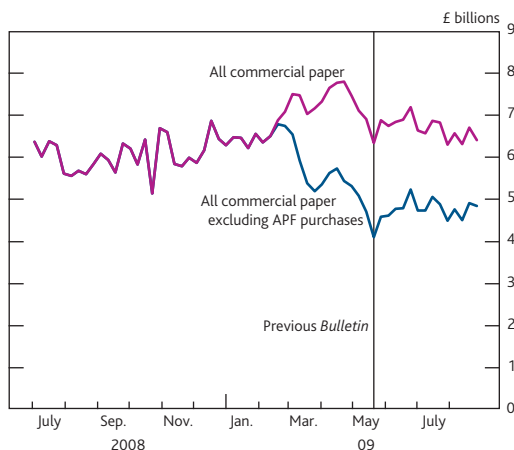
As purchases progressed, the Bank acquired a sizable proportion (around 70%) of the free float (the total issue size of the gilt minus government holdings) in four gilts. These gilts were subsequently suspended from auctions until further notice.⁽²⁾

Commercial paper

Over the review period, the Bank continued to offer to purchase sterling-denominated investment-grade commercial paper (CP) issued by companies that make a material contribution to UK economic activity.

As of 27 August, APF holdings of CP amounted to £1.6 billion, down from £2.2 billion as of 21 May. Between 21 May and 27 August gross purchases of £2.6 billion were more than offset by redemptions of £3.3 billion. While APF holdings over the period fell, the total amount of sterling-denominated CP outstanding for UK corporate and non-bank financial firms was slightly higher than on 21 May (Chart 37).

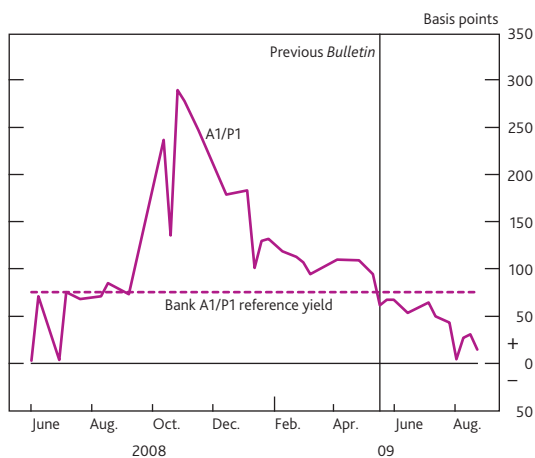
Chart 37 Sterling commercial paper outstanding for UK corporates and non-bank financial firms



Sources: CP Ware and Bank calculations.

Sterling primary market CP spreads narrowed further since the previous *Bulletin* (Chart 38). The narrowing of spreads, combined with the fall in APF net purchases and the increase in the total amount of sterling-denominated CP outstanding for UK corporate and non-bank financial firms, would seem to suggest that some issuers found it more economic to issue to investors rather than use the APF.

Chart 38 Primary market spreads on sterling three-month A1/P1-rated corporate commercial paper^(a)



Source: Euroclear.

(a) Spread to OIS rates.

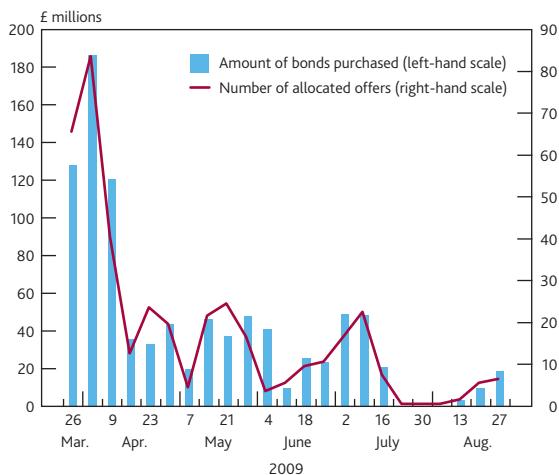
(1) Further details of individual operations are available at www.bankofengland.co.uk/markets/apf/gilts/results.htm.
 (2) The suspended gilts were the 5% 2014, 4.75% 2020, 8% 2021 and 4% 2022 gilts.

Corporate bonds

The Bank continued to offer to purchase high-quality corporate bonds, through auctions, typically on Tuesdays, Thursdays and Fridays.

From Thursday 16 July to Thursday 6 August the Bank did not make any purchases in its corporate bond auctions. This largely reflected a decline in offers over this period with the Bank receiving no offers in five consecutive auctions from 24 July to 4 August. Contacts suggested that continued strong investor demand combined with little primary market issuance during the summer had resulted in investors finding it more difficult to obtain sterling corporate bonds. These factors may in part explain the reduction in activity in the Bank's auctions during July and early August, and consequently the fall in the number of successful offers (**Chart 39**).

Chart 39 Weekly purchases of sterling corporate bonds^(a)



(a) Weekly (Friday-Thursday) amounts in terms of the proceeds paid to counterparties, on a trade-day basis.

As of 27 August, total corporate bond purchases were £0.9 billion, compared to £0.6 billion on 21 May. The portfolio had been acquired through 386 purchases of 118 bonds from 50 issuers, spread over auctions from 25 March to 27 August.⁽¹⁾ This reflected the aim of the Bank to make frequent but relatively small purchases to help improve the function of the secondary market, to help to reduce liquidity premia on high-quality corporate bonds, and so improve firms' access to capital markets.

Credit Guarantee Scheme

The Bank did not make any purchases of bank debt issued under the Credit Guarantee Scheme from the secondary market, but stands ready to do so should conditions in that market deteriorate.

Secured commercial paper facility

On 3 August, the Bank launched a secured commercial paper (SCP) facility to support the provision of working capital to

non-investment grade companies that are ineligible for the Bank's CP facility. The purpose of the SCP facility is to help improve the functioning of the private market by standing ready to make primary market purchases and by acting as a backstop for secondary market investors.

SCP issuers are programmes that are administered by sponsors, which it is anticipated will typically be banks. To be eligible for purchase by the APF, SCP must be backed by underlying assets that are short term and provide credit to companies (for example, trade receivables or equipment leases) or consumers (for example, credit cards or short-term loans), where the credit would support economic activity in the United Kingdom. Programmes that include assets such as term asset-backed security bonds, emerging market transactions and synthetic assets are likely to be ineligible for the SCP facility.

Eligible SCP programmes must have a minimum initial short-term credit rating of A1/P1/F1 from at least two of Standard & Poor's, Moody's and Fitch.

There were no programmes that were immediately eligible for the SCP facility. As part of the consultation process, banks indicated that it would take a number of months to set up programmes that would be eligible for the SCP facility. As with the CP facility, it is intended that the facility would operate for as long as the highly abnormal conditions in corporate credit markets persist, and the Bank intends to give twelve months notice of any withdrawal of the facility.⁽²⁾

Operations within the sterling monetary framework⁽³⁾

Following the introduction of asset purchases financed by the creation of central bank reserves, the Bank's operational approach initially aimed to ensure a net supply of reserves around the aggregate level of reserves targets initially set by participants for the March maintenance period, plus the amount of reserves injected via the Bank's programme of asset purchases (**Chart 40**). In the light of the revealed demand for central bank reserves, the Bank announced on 6 August that it would amend its operational approach to the provision of reserves. The Bank would continue to offer reserves in long-term repo open market operations (OMOs) but would cease to offer reserves in a weekly short-term OMO. The level of reserves would thus be determined by (i) the level of reserves injected via asset purchases, (ii) the reserves supplied in long-term repo OMOs, and (iii) the net impact of other sterling ('autonomous factor') flows across the Bank's balance sheet.

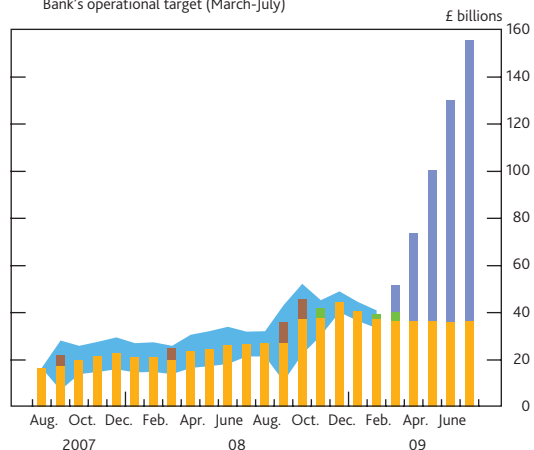
(1) Sum of corporate bonds purchased, less redemptions valued at initial purchase price.

(2) The SCP facility is described in more detail in the Market Notice available at www.bankofengland.co.uk/markets/marketnotice090730.pdf.

(3) This subsection and the subsection describing other market operations, cover operations from 7 May to 5 August. On 5 March, the usual system, in which banks chose monthly reserves targets to achieve on average over a maintenance period, was suspended. However, this article continues to use the term 'maintenance period' for convenience to refer to the period between one MPC decision date and the next.

Chart 40 Aggregate reserves targets and reserves provision

- Range within which reserves remunerated^(a)
- Additional provision from asset purchases financed by central bank reserves
- Additional provision resulting from uncovered OMO drains
- Additional provision in fine-tuning OMOs
- Reserves provision to meet aggregate targets (until March)/ Bank's operational target (March-July)



(a) Since 5 March, all reserves balances held by reserves banks have been remunerated at Bank Rate.

Long-term repo OMOs

Repo operations at six, nine and twelve-month maturities were offered against collateral routinely accepted in the Bank's short-term OMOs and Operational Standing Facilities (OSFs). In addition, the Bank continued to provide liquidity insurance by conducting extended-collateral long-term repo OMOs with a three-month maturity against a wider range of collateral. The results of these operations are shown in **Table B**.

All three-month extended-collateral long-term repo OMOs over the review period were uncovered, resulting in a decline in the stock of long-term repo OMOs outstanding (**Chart 41**). In light of revealed demand for funds in these operations, the

Chart 41 Factors affecting the supply of reserves (maintenance period averages)

- Short-term OMOs
- Asset purchases
- Ways and Means balances
- Long-term repo (three-month maturity)
- Long-term repo (six, nine and twelve-month maturities)
- Reserves balances (excluding APF impact)
- Reserves — APF impact
- Fine-tune liquidity provision
- Fine-tune liquidity drain
- Standing facility deposit
- Autonomous factors

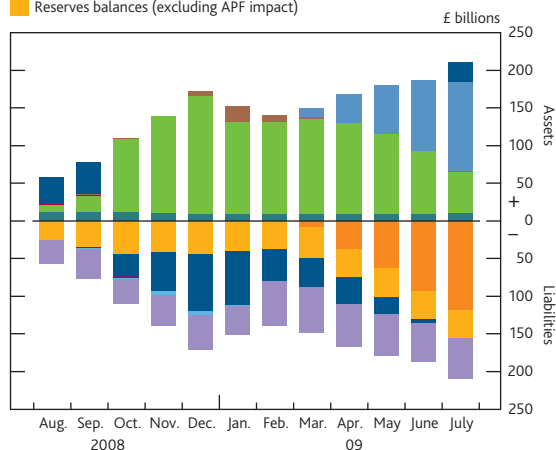


Table B Extended-collateral three-month long-term repo operations

19 May 2009

On offer (£ millions)	20,000
Cover	0.54
Weighted average rate ^(a)	0.868
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.27

2 June 2009

On offer (£ millions)	20,000
Cover	0.45
Weighted average rate ^(a)	0.722
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.12

16 June 2009

On offer (£ millions)	20,000
Cover	0.53
Weighted average rate ^(a)	0.729
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.13

30 June 2009

On offer (£ millions)	20,000
Cover	0.42
Weighted average rate ^(a)	0.602
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.00

14 July 2009

On offer (£ millions)	15,000
Cover	0.09
Weighted average rate ^(a)	1.097
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.50

4 August 2009

On offer (£ millions)	15,000
Cover	0.55
Weighted average rate ^(a)	0.898
Lowest accepted rate ^(a)	0.600
Tail ^(b)	0.30

(a) Per cent.

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

Bank reduced the amount on offer from £20 billion to £15 billion from the operation on 14 July. A further reduction from £15 billion to £10 billion was announced on 6 August. In contrast, all operations at six, nine and twelve-month maturities against routine OMO collateral were covered (**Table C**).

For the period under review, the Bank continued to announce two minimum bid rates applicable to its extended-collateral three-month long-term repo OMOs. The minimum rate for bids against routine OMO collateral was set equal to the higher of the equivalent-maturity OIS rate shortly before the operation and the maximum bid rate in the Bank's short-term OMOs. The minimum bid rate for bids against the wider

Table C Long-term repo operations

	Six-month	Nine-month	Twelve-month
19 May 2009			
On offer (£ millions)	750	400	200
Cover	4.00	4.00	4.00
Weighted average rate ^(a)	0.567	0.603	0.708
Highest accepted rate ^(a)	0.590	0.650	0.730
Lowest accepted rate ^(a)	0.551	0.551	0.701
Tail ^(b)	0.02	0.05	0.01
16 June 2009			
On offer (£ millions)	750	400	200
Cover	3.27	3.81	3.10
Weighted average rate ^(a)	0.596	0.654	0.753
Highest accepted rate ^(a)	0.650	0.700	0.753
Lowest accepted rate ^(a)	0.550	0.651	0.753
Tail ^(b)	0.05	0.00	0.00
14 July 2009			
On offer (£ millions)	750	400	200
Cover	2.33	2.63	3.25
Weighted average rate ^(a)	0.501	0.601	0.741
Highest accepted rate ^(a)	0.501	0.601	0.741
Lowest accepted rate ^(a)	0.501	0.601	0.741
Tail ^(b)	0.00	0.00	0.00

(a) Per cent.

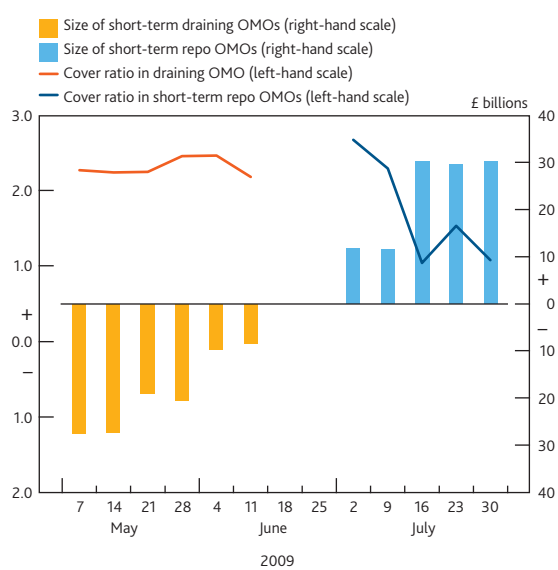
(b) The yield tail measures, in basis points, the difference between the weighted average accepted rate and the lowest accepted rate.

collateral pool was set 50 basis points higher than for bids against narrow collateral. On 6 August the Bank announced a change in the process for determining the minimum bid rate. For routine OMO collateral, the minimum bid rate would be set at the higher of the equivalent-maturity OIS rate and Bank Rate. For bids against the wider collateral pool, the minimum bid rate remained 50 basis points higher than that for routine OMO collateral.

Short-term operations

Following the introduction of asset purchases financed by the creation of central bank reserves, initially the Bank continued to conduct weekly short-term OMOs to drain reserves by issuing one-week bills, such that the level of reserves would be around the aggregate level of reserves targets initially set by participants for the March maintenance period, plus the amount of reserves injected via the Bank's programme of asset purchases. These operations to drain reserves were variable-rate operations.

The size of these weekly operations to drain reserves fell from £27.5 billion in the operation on 7 May to £8.4 billion on 11 June, as fewer reserves were supplied in the Bank's long-term repo operations (**Chart 42**). A further reduction in the reserves supplied in the long-term repo OMO on 16 June resulted in aggregate reserves reaching a level broadly in line with the Bank's operational target at the time. Consequently, the Bank chose not to conduct a short-term OMO on 18 and 25 June.

Chart 42 Size of short-term OMOs and cover ratio^(a)

(a) Size of OMOs shown as weekly average amounts outstanding.

Further net maturities in long-term repo OMOs resulted in aggregate reserves, excluding those injected via asset purchases, falling below the level implied by the Bank's operational target at the time. As a result, the Bank reverted to supplying reserves via variable-rate short-term operations from 2 July (**Chart 42**). These operations were suspended on 6 August in line with the revised operational approach described above.

Operational Standing Facilities

As part of the changes to the sterling monetary framework introduced on 5 March, the Bank announced that, if Bank Rate was set at 0.5% or below, the rate paid on the Operational Standing Deposit Facility would be zero, while the rate charged on the Operational Standing Lending Facility would continue to be set at 25 basis points above Bank Rate.

As a result of the change to remunerate all reserves balances at Bank Rate and (given the level of Bank Rate) the reduction in the rate paid on the Operational Standing Deposit Facility to zero, average use of the deposit facility was £0 million in each of the maintenance periods under review. Average usage of the lending facility was also £0 million throughout the period.

Discount Window Facility

In October 2008, the Bank introduced a Discount Window Facility (DWF) as part of the framework for its operations in the sterling money markets. The DWF is a permanent facility to provide liquidity insurance to the banking system and allows eligible banks and building societies to borrow gilts against a wide range of collateral.

On 7 July the Bank announced that the average daily amount outstanding in the Discount Window Facility between 1 January and 31 March 2009 was £0 million.

Other market operations

One objective of the Bank's market operations is to reduce the cost of disruption 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 risk, and subject to the need to control the risk to its balance sheet.

Within the sterling monetary framework, the Bank provides liquidity insurance through the provision of reserves accounts, extended-collateral long-term repo OMOs and the Discount Window Facility described above. Liquidity insurance has also been offered in other operations: US dollar repo operations and the Special Liquidity Scheme.

Special Liquidity Scheme

The drawdown period for the Special Liquidity Scheme (SLS) closed on 30 January 2009. Although the drawdown window to access the SLS has closed, the Scheme will remain in place for three years, thereby providing participating institutions with continuing liquidity support.

US dollar repo operations

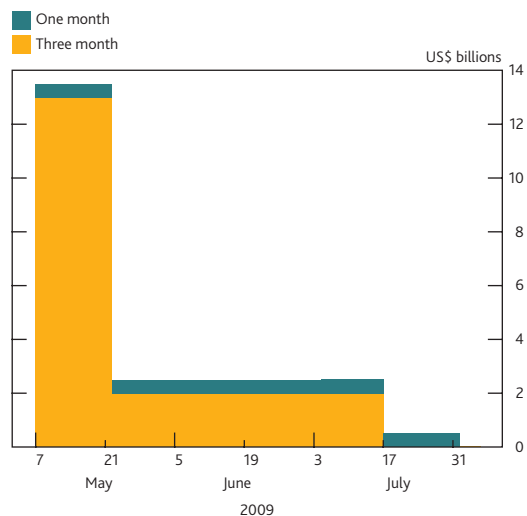
In concert with other central banks, since 18 September 2008 the Bank has offered US dollar financing to financial institutions funded by a swap with the Federal Reserve. These measures are designed to improve the liquidity conditions in global financial markets.

There were no bids in the Bank's one-week dollar operations. Bids also declined for funds at longer maturities. This led to a corresponding fall in the total stock outstanding; most recently in August, when funds offered in July matured, reducing the outstanding total in all US dollar repo operations to £525 million (**Chart 43**). The fall in the outstanding total is represented in a fall in 'other assets' on the Bank's balance sheet (**Chart 44**) with a corresponding fall in US dollar deposits from the Federal Reserve Bank of New York (included in 'other liabilities' in **Chart 45**).

The Bank had previously offered US dollar financing at one-week, one-month, and three-month maturities. In light of the generally reduced use of these operations, the Bank announced on 25 June that — while the swap lines between the Federal Reserve and the Bank had been extended to 1 February 2010 — the one-month operation would be suspended following the operation on 28 July.

As previously announced, since 6 April, the Bank, along with other central banks, has had swap arrangements in place that would enable the provision of foreign currency liquidity by the Federal Reserve to US financial institutions. Should it be required, the Bank would provide sterling via a swap arrangement with the Federal Reserve, similar to that which underpins the Bank's US dollar repo operations.

Chart 43 US dollar repo: stock outstanding by maturity^(a)



(a) Stock outstanding is shown from settlement date.

Bank of England balance sheet

The Bank of England uses its balance sheet for policy purposes. The expansion of its balance sheet since 2007, and more especially since 2008, reflects the extraordinary policy measures that it has adopted.

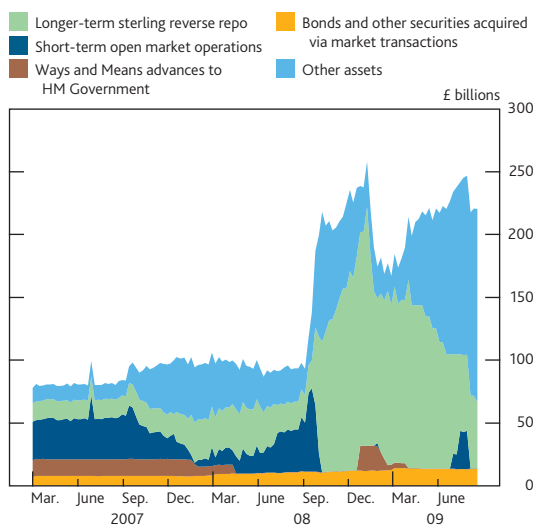
Purchases of commercial paper, corporate bonds and gilts under the APF described above, have since 5 March been the main factor in the expansion of the Bank's balance sheet. APF transactions are undertaken by a subsidiary company of the Bank of England, the Bank of England Asset Purchase Facility Fund Limited (BEAPFF). The BEAPFF borrows from the Bank to pay for the purchases it makes. It is this lending to the BEAPFF that appears on the Bank's balance sheet as an asset under 'other assets' (**Chart 44**). On the Bank's balance sheet the liability corresponding to this asset was initially a deposit from the government's Debt Management Office. This deposit appeared under 'other liabilities' (**Chart 45**). Following the decision by the MPC on 5 March to use the APF as a monetary policy tool, the Bank financed its lending to BEAPFF by the creation of central bank reserves. This is reflected in an increase in the level of reserves balances (**Chart 45**).

Over the period 27 May to 26 August, the Bank of England's balance sheet averaged £227 billion. While this was down from a high in 2008 Q4, it represented a rise from Q2. This increase reflected purchases of commercial paper, corporate bonds and gilts under the APF, and the subsequent increase in reserve balances on the liability side. These increases to the balance sheet were partially offset by the reduced size of reserves provided in extended-collateral long-term repo OMOs and the decreasing size of the Bank of England's US dollar repo operations.

Foreign reserves

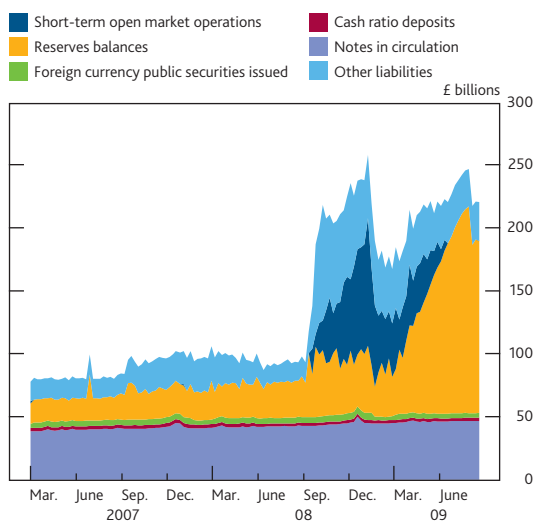
As part of the monetary policy framework introduced by the Chancellor of the Exchequer in 1997, the Bank of England holds its own foreign exchange reserves in support of its monetary policy objective. These reserves are separate from the Government's foreign exchange reserves, which the Bank manages as HM Treasury's agent. The assets held in the Bank's reserves are included in 'bonds and other securities acquired via market transactions' (Chart 44). They are financed with medium-term foreign currency securities issued by the Bank (Chart 45). At the end of July the Bank's foreign exchange reserves comprised £3.9 billion of assets.

Chart 44 Bank of England consolidated balance sheet: assets^(a)



(a) Excludes loans and associated deposits in course of settlement.

Chart 45 Bank of England consolidated balance sheet: liabilities^(a)



(a) Excludes loans and associated deposits in course of settlement.

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 Bank for International Settlements and European Central Bank, and the Bank's physical assets), and aggregate cash ratio deposits. The portfolio consists 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 portfolio currently includes around £2.9 billion of gilts and £1 billion of other debt securities. Since April 2009, both the size of the purchases (£43 million, previously £20 million) and the frequency (bi-monthly rather than monthly) have increased reflecting developments in the Bank's capital and reserves. Over the period from 7 May to 5 August, gilt purchases were made in accordance with the quarterly announcements on 1 April 2009 and 1 July 2009.

Developments in market structure

NYSE Liffe launches new options on short-term interest rates

On 27 July, NYSE Liffe (a London-based derivatives exchange within the NYSE Euronext group) launched new two-year options on sterling and euro short-term interest rates.

As for existing options with shorter maturities, the new options settle on futures contracts referencing three-month market interest rates. Sterling futures contracts settle on three-month Libor and euro contracts settle on three-month Euribor. Option contracts therefore help investors hedge or speculate on future levels of short-term interest rates.

The introduction of the new two-year options followed strong growth in market activity for the existing shorter-maturity options; with average daily volume in both sterling and euro contracts having increased more than 30% on the same period of 2008. In addition, there was a considerable increase in the traded volume of futures contracts with two-year maturities, which were up about 40% on the same period last year. Increased activity in these contracts was said to reflect market views that central banks would maintain interest rates at low levels in the near term but more uncertainty about their levels in the medium term, which drove demand for hedging and speculative positions.