Markets and operations

This article reviews developments in sterling financial markets since the 2008 Q4 *Quarterly Bulletin* up to the end of February 2009. The article also reviews the Bank's official operations during this period.

Sterling financial markets(1)

Overview

After some improvement following the relatively smooth passing of the year end, bank funding markets reportedly became more difficult again during late January and February. Sterling Libor-OIS spreads widened slightly while interbank term lending remained limited. This seemed to reflect renewed concerns about the scale of potential credit losses and write-downs facing banks, given further falls in global asset prices and the significant and synchronised weakening in international economic activity.

More generally, while conditions across financial markets have improved somewhat since the autumn, overall liquidity conditions have yet to normalise to any significant degree. Contacts cite ongoing balance sheet constraints on financial institutions as an important factor in continued pricing anomalies in various asset markets.

Against that background, and given the prospect of UK CPI inflation falling below target over the medium term, absent further stimulus, the UK Monetary Policy Committee (MPC) reduced Bank Rate further. In addition, the UK authorities announced a series of initiatives to help ensure an adequate supply of credit to households and businesses. These included measures to reduce uncertainty about the adequacy of bank capital by capping the losses on their holdings of risky assets; to facilitate bank funding by means of state guarantees; and initiatives for the Bank to purchase sterling commercial paper, corporate bonds and other securities in order to improve financing conditions in the economy.

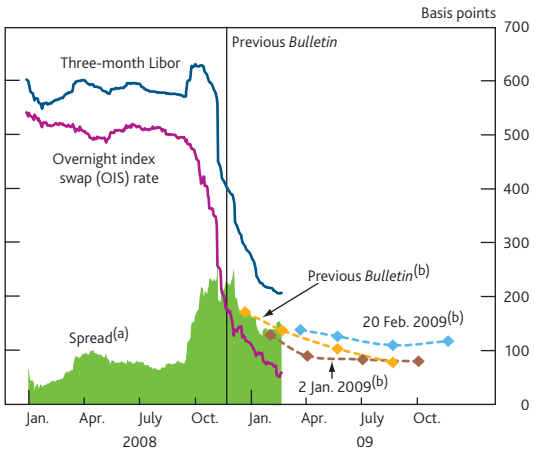
These asset purchases were initially to be financed by government borrowing. But on 5 March (after the review period for this article) the MPC announced a second phase of asset purchases, for both private sector and UK government securities, to be financed by central bank reserves. The MPC also reduced Bank Rate to 0.5%.

Recent developments in sterling capital markets

Bank funding markets

Conditions in sterling interbank money markets were reported to have improved slightly through December and early January with few problems over the year end. Indeed, activity increased in the first few days of the new year, as lenders' balance sheet constraints eased somewhat. This was associated with a narrowing in the spread between three-month Libor and overnight index swap (OIS) rates (**Chart 1**).

Chart 1 Three-month interbank rates and spreads relative to future expected policy rates



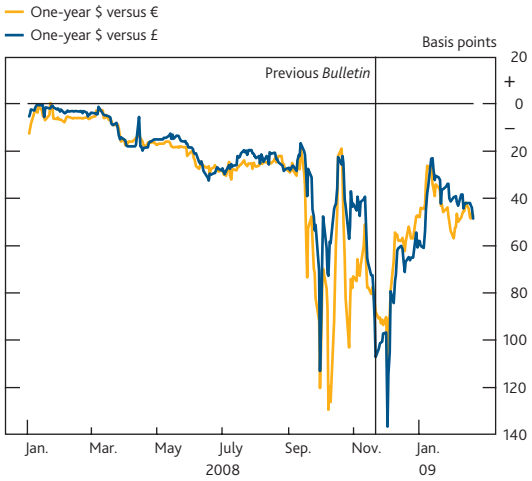
Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Three-month London interbank offered rate (Libor) spreads over equivalent-maturity OIS rates.
(b) Three-month Libor forward spreads over equivalent-maturity forward OIS rates.

Use of cross-currency swap markets reportedly also became easier compared with strained conditions in late 2008. For example, sterling-US dollar basis swap spreads returned to pre-September 2008 levels by early January (**Chart 2**), indicating that the cost of raising US dollar funding via cross-currency swaps generally fell. Relatedly, contacts reported that some large financial institutions raised US dollar

(1) This article focuses on sterling capital market developments. The data cut-off for this section is 20 February.

Chart 2 One-year basis swap spreads

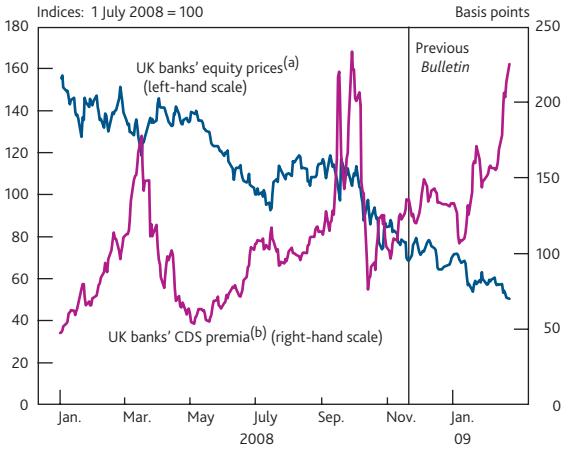


Source: Bloomberg.

funding and swapped this into other currencies such as euro to take advantage of the basis swap spread.

However during February, Libor-OIS spreads started to widen again and the term structure of forward spreads shifted up slightly (**Chart 1**). Contacts reported some increased reluctance to lend to banks beyond very short maturities as concerns over the health of banks resurfaced internationally. In particular, with a number of banks reporting large credit losses and write-downs for 2008 Q4, perceptions about bank counterparty risk appeared to pick up again. Consistent with that, premia on UK banks' credit default swaps (CDS) rose, and approached levels reached in October 2008 when fears about system-wide failure were intense (**Chart 3**).

Chart 3 Major UK banks' CDS premia and equity prices

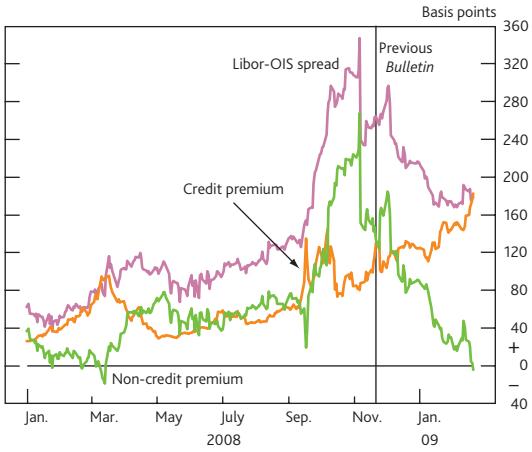


Sources: Bloomberg, Markit Group Limited and Bank calculations.

(a) Average of Barclays, HBOS, HSBC, Lloyds, RBS and Standard Chartered weighted by market capitalisation.
(b) Unweighted average of five-year CDS premia for Barclays, HBOS, HSBC, Lloyds, RBS and Standard Chartered.

A mechanical decomposition of the spread between twelve-month Libor and OIS rates, based on banks' CDS premia, correspondingly suggests shows that the portion of the spread attributable to credit premia increased (**Chart 4**).

Chart 4 Indicative decomposition of the sterling twelve-month Libor-OIS spread(a)

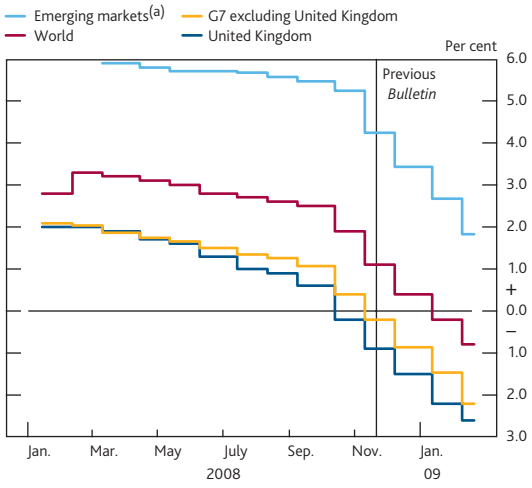


Sources: British Bankers' Association, Markit Group Limited and Bank calculations.

(a) See box, 'An indicative decomposition of Libor spreads', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 498–99 for further details.

Some of the renewed worries about banks' financial health probably reflected heightened concerns about the adverse feedback from the worsening macroeconomic environment on to banks' balance sheets. Economic activity decelerated sharply in the fourth quarter of 2008 in all the major advanced economies. And, according to Consensus forecasts, growth expectations for both advanced and emerging market economies fell significantly towards the end of 2008 (**Chart 5**). This weakening in global growth could potentially lead to further losses on banks' domestic and international asset portfolios, including in the United Kingdom.

Chart 5 Expected real GDP growth for 2009



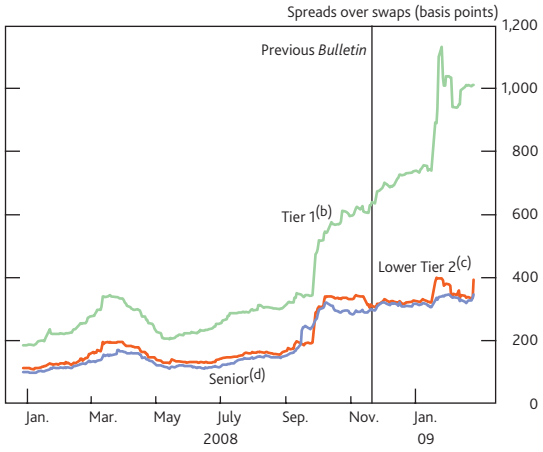
Source: Consensus Economics.

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

In part at least, some of the rise in banks' CDS premia could be related to concerns among investors about the effect of the possible nationalisation of some UK banks on holders of bank debt securities. Although in the case of both Northern Rock and Bradford & Bingley senior debt holders were protected following Government intervention, investors in other banks remained cautious over the long-term implications for senior debt holders. This uncertainty may have increased the cost of default protection on banks' debt.

Such worries about nationalisation were most apparent in secondary markets for bank equities and subordinated debt securities, the owners of which would be most vulnerable should a bank be taken into public ownership. UK bank equity prices fell further over recent months (**Chart 3**) and credit spreads on UK banks' junior debt securities widened quite sharply (**Chart 6**). In contrast, spreads on senior debt drifted only slightly wider, albeit to elevated levels compared with early in 2008.

Chart 6 Secondary market spreads on sterling-denominated senior and subordinated UK bank debt[(a)]

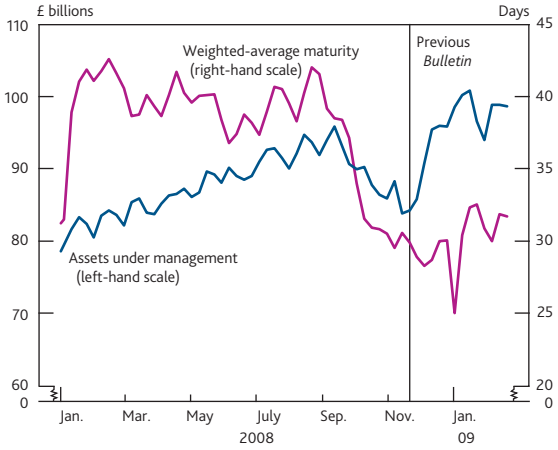


Sources: JPMorgan Chase and Co. and Bank calculations.

(a) Simple average of secondary market spreads for Barclays, HBOS, HSBC, Lloyds and RBS.
(b) Tier 1 debt comprises perpetual instruments (that are callable) with non-cumulative coupons (ie deferred coupon payments that do not necessarily need to be paid at any point in the future). Holders of Tier 1 debt are subordinate to holders of Lower Tier 2 instruments.
(c) Lower Tier 2 debt comprises dated instruments with cumulative coupons (ie deferred coupons that need to be paid eventually) where holders are subordinate to senior debt holders.
(d) Senior debt comprises non-subordinated medium and long-term debt.

Banks also rely on other financial institutions such as money market funds (MMFs) to provide funding. Following some withdrawals last autumn, assets under management at MMFs recovered and these supported lending to banks. Indeed, according to contacts, improved sentiment in early January led fund managers to invest some funds at longer maturities. However, MMFs generally remained reluctant to lend significantly at term, preferring instead to maintain liquid portfolios to guard against future redemptions. As a result, the average maturity of their portfolios remained much lower than before the onset of the crisis (**Chart 7**).

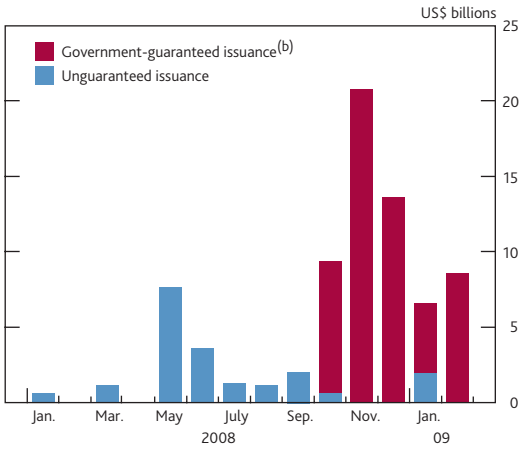
Chart 7 Sterling money market funds: assets under management and weighted-average maturity



Source: iMoneyNet.

At longer maturities, volumes of senior debt issuance by UK banks remained heavily dependent upon government debt guarantee schemes. In the United Kingdom, nearly all senior debt issued by UK banks since the previous *Bulletin* made use of the UK Credit Guarantee Scheme (CGS)[(1)] although the amount of funding raised fell compared with late 2008 (**Chart 8**). According to contacts, the recent fall in guaranteed issuance could be related in part to the increased number of similar schemes that became fully operational in other countries as well as banks refraining from issuing in the run-up to publishing their annual accounts.

Chart 8 UK bank senior debt issuance[(a)]



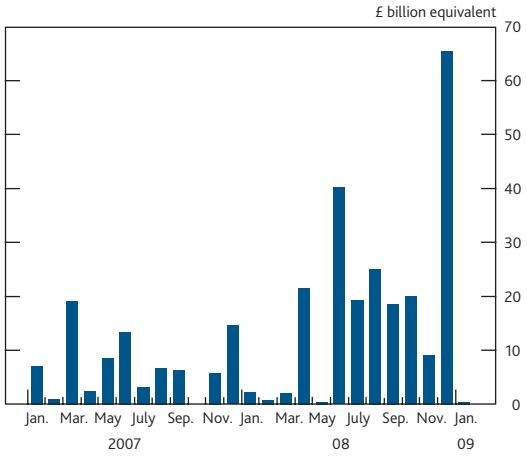
Source: Dealogic.

(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.

In terms of other bank funding markets, contacts reported that primary sterling residential mortgage-backed securities

(1) For more details of the CGS, see the relevant section of the Debt Management Office website: www.dmo.gov.uk.

Chart 9 Sterling issuance of UK RMBS[a]



Source: Bank calculations.

(a) Retained and public issuance.

(RMBS) markets remained effectively closed, at least for publicly issued securities. In general, contacts did not expect a sustained improvement in market conditions during 2009.

In recognition of the continuing strains in bank funding markets and the likely implications for the availability of credit to households and firms, on 19 January the UK Government announced a series of initiatives to improve market functioning and support lending to the wider economy. These are outlined in the box opposite.

In addition, the Financial Services Authority (FSA) published a statement clarifying its policy towards bank capital ratios, in particular, that capital buffers built up as part of the recent UK bank recapitalisations should allow banks to withstand further losses and facilitate continued lending. Furthermore, it outlined its long-term preference for the regulatory capital regime to incorporate countercyclical measures which lead to banks building up capital buffers in good years which they can draw down during economic downturns.

Corporate credit

With banking market capacity much reduced, the Bank's regional Agents reported a general tightening in the terms on bank lending and syndicated loans to companies over the review period. Contacts also commented that firms' credit lines from lenders were under increased scrutiny, in some cases being renegotiated or reduced. As a result, firms reportedly looked to capital markets as a replacement source of funding. Indeed, according to a recent investigation by the Association of Corporate Treasurers, more unrated companies were likely to seek a credit rating in order to access non-bank finance.

Reflecting greater use by firms of capital market finance, primary issuance of investment-grade corporate bonds picked up in recent months (**Chart 10**). The recent announcements of the various government initiatives to support capital market

UK Government package to support lending[1]

On 19 January, the Treasury released plans designed to support lending in the UK economy and reinforce the stability of the financial system. Particular measures to be adopted included:

- The extension of the drawdown window of the **Credit Guarantee Scheme (CGS)** from 9 April 2009 to 31 December 2009. The final maturity date of the scheme remained at 9 April 2014. This extension of the drawdown window will allow banks to access more funding via issuance of CGS debt.

- Plans for the introduction of a **guarantee scheme for asset-backed securities** (ABS) providing full or partial guarantees for AAA-rated ABS backed by mortgages, corporate and consumer debt.

- The **extension of the term of the Bank of England's permanent Discount Window Facility**. Specifically, for an additional fee of 25 basis points the Bank would extend the Facility to a term of 364 days in addition to the standard 30-day option. This is designed to meet banks' longer-term liquidity demands.

- The establishment of a new **Asset Purchase Facility** allowing the Bank of England to purchase up to £50 billion of high-quality private sector assets, including CGS paper, corporate bonds, commercial paper, syndicated loans and a limited range of ABS, financed by the issue of Treasury bills.

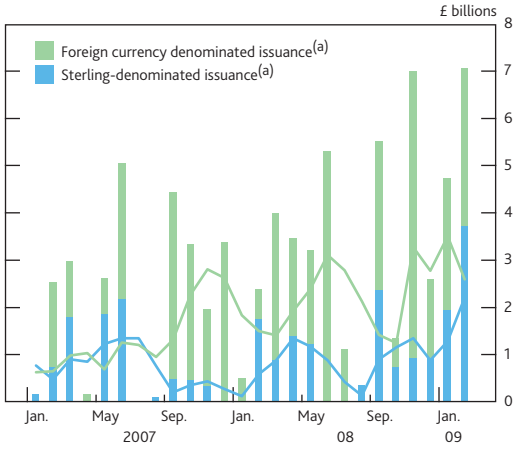
- The introduction of an **asset protection scheme**. For a fee, the Treasury would provide protection against the majority of credit losses exceeding a 'first loss' amount, with the participating institution covering the residual exposure, likely to be in the region of 10%. Eligible institutions are UK incorporated deposit takers with more than £25 billion of eligible assets.

  Participation in the scheme is conditional on a commitment to increase lending to borrowers and comply with the Financial Services Authority's code of practice on remuneration policies. Eligible assets include corporate and leveraged loans, property loans and structured credit assets. The fee may be paid in cash or the issue of capital instruments; ordinary shares are not likely to qualify.

In addition, and in order to improve conditions in the UK mortgage markets, the UK Government also announced that Northern Rock would no longer actively pursue a policy of rapidly reducing its mortgage book. Rather, the bank would aim to increase mortgage lending by up to £14 billion over the next two years.

(1) For more details of the UK Government package, see www.hm-treasury.gov.uk/press_05_09.htm.

Chart 10 Investment-grade corporate bond issuance by UK private non-financial corporations (PNFCs)



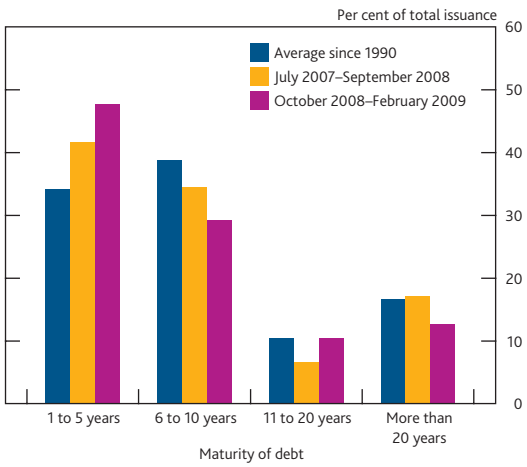
Sources: Dealogic and Bank calculations.

(a) Lines correspond to three-month moving averages.

financing for UK firms were generally well received. The Bank started its purchases of sterling corporate commercial paper under the Asset Purchase Facility on 13 February and is currently consulting on the purchase of other assets — see page 26 for more details.

Nonetheless, over the review period primary market conditions reportedly remained difficult for lower-rated companies. Moreover, most of the recent primary corporate bond issuance was at relatively short maturities. Specifically, between October 2008 and January 2009, close to 50% of newly issued debt securities were of maturity of five years or less. This compared with an average proportion since 1990 of around 35% (**Chart 11**). According to contacts, such a shortening in issuance maturities may indicate a reluctance to issue long-term debt at the prevailing wide spreads over government bonds, though it might also have reflected an increased use of capital market funding as a substitute for bank borrowing.

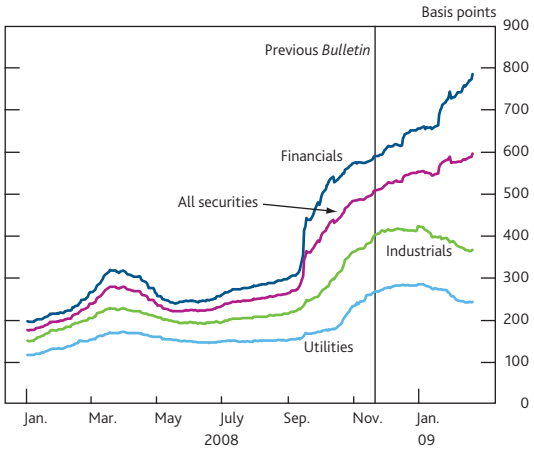
Chart 11 UK PNFC bond issuance by maturity



Source: Dealogic.

In secondary markets, sterling investment-grade corporate bond spreads widened further over the review period (**Chart 12**). But in large part this reflected developments in the financial sector. Spreads on sterling-denominated corporate bonds issued by investment-grade, non-financial companies generally narrowed slightly from January 2009 onwards, although they remained at wide levels.

Chart 12 Sterling investment-grade corporate bond spreads by sector(a)



Source: Merrill Lynch.

(a) Option-adjusted spreads.

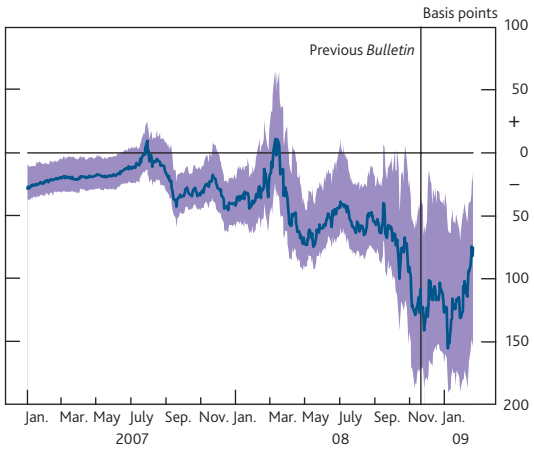
Given the worsening macroeconomic environment, it seems unlikely that the compensation required by investors in corporate bonds to cover credit risk (both expected losses and uncertainty around such losses) would have fallen recently. Instead, contacts reported a pickup in investor demand for exposure to corporate bonds which could have reduced the required liquidity premia embedded in secondary market corporate bond spreads.

One way to assess the liquidity premia in corporate bond spreads is the so-called CDS-cash basis (the difference between matched-maturity CDS premia and spreads on corporate bonds). An indicative measure shown in **Chart 13** suggests that the basis for non-bank, investment-grade corporate bonds became sharply more negative from the middle of 2007 to the end of 2008 which could be consistent with an increase in liquidity premia in corporate bond spreads. But since the beginning of this year the basis narrowed, at least for the median borrower in the sample.

Equities

The recent signs of slightly improved conditions in sterling corporate bond markets, at least for non-financial companies, initially followed a period of modest recovery in equity markets. In the early part of the period UK equity prices generally recovered from the five-year lows reached towards the end of 2008.

Chart 13 Indicative 'basis' between sterling-denominated bond spreads and corresponding CDS premia for non-bank corporates[a][b][c]

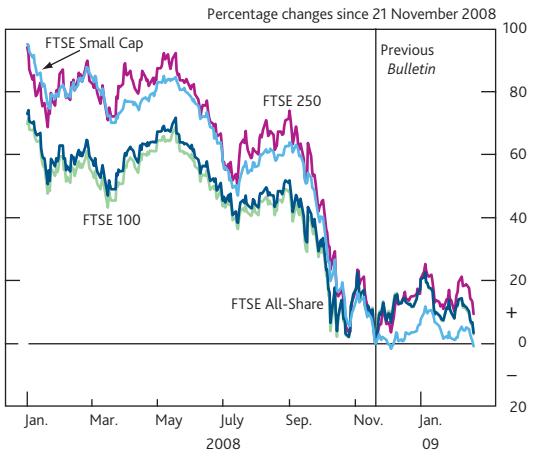


Source: UBS Delta.

(a) Based on 140 investment-grade sterling bonds issued by non-bank firms.
(b) CDS premia less the asset swap spread for the same firm. The maturity of the chosen bond may not necessarily match the maturity of the corresponding CDS as data are typically only available for five-year CDS.
(c) The purple band shows the interquartile range.

However, by the end of February most of the end-of-year rally in UK equity prices was unwound and the major UK equity indices approached their earlier lows (**Chart 14**). Financial stocks experienced the most pronounced falls, related to renewed concerns over the health of banks' balance sheets and business prospects going forward (**Chart 15**). But the falls in January and February were generally broad-based across different sectors of the UK economy covering both small and large firms.

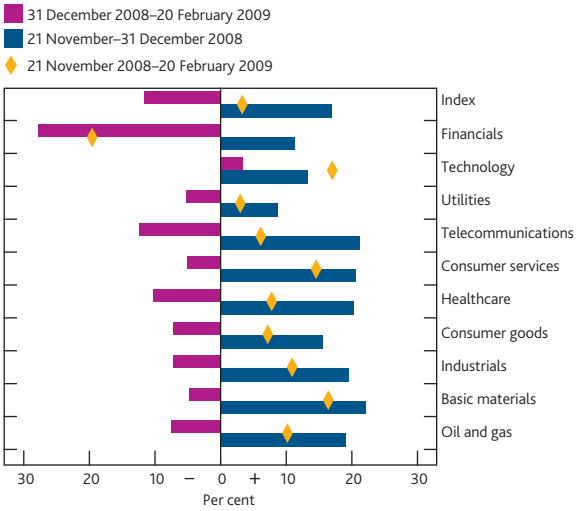
Chart 14 UK equity indices: changes since the previous *Bulletin*



Sources: Bloomberg and Bank calculations.

The recent weakness in UK equity markets might be linked to a perceived deterioration in the prospects for corporate earnings. An increased number of UK corporates cut their 2008 dividends (**Chart 16**) and reported sizable reductions in their profits. And, while companies' earnings announcements

Chart 15 Changes in UK equities by sector since 21 November 2008[a]

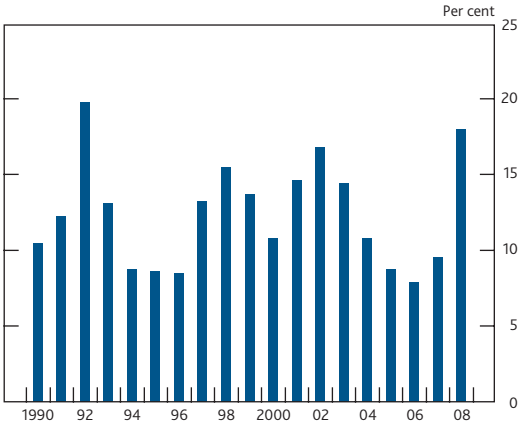


Sources: Thomson Datastream and Bank calculations.

(a) This chart uses the Thomson Datastream index, rather than the FTSE All-Share, in order to provide as detailed a sectoral breakdown as possible.

contained few surprises in general, contacts reported that investors' perceptions hardened around continued weak future earnings. Indeed, IBES forecasts of corporate earnings growth for FTSE 100 companies for 2009 were revised down further.

Chart 16 Percentage of companies in the FTSE All-Share index that cut their ordinary dividend per share[a]



Source: UBS.

(a) Excluding investment trusts.

Perhaps consistent with less uncertainty about an albeit weak financial outlook for firms, forward-looking measures of equity price volatility derived from options fell since the previous *Bulletin*. At the same time however, the implied probability distribution around future equity prices became more negatively skewed, which could reflect increased investor appetite to insure against further large falls in equity prices (**Chart 17**). Indeed, contacts noted increased demand from investors to buy 'out of the money' put options on major equity indices (ie options that provide protection against large

Chart 17 FTSE 100 option-implied volatility and skews[a][b]

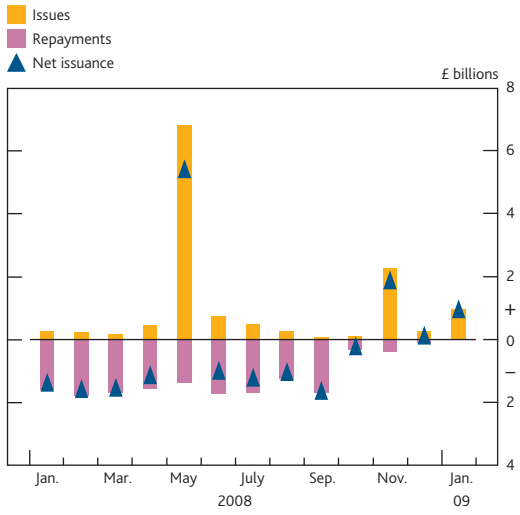
Sources: Bank of England and Euronext.liffe.

(a) Calculated from the distribution of returns from three-month option prices.
(b) A negatively skewed distribution is one for which large negative deviations from the mean are more likely than large positive deviations.

future equity price falls). More generally, capital concerns and reduced risk appetite reportedly made some investors reluctant to increase their exposure to equities.

Apart from a few large, one-off transactions, primary equity issuance by UK PNFCs remained quite weak over recent months, echoing a global slowdown in equity issuance. Against the background of fairly limited investor demand and restricted underwriting capacity within the banking sector, UK firms reportedly sought to maintain their capital positions and preserve liquidity by reducing share redemptions (including equity buybacks) (**Chart 18**).

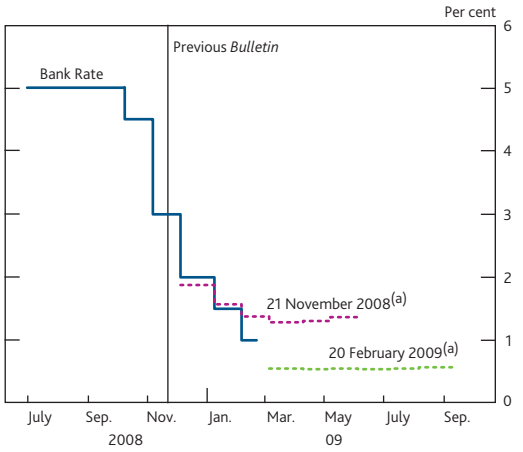
Chart 18 Equity issuance and repayments by UK PNFCs (all currencies)



Short-term interest rates

With global macroeconomic conditions having worsened, alongside direct measures by the UK authorities to help improve conditions in sterling debt markets, the MPC reduced Bank Rate further. The reduction occurred in three consecutive cuts, of 100 basis points, 50 basis points, and 50 basis points, each of which was in line with market expectations prevailing at the time of the respective decision. The implied path of short-term sterling market interest rates shifted down, and at the end of the review period was consistent with Bank Rate being reduced to 0.5% and remaining at this level during the remainder of 2009 (**Chart 19**). And in fact, on 5 March (after the review period for this article) the MPC reduced Bank Rate again to 0.5%.

Chart 19 Bank Rate and forward market interest rates



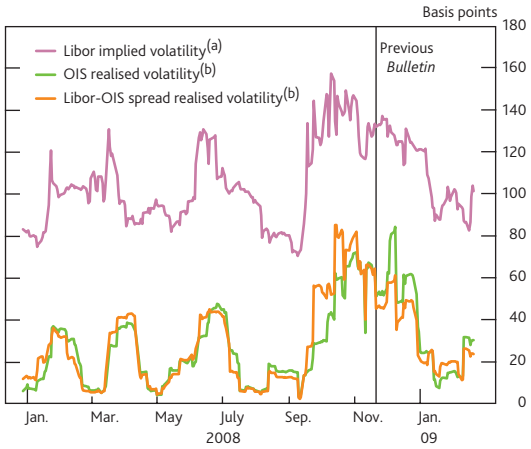
(a) Implied forward overnight interest rates derived from sterling overnight index average (SONIA) swaps.

Uncertainty about short-term interest rates, as measured by implied volatility derived from options on interest rate futures, fell in sterling and other currencies since the previous *Bulletin*, but remained elevated. Such options are linked to futures contracts that settle on Libor and consequently it is difficult to infer how much of the moves in implied volatility related to uncertainty about the spread between Libor and policy rates or about policy rates themselves. To the extent that realised interest rate volatilities provide a guide to future perceptions, **Chart 20** suggests that both factors were important. That is, investors became less uncertain about both the outlook for UK policy rates and about the risk premia embedded in Libor.

Implied uncertainty about future Libor could have been affected by expectations about the introduction of monetary policy measures to steer the quantity of reserves. In particular, a decision to begin purchasing a range of financial assets financed by central bank reserves, a process commonly referred to as quantitative easing.

On 5 March (after the review period for this article) the MPC announced its intention to implement an asset purchase programme of £75 billion financed by the issuance of central bank reserves — see the box on page 26 for more details.

Chart 20 Six-month sterling interest rate volatility



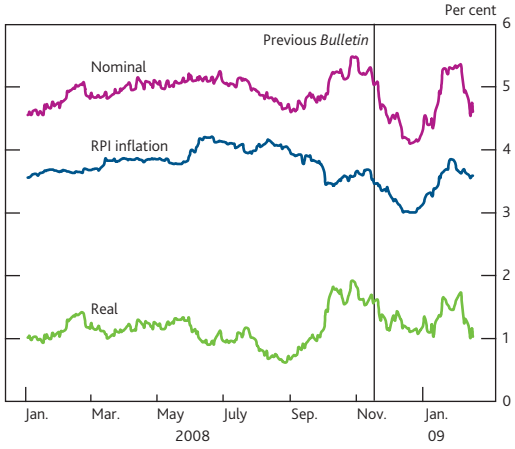
Sources: Bloomberg, British Bankers' Association, Euronext.liffe and Bank calculations.

(a) Inferred from options on Libor futures.
(b) Twenty-day rolling variance of daily changes.

Long-term interest rates

Expectations of an increase in gilt purchases by the Bank due to its asset purchase programme may have been one factor behind the recent fall in longer-term gilt yields. But gilt yields and implied forward rates were quite variable through the period (**Chart 21**) suggesting other factors were probably also at work.

Chart 21 Sterling five-year interest rates and inflation five years forward(a)

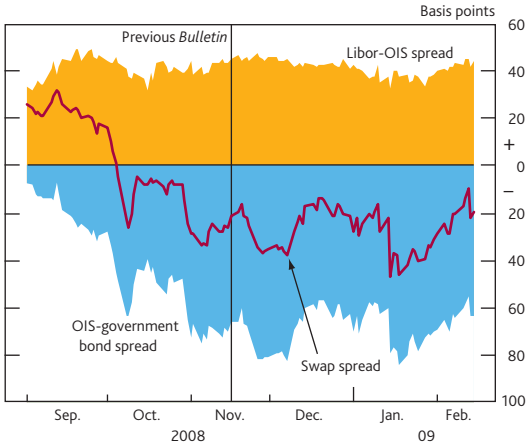


(a) Derived from the Bank's government liability curves.

According to contacts, strong demand for government securities in December, in the wake of the turmoil in banking markets in Autumn 2008, helped push gilt prices higher and yields lower, although subsequently this effect may have unwound somewhat. Contacts also noted that gilt yields were affected by speculation about prospective revisions to UK liquidity regulations for banks (see page 18), as well as expectations of increased government bond issuance to finance commercial bank rescues and fiscal stimulus packages.

One possible way to gauge the impact on yields of changes in the demand and supply for gilts is to consider moves in interest rate swap spreads — the difference between swap rates and gilt yields of similar maturities. More specifically, decomposing the fifteen-year sterling swap spread into the spread between Libor and OIS rates and the spread between OIS and gilt yields, indicates that the recent swings in swap spreads were largely accounted for by movements in the gilt yield relative to the expected path of the overnight rate (**Chart 22**).

Chart 22 Indicative decomposition of fifteen-year sterling swap spread



Sources: Bloomberg and Bank calculations.

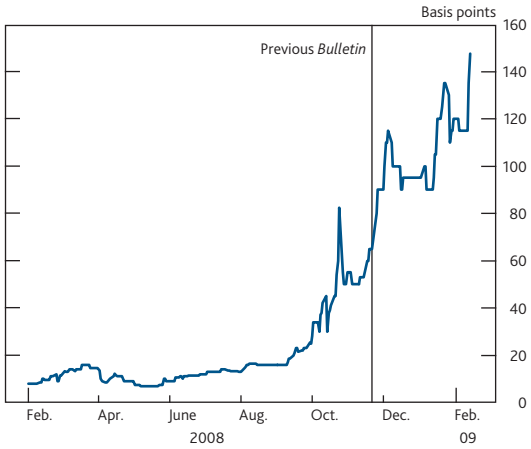
Since OIS are derivative instruments settling on an overnight interest rate and involve no exchange of cash at the inception of the trade, credit and liquidity risk premia in OIS rates should be small. As a result, for the most part developments in OIS-gilt yield spreads seem likely to have reflected changes in the perceived scarcity value (ie liquidity premia) attached to gilts.(1)

Of course, investors could have demanded greater compensation to cover the, albeit remote, potential for default on gilts. That could also have pushed up gilt yields relative to swap rates. And indeed, the CDS premia on UK government debt rose noticeably over the past few months continuing a trend since the autumn (**Chart 23**).

However, contacts reported that sovereign CDS are typically thinly traded, and hence their premia can be significantly affected by liquidity conditions. Moreover, contacts suggest that participants do not typically trade sovereign CDS with a view that countries will default, given the potential for governments ultimately to monetise their debt. Rather they tend to use sovereign CDS principally as a way to hedge

(1) For a fuller discussion of the potential impact of liquidity in government bond markets on secured borrowing rates see the box, 'Why have secured funding spreads increased recently?', on page 260 of the 2008 Q3 *Quarterly Bulletin*.

Chart 23 UK sovereign CDS premia



Source: Bloomberg.

their exposure to potential movements in government bond spreads.

More generally, long-term sterling swap spreads have been persistently negative since October 2008 — that is government bond yields were above similar maturity swap rates. This is difficult to rationalise with financial markets working efficiently since swap rates would normally include an extra premium to compensate investors for the risk of a systemic failure of the banking sector.

As explained in the box on pages 16–17, negative swap spreads are one example of various pricing anomalies in financial markets that have yet to normalise. Given these sorts of pricing anomalies in fixed-income markets, it remains more difficult than normal to draw firm conclusions about investors' perceptions of fundamental influences on the prices of government bonds and associated derivatives.

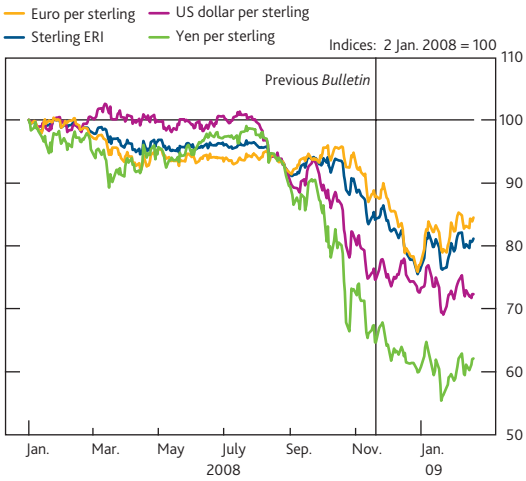
In principle, increased government borrowing would tend to push up long-term real interest rates, to the extent that planned savings in the private sector did not increase commensurately. In fact, long-term sterling real forward rates derived from yields on index-linked gilts ended the period lower and remained at relatively low levels (**Chart 21**).

In contrast, long-term inflation forwards (derived from the difference between yields on conventional and index-linked gilts) ended the period slightly higher although they drifted down a little over the past month (**Chart 21**). To some extent the prospect of quantitative easing, and in particular uncertainty about when the associated injection of central bank reserves would, if appropriate, ultimately be withdrawn, might have led investors to revise upwards their expectations of long-run expectations and/or the required compensation for uncertainty about future inflation (ie inflation risk premia). But survey evidence indicated that expectations of long-term inflation were broadly unchanged and indeed were lower than in the middle of 2008.

Foreign exchange

The sterling effective exchange rate index (ERI) depreciated by around 4% since the previous *Bulletin*, reflecting declines against all of the major currencies and continuing the general drift down in the external value of sterling since late 2007 (**Chart 24**).

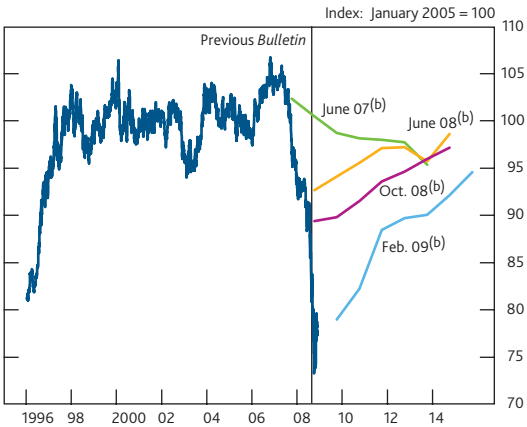
Chart 24 Cumulative changes in sterling exchange rates since 2 January 2008



Sources: Bloomberg and Bank calculations.

However, survey measures provided only limited support for the view that investors' long-term expectations for sterling have fallen significantly. The latest long-term Consensus Economics forecast for sterling, although a little lower compared with October 2008, was similar to its level in June 2007 (**Chart 25**). Similarly, the latest Bank of America/Merrill Lynch survey of fund managers indicated that for the first time since the survey began in 2002 respondents believed sterling to be undervalued (**Chart 26**).

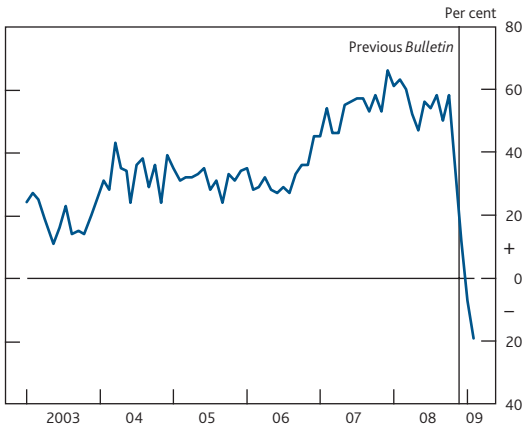
Chart 25 Actual and Consensus expectations for the sterling effective exchange rate index[a]



Sources: Bank of England and Consensus Economics.

(a) Expectations for the sterling ERI are derived from bilateral US dollar, euro and yen exchange rates, weighted by UK trade shares in 2006.
(b) Dates refer to the publication date of the Consensus Economics survey of forecasts.

Chart 26 Net balance of fund managers who believed sterling to be overvalued

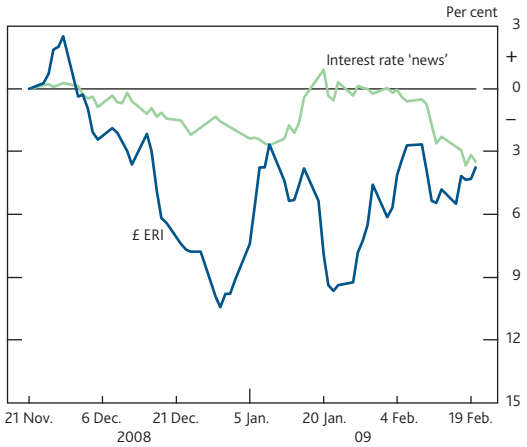


Source: Bank of America/Merrill Lynch *Global Fund Manager Survey*.

Contacts instead suggested that the recent weakness in sterling can at least in part be attributed to worsening perceptions about the near-term prospects for the UK economy and corresponding expectations for UK interest rates. Perhaps consistent with that, the pace of decline in the value of sterling would appear to have slowed over recent months — and indeed sterling appreciated by around 9% against the euro since the beginning of 2009 — as the deteriorating outlook for economic activity spread internationally.

By the end of February, developments in relative interest rates, as indicated by movements in international yield curves, could account for most of the depreciation in sterling since the previous *Bulletin*. But they did not appear to explain the pattern of changes through the period (**Chart 27**). This suggests that other factors may also have been influential.

Chart 27 Implied contribution of interest rate 'news' to cumulative change in sterling ERI since previous *Bulletin*[a]

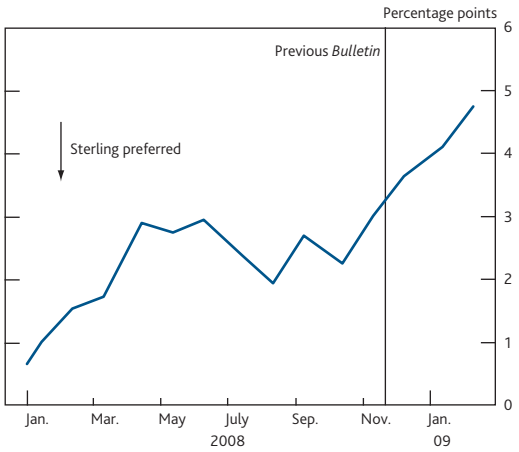


Sources: Bank of England and Bloomberg.

(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.

One alternative explanation for the continued fall in sterling could be that investors required greater compensation to bear the risk associated with holding sterling-denominated assets, perhaps because of increased concerns about risks to the UK economic outlook. Consistent with that, estimates of currency risk premia, based on combining information on interest rate differentials and surveys of forecasts for exchange rates, indicated that sterling risk premia continued to rise over recent months (**Chart 28**).

Chart 28 Three to 24-month risk premia estimates for sterling ERI[a]

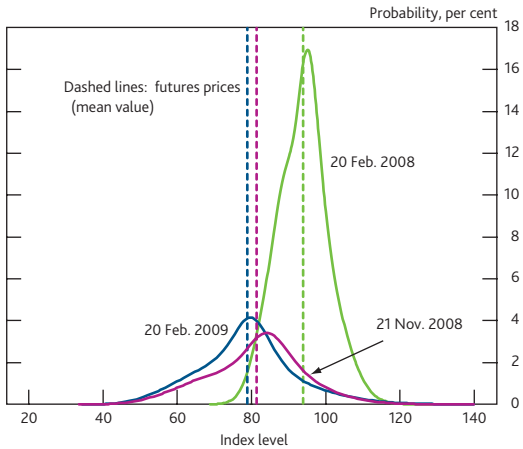


Sources: Consensus Economics and Bank calculations.

(a) Risk premia estimate the expected rate of return required by foreign investors to invest in a domestic risk-free asset, over the foreign risk-free rate of return. A positive risk premium implies that the currency is expected to appreciate relative to the path implied by the interest rate differential.

More generally, uncertainty surrounding sterling exchange rates remained elevated. This was reflected in the width of the implied probability distribution of future levels of sterling, derived from option prices (**Chart 29**).

Chart 29 One-year unconditional sterling ERI probability distribution[a]



Sources: Reuters and Bank calculations.

(a) Probability of the sterling ERI being within ±0.5 index points of any given level. For example, on 20 February 2009 the probability of the ERI being at 78.8 (between 78.3 and 79.3) in one year's time was around 4%. For details of how this probability distribution is constructed see the box on pages 130–31 of the Summer 2006 *Quarterly Bulletin*.

Pricing anomalies in financial markets

In theory, the prices of different assets which provide equivalent discounted cash flows should be the same. If not, there could be 'pure' arbitrage opportunities; that is, with no risk, investors could pursue strategies guaranteed to earn a profit or at least not make a loss. And the actions of investors seeking to exploit such opportunities should eliminate the price differentials.

This box reviews some recent examples where market prices might seem to imply apparent arbitrage opportunities. Their persistence suggests that, in practice, there are explicit and implicit costs involved in taking advantage of pricing differentials. These costs may weaken the relationship between prices of assets with similar cash flows, and hence give rise to asset pricing anomalies that would not usually exist.

If there are arbitrage opportunities that are not exploited and asset prices depart from their underlying or 'fundamental' value, there is no guarantee that the price allows investors to make consistent inferences about the expected pay-offs.

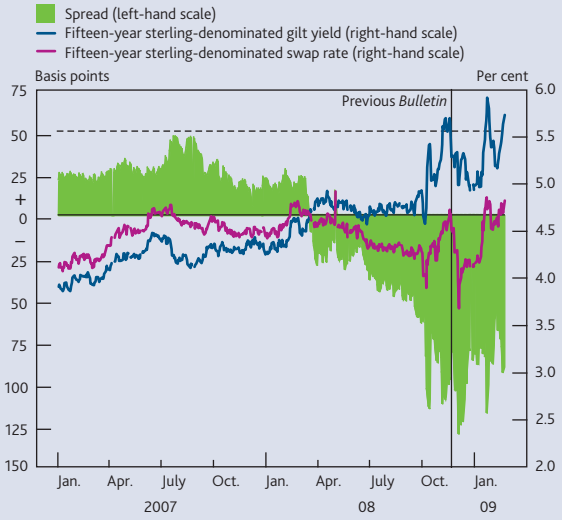
Current examples

The financial crisis has given rise to a number of such pricing anomalies. Examples include negative spreads between long-term swap rates and gilt yields of similar maturities (**Chart A**); wide spreads between domestic funding rates and the cost of raising foreign currency and swapping it into domestic currency (**Chart B**); spreads between forward rates implied by spot Libor rates of differing maturities relative to those embedded in forward rate agreements (**Chart C**); and the higher compensation for exposure to credit risk through corporate bonds relative to credit default swaps (the so-called CDS-cash basis) (**Chart 13** on page 11).

Take the case of interest rate swap spreads (**Chart A**). In the absence of market imperfections, swap rates should equal yields on gilts of similar maturities plus an extra premium to compensate investors for the risk of a systemic failure of the banking sector.[1] As a result, swap spreads are typically positive — historically the average fifteen-year sterling swap spread has been around +50 basis points.

At face value, negative swap spreads represent a profitable trading opportunity. To try to profit from this spread an investor could purchase a long-term government bond, say a fifteen-year bond yielding an annual interest rate of 5%, and simultaneously enter into an interest rate swap, paying a fixed rate, say 4.8% per annum, over the same maturity, to lock in a profit. Specifically, the investor can finance the bond purchase by borrowing funds secured against the value of the bond at six-month repo rates and rolling over this financing every six months. Provided the payments on this secured borrowing are less than the floating-rate payments received on the swap (ie six-month unsecured Libor, reset every six months for the following fifteen years), the investor would hope to earn at least the fixed-rate differential of 20 basis points per annum.

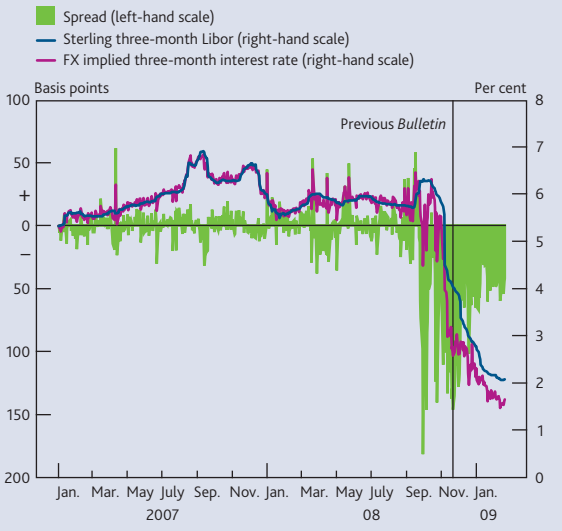
Chart A Fifteen-year sterling-denominated gilt yields, swap rates and their spread[a]



Sources: Bloomberg and Bank calculations.

(a) Dashed line represents the average spreads between sterling-denominated gilt yields and swap rates from January 1998 to February 2009.

Chart B Three-month sterling Libor and implied interest rates from foreign exchange forwards[a]



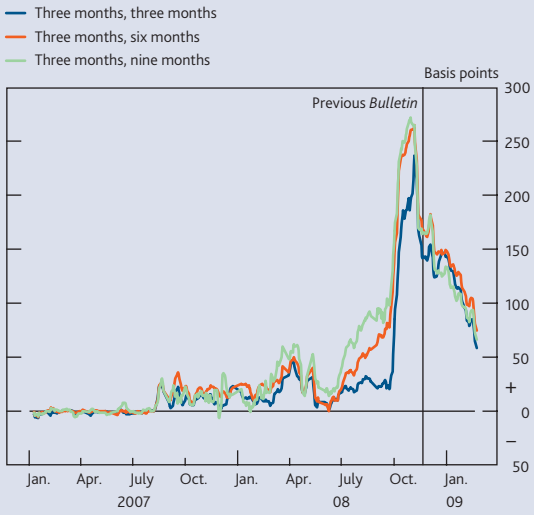
Sources: Bloomberg, Reuters and Bank calculations.

(a) For more details of the calculation of implied interest rates from foreign exchange forwards, see 2008 Q2 *Quarterly Bulletin*, page 134, Chart 26 and *BIS Quarterly Review* March 2008, pages 73–86.

Similar arguments could be applied to the other pricing anomalies identified above. For example, a bank should be indifferent to borrowing at domestic Libor rates versus borrowing at a foreign Libor rate and entering into an

FX forward contract to swap the proceeds into domestic currency (**Chart B**), especially as reporting banks in Libor panels for the main currencies are very similar so the default risk embedded in different Libors should be comparable. And an investor trying to exploit the negative CDS-cash basis could borrow funds to buy the corporate bond and simultaneously buy default protection on the underlying bond in the CDS market.

Chart C Spreads between sterling implied forward rates from Libors and forward rate agreements (FRAs)(a)



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

(a) Five-day moving averages of the spread between three-month Libor, *x* months forward (inferred from spot Libors) and the equivalent-maturity forward rate agreement. For each of the lines, *x* refers to three, six or nine months.

Why have they persisted?

Normally these sorts of pricing anomalies would not be expected to have persisted. But there are a number of features of the current conjuncture that may have prevented investors from taking advantage of such mispricing. One factor might be funding/credit constraints. In theory, the complete elimination of arbitrage opportunities assumes that market participants can access limitless capital. But credit constraints might mean investors are limited in their ability to borrow funds in order to exploit an opportunity to a sufficient scale to remove pricing differentials.

Credit constraints may manifest themselves in the quantity and/or price of credit available. Constraints on the quantity of capital available for trading purposes could mean that market participants are simply unable to exploit the price differentials. For example, consider an investor trying to exploit the negative CDS-cash basis by borrowing funds to buy the corporate bond and simultaneously buy default protection on the bond in the CDS market. Borrowing funds and purchasing the bond would tend to expand the investor's balance sheet, and hence potentially increase leverage, relative to simply taking a position in CDS markets (which are derivatives and require less upfront capital investment). This could represent a 'barrier to arbitrage' and could in turn give rise to a liquidity premium in corporate bond yields.

Similarly, increases in the price of credit could result in higher transaction costs for investors, as reflected in wider bid-ask spreads. This would increase the 'costs of arbitrage', such that the trading opportunity might only be profitable if the pricing anomaly is sufficiently wide to cover the increased cost.

Investor risk aversion might also offer a partial explanation behind some of the recent anomalies. 'Pure' arbitrage should not be affected by investors' attitude to risk since these opportunities enable the investor to guarantee a profit or at least break even. However, in most cases the different assets are not perfect substitutes for each other and as such there may only be approximate arbitrage opportunities that offer a large potential profit at little risk (but could generate losses in some circumstances). For example, in the case of negative interest rate swap spreads, investors may be unwilling to take on the financing risk (ie the possibility that the secured rate may be above the unsecured rate). Similarly, if market participants have become more uncertain about counterparty risks (ie the uncertainty about whether the counterparty will be able to honour its side of a commitment), that might have made them more reluctant to put on trades to exploit the pricing anomaly. This might perhaps be because they perceive the risks to have become unquantifiable (ie an example of so-called Knightian uncertainty).

Moreover, even if a trade is guaranteed to generate a return on maturity, it could nonetheless present significant mark-to-market risks in the interim. Most investors have to value their positions over time based on prevailing market prices. A fall in the value of the position could impact the investors' balance sheet via collateral or margin calls from counterparties. And if the investor was forced to sell the position prior to maturity there is a risk that this could result in a loss, particularly if the underlying assets were relatively illiquid. As a result, investors (particularly leveraged investors who might be expected to be especially active in these types of trade) may be reluctant at times to exploit the opportunities that exist.

(1) See Cortes, F (2006), 'Understanding the term structure of swap spreads', *Bank of England Quarterly Bulletin*, Spring, pages 45–56.

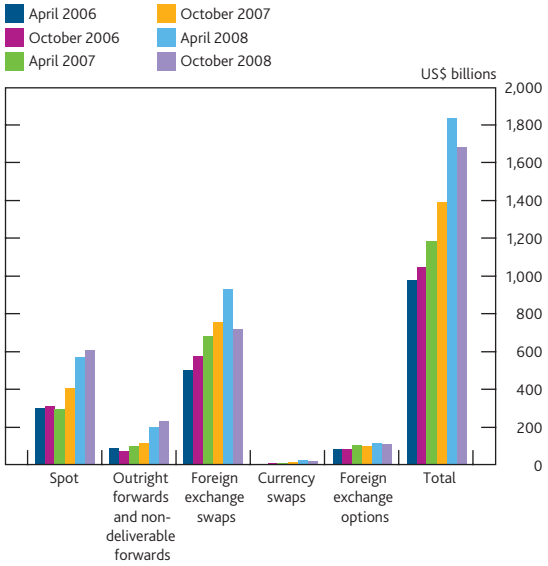
Developments in market structure

UK foreign exchange turnover survey

Results of the October 2008 Foreign Exchange Joint Standing Committee (FXJSC) survey were published on 27 January. The survey showed that foreign exchange turnover in London declined in October 2008 compared with April 2008. This was the first six-month fall in overall turnover published by the FXJSC since the survey started in 2004.

Average daily turnover recorded in the October 2008 survey was $1,679 billion, 8% lower than the April 2008 survey, although it remained 21% higher than in October 2007 (**Chart 30**). Some of the fall in turnover reflected the strength of the US dollar in October — taking account of that currency effect, turnover fell by just over 1%. According to contacts, turnover continued to fall in November and December.

Chart 30 UK foreign exchange daily average turnover by instrument



Source: London Foreign Exchange Joint Standing Committee.

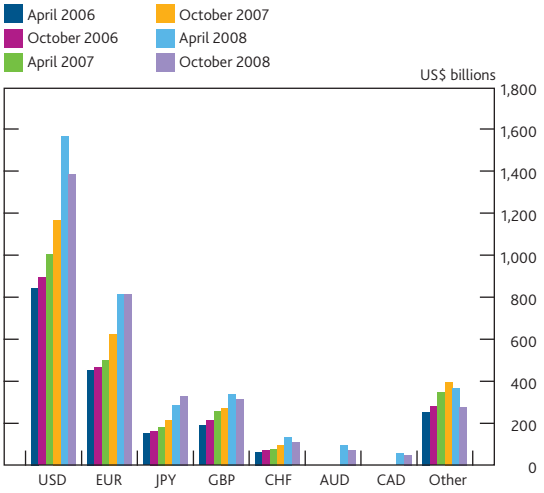
In terms of instruments, the reported fall in turnover in the October survey was more than accounted for by a 23% fall in foreign exchange swap activity. This reflected the ongoing strains in international money markets. In contrast, turnover for spot and outright forward instruments continued to rise.

Turnover in all major currencies fell in the six months to October, except for the Japanese yen and euro (**Chart 31**). Turnover in sterling fell by 7% in October from April. Notably, US dollar turnover dropped 11% over the same period.

Proposed new liquidity standards for UK banks

The FSA published its consultation paper on strengthening liquidity standards for UK banks on 4 December 2008. At the

Chart 31 UK foreign exchange daily average turnover by currency



Source: London Foreign Exchange Joint Standing Committee.

core of the proposed regime is a requirement on banks to assess how much liquidity they would potentially need under stress conditions. Based on the results of those stress tests, the FSA plans to impose quantitative requirements that aim to constrain the amount of liquidity risk each bank can take. They will also require banks to hold a buffer of the highest-quality liquid assets comprising essentially of high-quality government bonds.

Alongside these *quantitative* measures, the FSA proposed a strengthened *qualitative* framework for liquidity risk management, with an increased focus on firms' stress testing and contingency funding plans. This is based on recently agreed international liquidity standards, in particular the Basel Committee on Banking Supervision's Principles for Sound Liquidity Risk Management and Supervision.

The consultation period closed on 4 March 2009. The FSA hopes to introduce new rules by the summer of 2009.

Bank of England official operations

Sterling monetary framework

On 5 March, the MPC announced that Bank Rate would be reduced by 0.5 percentage points to 0.5%, and that the Bank would undertake a programme of asset purchases of £75 billion financed by the issuance of central bank reserves. Part of that sum would finance the Bank's programme of private sector asset purchases through the Asset Purchase Facility (APF) intended to improve the functioning of corporate credit markets. But in order to meet the MPC's objective for total asset purchases, it was announced that the Bank would also buy medium and long-term conventional gilts in the secondary market.

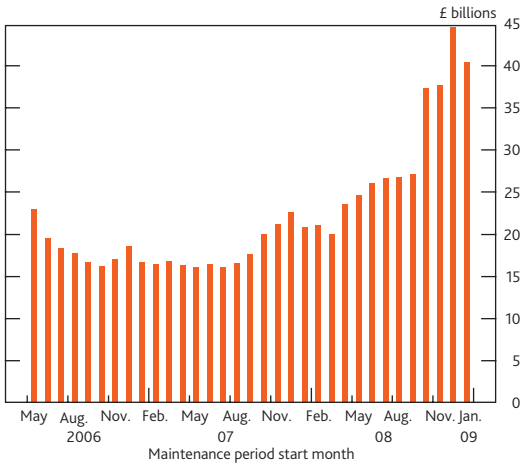
This section covers the three full reserves maintenance periods from 6 November to 4 February prior to this announcement. The subsequent changes to the sterling monetary framework are described in the box on page 26.

Maintaining short-dated interest rates in line with Bank Rate

Reserves targets

In normal circumstances, the Bank seeks to maintain overnight interest rates in line with Bank Rate ensuring a net supply of reserves in line with the banking system's demand, as reflected in targets chosen by the banks themselves. Aggregate reserves targets increased by £0.4 billion to £37.7 billion in November, and increased again to £44.6 billion in December as reserves scheme participants continued to set higher targets to help manage unexpected liquidity or payment shocks around the end of the year. Aggregate reserves targets were subsequently reduced to £40.4 billion in January. Reserves targets remained high relative to their average since the launch of the reserves scheme in May 2006 (**Chart 32**).

Chart 32 Aggregate reserves targets



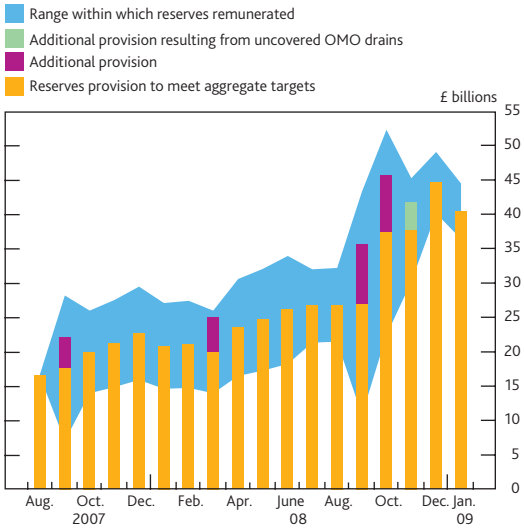
Reserves target ranges

Reserves balances are usually remunerated at Bank Rate within a range around each bank's individual reserves target. This range was ±40% for the October maintenance period. The Bank reduced the range to ±20% for the November maintenance period. It subsequently reduced the range to ±10% with effect from the December maintenance period (**Chart 33**).

Open market operations

By operating at a variety of maturities, in normal circumstances the Bank gives itself the flexibility to adjust the supply of reserves as needed without unnecessary 'churn' in its short-term repo open market operations (OMOs). Long-term financing is provided by means of long-term repo OMOs at three, six, nine and twelve-month maturities and by means of gilt-purchase OMOs.

Chart 33 Aggregate reserves targets and reserves provision



The Bank offered to provide reserves in long-term repo OMOs, according to its published monthly schedule, in each of the three maintenance periods. In addition, the Bank continued to provide liquidity insurance via extended-collateral long-term repo OMOs at a three-month maturity (described further below). Repo operations at six, nine and twelve-month maturities were offered against routine OMO collateral. In the operation held in December no bids were received for the nine months and twelve-months OMOs. Other operations were fully covered (**Table A**).

Over the review period, the Bank conducted two gilt-purchase OMOs, on 24 November 2008 and 26 January 2009. Both operations were fully covered (**Table B**).

Long-term repo and bond purchase OMOs provide reserves for the maintenance period in which they are settled and for all subsequent maintenance periods until maturity. Weekly and fine-tuning OMOs offer the greatest flexibility for adjusting the Bank's net supply of reserves.

Since October 2008, reserves provided in extended-collateral long-term OMOs have increased substantially (**Chart 34**). Since then, the Bank has ceased to lend in its weekly short-term OMOs and has instead sought to drain reserves.

It has done this via offers to sell one-week Bank of England sterling bills (Bank bills),[1] in order to leave reserves banks with sufficient reserves, in aggregate, to meet their combined targets.

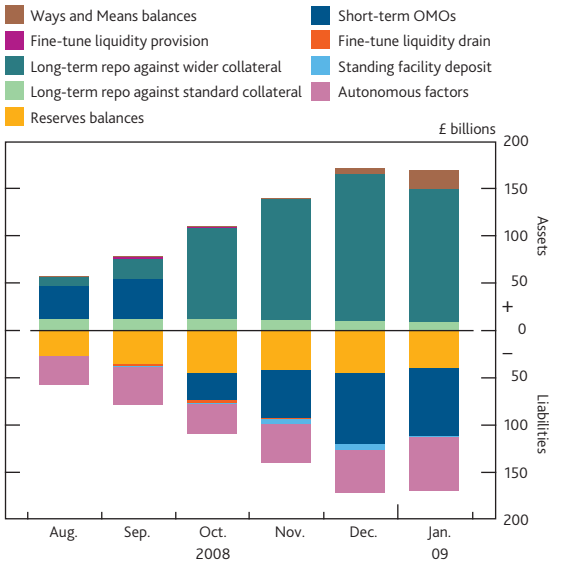
(1) For the use of central bank bills in the implementation of monetary policy see the box on page 377 of the 'Markets and operations' article in the 2008 Q4 *Quarterly Bulletin*.

Table A Long-term repo operations

	Six-month	Nine-month	Twelve-month
18 November 2008			
On offer (£ millions)	750	400	200
Cover	2.73	3.13	3.00
Weighted average rate[a]	1.800	1.870	1.925
Highest accepted rate[a]	1.890	1.890	1.940
Lowest accepted rate[a]	1.720	1.850	1.910
Tail[b]	8.00	2.00	1.50
16 December 2008			
On offer (£ millions)	750	400	200
Cover	0.93	0.00	0.00
Weighted average rate[a]	1.114	0.000	0.000
Highest accepted rate[a]	1.212	0.000	0.000
Lowest accepted rate[a]	1.050	0.000	0.000
Tail[b]	6.00	0.00	0.00
20 January 2009			
On offer (£ millions)	750	400	200
Cover	2.15	2.39	3.08
Weighted average rate[a]	0.880	0.912	0.990
Highest accepted rate[a]	0.900	0.950	0.990
Lowest accepted rate[a]	0.850	0.820	0.990
Tail[b]	3.00	9.20	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.

Chart 34 Factors affecting the supply of reserves (maintenance period averages)



In the November maintenance period, the offers to sell Bank bills on a weekly basis were not fully taken up (**Chart 35**). The Bank adjusted the amount of bills offered for sale each week in light of its forecast for autonomous factors in the coming week together with any reserves which were not drained in previous operations in the maintenance period. For the maintenance period as a whole, more reserves were supplied (net) than banks required to meet their aggregate targets (**Chart 33**). However, the range around targets within which the Bank remunerated reserves was sufficiently wide for all of these reserves to be remunerated at Bank Rate.

Table B Issue Department gilt-purchase OMOs

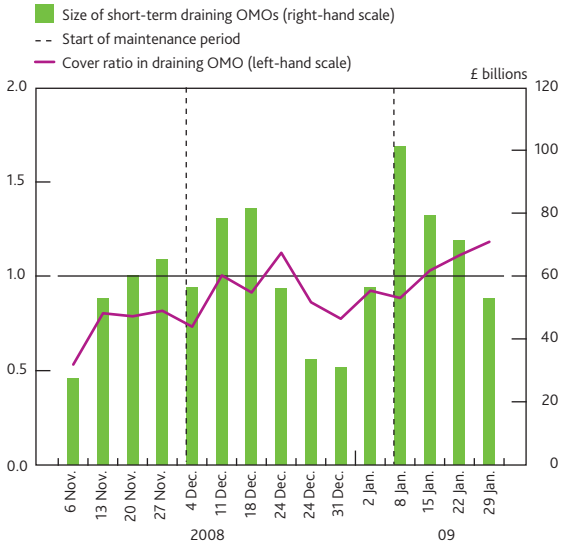
	Amount purchased (£ millions)	Sector cover ratio	Weighted average accepted price	Highest accepted price	Lowest accepted price	Tail[a]
24 November 2008						
Short		2.48				
UKT 5% 07/09/14	83.09		108.810	108.860	108.723	0.050
UKT 8% 07/12/15	136.89		125.400	125.430	125.390	0.030
Medium		3.61				
UKT 4.75% 07/03/20	125.99		104.840	104.847	104.840	0.007
Long		1.98				
UKT 5% 07/03/25	45.91		105.668	105.700	105.587	0.032
UKT 6% 07/12/28	45.91		118.973	119.050	118.913	0.077
Total purchased[b]	437.79					
26 January 2009						
Short		3.28				
UKT 4.75% 07/09/15	105.89		108.671	108.690	108.664	0.019
UKT 8% 07/12/15	64.08		127.297	127.371	127.280	0.074
Medium		2.82				
UKT 8% 07/06/21	133.93		138.978	138.989	138.970	0.011
Long		4.98				
UKT 5% 07/03/25	47.99		105.148	105.148	105.120	0.032
UKT 6% 07/12/28	47.95		117.554	117.554	117.540	0.026
Total purchased[b]	399.84					

(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.

In December, Euroclear UK & Ireland announced that with effect from 10 December 2008 Bank bills could be included in the CREST delivery-by-value (DBV) category 'unstripped British government debt' (UBG) and could therefore be delivered using this category within CREST, including, where eligible, in the Bank's operations under the sterling monetary framework.[1] The UBG category is the main basket used by market participants in gilt repo transactions. Since their inclusion within the UBG DBV category, the Bank's counterparties indicated that they became a more attractive asset to hold; and as a result, cover in operations to sell Bank bills increased (**Chart 35**).

(1) Delivery-by-value allows CREST members to borrow or lend cash against a package of securities overnight, which are automatically selected and delivered at the end of the day and unwound the following morning.

Chart 35 Size of short-term draining OMOs and short-term cover ratio[a]



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

Counterparties continued to make use of the ability to place funds with the Bank via the Operational Standing Facilities. Use of the deposit facility, where banks deposited funds at 25 basis points below Bank Rate, naturally tended to coincide with periods when short-dated market interest rates were below Bank Rate. During the November, December and January maintenance periods daily usage by banks averaged £5.3 billion, £5.4 billion and £1.3 billion respectively. Use of the deposit facility had the effect of draining reserves. There was no use of the lending facility during the period under review.

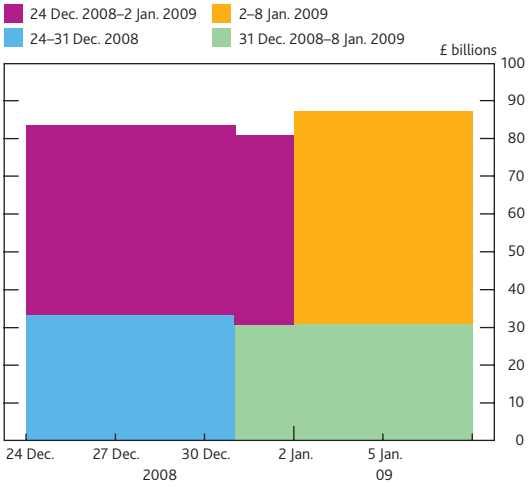
The Bank held routine overnight fine-tuning OMOs at the end of each maintenance period.

On 29 December, HM Treasury refinanced the loans that the Bank had made to the Financial Services Compensation Scheme (FSCS) and to Bradford & Bingley. To fund this refinancing, HM Treasury borrowed temporarily from the Bank using the 'Ways and Means' facility, the UK central government's overdraft facility with the Bank (**Chart 34**). HM Treasury intends to repay this Ways and Means borrowing during the spring of 2009. The original loan to the FSCS was an 'autonomous factor' increasing the size of the Bank's bill — sale OMOs needed to achieve the reserves target. The repayment of this Ways and Means borrowing will have the opposite effect.

OMOs over the year end

In order to provide greater assurance to banks in managing their liquidity positions over the year end, the Bank announced on 19 December 2008 that it intended to vary its schedule of weekly draining OMOs. Rather than offering a single weekly OMO spanning the year end, two short-term operations with different maturities were conducted on 24 December 2008. In addition, further operations were conducted on 31 December 2008 and on 2 January 2009 (**Chart 36**).

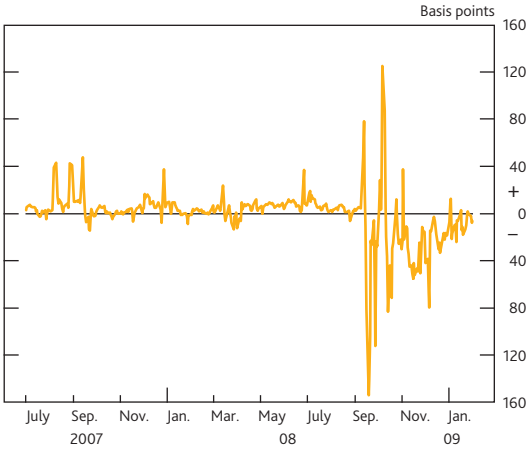
Chart 36 Amounts outstanding in short-term drain operations around the year end



Short-dated interest rates

Secured sterling overnight market interest rates tended to trade a little below Bank Rate during the period under review and were less volatile than during the October maintenance period (**Chart 37**). During the November maintenance period, when overnight market interest rates traded a little further below Bank Rate, reserves banks in aggregate held more reserves than were required to meet their targets. In the December and January maintenance periods, when reserves were in line with targets, market rates tended to trade close to Bank Rate (**Chart 38**).

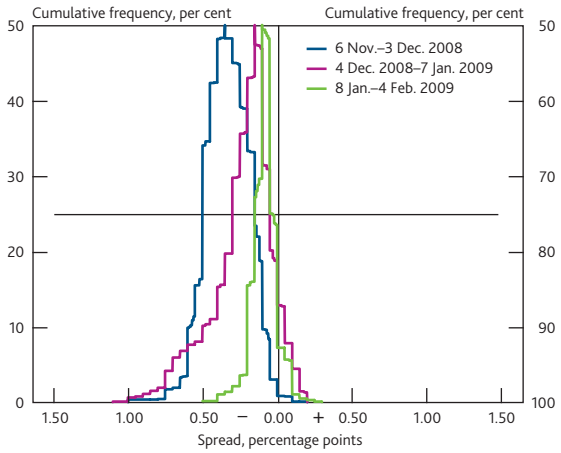
Chart 37 Spread to Bank Rate of secured sterling overnight interest rates since July 2007



Sources: BrokerTec and Bank calculations.

Banks might usually be expected to charge a premium for the credit risk associated with unsecured interbank lending compared to a secured transaction of the same maturity.

Chart 38 Folded cumulative distribution[a] of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate

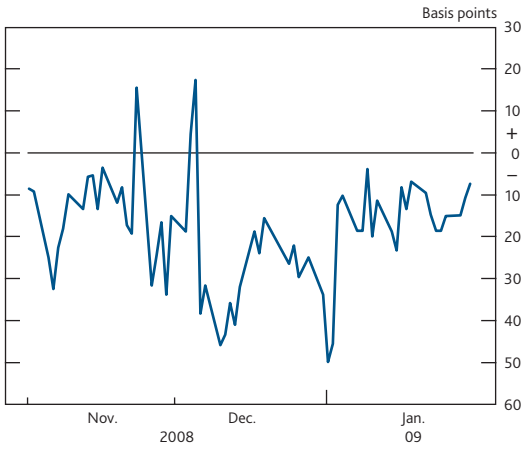


Sources: BrokerTec and Bank calculations.

(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.

However, overnight secured interest rates have for most of the period under review been higher than equivalent unsecured interest rates (**Chart 39**).

Chart 39 Spread between secured and unsecured sterling overnight interest rates



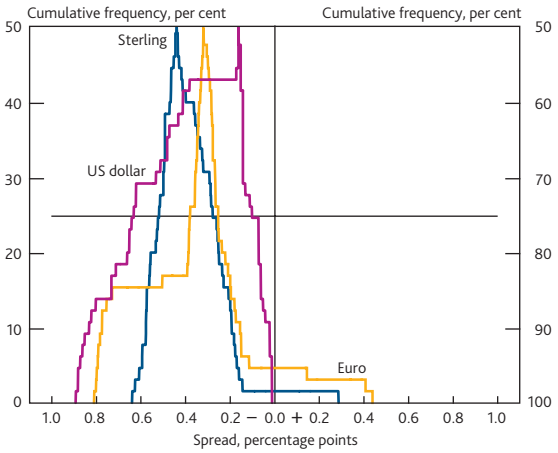
Sources: BrokerTec and Bank calculations.

The relatively low level of unsecured overnight interest rates compared to policy rates has been a global phenomenon (**Chart 40**). As discussed in previous *Bulletins*, fragmentation of money markets might explain why market participants were not utilising the unsecured market to finance secured lending in sufficient size to arbitrage away any 'risk-less' spread.

Reducing the cost of disruption to the liquidity and payment services supplied by commercial banks

The second objective of the Bank's market operations is 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 control the risk to its balance sheet.

Chart 40 Folded cumulative distribution[a] of spread of international unsecured overnight interest rates to official interest rates for period 6 Nov. 2008–4 Feb. 2009



(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.

In addition to the provision of reserves accounts, the Bank provides liquidity insurance in a number of ways. Within the sterling monetary framework, these include extended-collateral long-term repo OMOs and the Discount Window Facility described below. In addition, as described in the subsequent section, operations outside the sterling monetary framework, including US dollar repo operations and the Special Liquidity Scheme, have also been employed.

Extended-collateral long-term repo operations

Extended-collateral three-month long-term repo OMOs continued to be conducted on a weekly basis up until 18 November 2008, with £20 billion offered in each operation during the period under review. Following an announcement on 14 November 2008, the Bank reduced the frequency of these operations from weekly to twice-monthly. The Bank announced on 2 February 2009 that it would continue to hold these operations twice-monthly up to and including the scheduled long-term repo operation on 14 April 2009.

The results of these operations are shown in **Table C**. Cover in these operations has been variable.

Discount Window Facility (DWF)

In October 2008 the Bank introduced a 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. It allows eligible banks and building societies to borrow gilts against a wide range of collateral. In recognition of the continued stresses in financial markets, the Bank announced on 19 January 2009 that, for an additional fee

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

11 November 2008	
On offer (£ millions)	20,000
Cover	0.55
Weighted average rate[a]	2.567
Lowest accepted rate[a]	2.440
Tail[b]	13.00
18 November 2008	
On offer (£ millions)	20,000
Cover	0.36
Weighted average rate[a]	2.198
Lowest accepted rate[a]	1.890
Tail[b]	31.00
2 December 2008	
On offer (£ millions)	20,000
Cover	0.68
Weighted average rate[a]	1.740
Lowest accepted rate[a]	1.410
Tail[b]	33.00
16 December 2008	
On offer (£ millions)	20,000
Cover	0.85
Weighted average rate[a]	1.634
Lowest accepted rate[a]	1.430
Tail[b]	20.00
6 January 2009	
On offer (£ millions)	20,000
Cover	1.24
Weighted average rate[a]	1.070
Lowest accepted rate[a]	1.010
Tail[b]	6.00
20 January 2009	
On offer (£ millions)	20,000
Cover	1.61
Weighted average rate[a]	1.205
Lowest accepted rate[a]	0.951
Tail[b]	25.00
3 February 2009	
On offer (£ millions)	20,000
Cover	1.73
Weighted average rate[a]	1.018
Lowest accepted rate[a]	0.803
Tail[b]	0.22

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

of 25 basis points, it would permit drawing from the DWF with a term of 364 days in addition to the standard option to draw for 30 days.

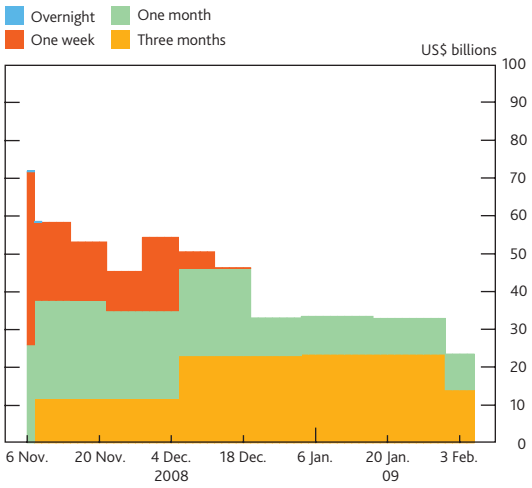
There is a consequential change to the arrangements for publication of the use of the DWF. The average aggregate daily value of gilts lent under the DWF with an initial maturity of 30 days or less during each calendar quarter will continue to be published on the first Tuesday following the final working day of the following calendar quarter. The average aggregate daily value of gilts lent with an initial maturity of more than 30 days during each calendar quarter will be published on the first Tuesday following the final working day of the calendar quarter five quarters ahead.

Other market operations

US dollar repo operations

In co-operation with other central banks, since 18 September 2008, the Bank has offered dollar financing to financial institutions funded by a swap with the Federal Reserve. Dollar financing is currently offered at one-week, one-month and three-month maturities. The profile of the stock of dollar financing is shown in **Chart 41**.

Chart 41 US dollar repo: stock outstanding by maturity[a]



(a) Stock outstanding is shown from settlement date.

To address continued pressures in global US dollar funding markets it was announced on 3 February 2009 that swap lines between the Federal Reserve and other central banks had been extended to 30 October 2009. In the United Kingdom, there has been declining participation in the US dollar repo operations recently. The Bank will continue to conduct US dollar repo operations, including its weekly tenders, as long as necessary but will keep them under review in the light of market conditions.

Special Liquidity Scheme (SLS)

As previously announced the drawdown period for the 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 and certainty. The box on page 25 provides further details on the usage of the SLS.

Asset Purchase Facility

On 19 January 2009, HM Treasury authorised the Bank to purchase up to £50 billion of high-quality private sector assets under an Asset Purchase Facility (APF). The initial aim of the Facility was to help improve financing conditions for companies.

The following sterling assets were initially announced as eligible for purchase: commercial paper, corporate bonds,

paper issued under the Credit Guarantee Scheme, syndicated loans and asset-backed securities created in viable securitisation structures.

The Bank, on 13 February, launched a Commercial Paper Facility to enable the purchase of investment-grade sterling-denominated commercial paper (CP) issued by companies that make a material contribution to economic activity in the United Kingdom. CP would be purchased both at issuance and in the secondary market, subject to a minimum spread. This could channel funds directly to parts of the corporate sector while also underpinning secondary market activity and helping to enlarge the private issuance market, and so removing obstacles to corporate access to capital markets. Over the first three weeks of operation the total amount purchased, in terms of the amount paid to the sellers, was £985 million.

Until the announcements made on 5 March noted above, the APF was financed by the issuance of Treasury bills by the Debt Management Office so that asset purchases under the Facility would not affect the level of reserves. Subsequent changes to the APF are described in the box on page 26.

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. The reserves comprised around £2.5 billion of assets at the end of the review period. 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 third bond issue in the programme, due in March 2009, will complete the transition process to a portfolio of approximately $6 billion of foreign exchange reserves.

Facilitating the provision of payment services

In May 2008, 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 each day by the Bank to generate intraday liquidity. These assets were funded by a series of Euro Notes. The final such note, for €3 billion nominal, matured 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, eg in the BIS and ECB, and the Bank's physical assets) together with aggregate cash ratio deposits. They 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 quarterly announcements on 1 October 2008 and 2 January 2009: £20 million each in November and January.

Special Liquidity Scheme

On 21 April 2008, the Bank of England launched the Special Liquidity Scheme (SLS) to improve the liquidity position of the banking system. The Scheme was designed to finance part of the overhang of illiquid assets on banks' balance sheets by allowing banks and building societies to swap for up to three years some of their legacy illiquid assets for UK Treasury bills. The drawdown period for the SLS closed on 30 January 2009, and data about its use was published on 3 February.

Usage of the Scheme

Thirty two banks and building societies accessed the Scheme. In aggregate, those firms accounted for over 80% of the combined sterling balance sheets of the financial institutions eligible to use the Scheme.

The Bank announced that Treasury bills with a face value of approximately £185 billion had been lent under the Scheme. Given its scale, the Scheme is indemnified by HM Treasury, but is designed to control the risk of potential losses. Banks will need, at all times, to provide the Bank of England with securities of significantly greater value than the Treasury bills they have received.

Most of the securities held by the Bank as collateral in the Scheme have been residential mortgage-backed securities or covered bonds secured on pools of residential mortgages. As at 30 January 2009, the total nominal 'par' value of this collateral amounted to approximately £287 billion. The Bank's valuation of those securities at that time was approximately £242 billion, an effective discount to par of about 16%.

Valuation and haircuts

Securities are valued by the Bank using observed market prices that are independent and routinely available publicly. The Bank reserves the right to use its own calculated prices, including where such independent market prices are unavailable. Those calculated prices are designed to deliver valuations taking account of securities' contracted cash flows and yields of comparable securities, but not individual loan-by-loan analysis of portfolios. To account for the risk that a calculated price is an over-estimate of what a market price would have been had it existed, an additional haircut is added.

Haircuts are designed to protect against the risk of loss in the event of a counterparty defaulting, and are therefore set taking into account uncertainty about possible valuations of the Bank's collateral, including in the event of default.

The Scheme after the close of the drawdown window

Although the drawdown window to access the SLS has closed, the Scheme will remain in place for three years. During this time, if the haircut-adjusted value of the collateral were to fall, the counterparties would need to provide more securities, or return some of the Treasury bills. And if their assets pledged as security were to be down-rated, the counterparties would need to replace them with alternative, highly rated assets.

The SLS has served its purpose in relation to the overhang of illiquid assets on balance sheets up to the end of 2007 and continues to provide participating institutions with liquidity support and certainty. But financing conditions have remained difficult for banks and building societies, and further measures have been introduced by the Bank and HM Treasury to improve bank financing and credit conditions in the economy more widely (see box on page 9).

The Asset Purchase Facility and changes to the sterling monetary framework

On 19 January 2009, HM Treasury authorised the Bank to purchase up to £50 billion of high-quality private sector assets under an Asset Purchase Facility (APF). The initial aim of the Facility was to improve the functioning of corporate credit markets. The APF also provided a framework for the Monetary Policy Committee (MPC) to undertake asset purchases for monetary policy purposes.(1)

An exchange of letters between the Governor and the Chancellor, dated 17 February and 3 March respectively, was published on 5 March. The MPC will use the APF for monetary policy purposes by financing asset purchases using central bank reserves. To that end, the range of eligible assets will include UK government debt purchased in the secondary market as well as certain private sector assets. Purchases of up to £150 billion were authorised, of which it was specified that up to £50 billion should be used to purchase private sector assets.

Within that framework, as well as announcing on 5 March that Bank Rate would be reduced by 0.5 percentage points to 0.5%, the MPC announced that the Bank would undertake a programme of asset purchases of £75 billion financed by the issuance of central bank reserves. Part of that sum would finance the Bank's programme of private sector asset purchases through the APF. But in order to meet the MPC's objective for total asset purchases, it was announced that the Bank would also buy medium and long-term conventional gilts in the secondary markets. The MPC noted that at its future meetings, it would monitor the effectiveness of the purchase programme in boosting the supply of money and credit, and in due course raising the rate of growth of nominal spending, adjusting the speed and scale of purchases as appropriate.

In a Market Notice issued on 5 March, the Bank announced that it would purchase gilts in reserve auctions, normally twice weekly. The Chancellor's letter to the Governor confirmed that the government's debt issuance strategy would not be altered as a result of the asset purchase transactions undertaken by the Bank for monetary policy purpose.

Changes to the sterling monetary framework

As a consequence of the MPC's decision, in a Market Notice issued on 5 March, the Bank announced a number of changes to the sterling monetary framework. With effect from the maintenance period starting on 5 March, until further notice, all reserves balances held by reserves banks would be remunerated at Bank Rate. The usual system in which reserves banks choose monthly reserves targets that they have to achieve on average over the maintenance period was suspended.

The Bank also announced that if Bank Rate was 0.5% or below, the rate paid on the Operational Standing Deposit Facility would be zero; the rate charged on the Operational Standing Lending Facility would continue to be set 25 basis points above Bank Rate.

The Bank would continue to provide liquidity insurance to the banking system, and inject reserves, by holding extended-collateral, and routine, long-term repo open market operations (OMOs) on the schedule previously announced.

In respect of the level of reserves, the Bank announced that broadly, its operational approach would be to ensure that the net supply of reserves was around the aggregate level of reserves targets initially set by reserves scheme participants for the maintenance period starting on 5 March, plus the amount of reserves injected via the purchase of assets acquired as authorised by the MPC. In order to achieve that, the Bank would continue for the time being to hold weekly OMOs to drain reserves injected via extended-collateral long-term repo operations by issuing one-week Bank of England sterling bills. Henceforth, these bills would normally be issued on a variable-rate basis. Short-term lending operations would remain available for use if necessary. For as long as reserves averaging was suspended, the Bank said it would not conduct a routine fine-tuning OMO on the final day of the maintenance period.

(1) The use of asset purchases for monetary policy purposes was discussed in the February 2009 *Inflation Report*, pages 44–45.