Markets and operations

This article reviews developments in sterling financial markets since the 2008 Q2 *Quarterly Bulletin* up to the end of August 2008. The article also reviews the Bank's official operations during this period.

Sterling financial markets(1)

Overview

Market expectations for the United Kingdom's Bank Rate were revised up and then sharply down over the past three months, as market participants reassessed the net impact on near-term UK inflation prospects of high commodity prices and the deteriorating outlook for global economic activity. Perceived uncertainty about short-term sterling interest rates also increased sharply before declining towards the end of the period.

In money markets, term unsecured borrowing rates remained elevated, while the cost of secured borrowing shifted notably higher. More generally, conditions in bank funding markets remained stressed. This reflected continued strains on banks' trading books associated with the fallout from structured credit problems, and potential worries about the impact of weaker economic activity on borrower defaults and in turn banks' loan portfolios.

Against that background, bank credit supply remained constrained, equity prices fell, corporate bond spreads widened further and the sterling effective exchange rate depreciated quite sharply. And these developments continued beyond the review period in the face of further indicators of weaker global activity, official intervention to support US government-sponsored enterprises, Fannie Mae and Freddie Mac, and the bankruptcy filing by Lehman Brothers.

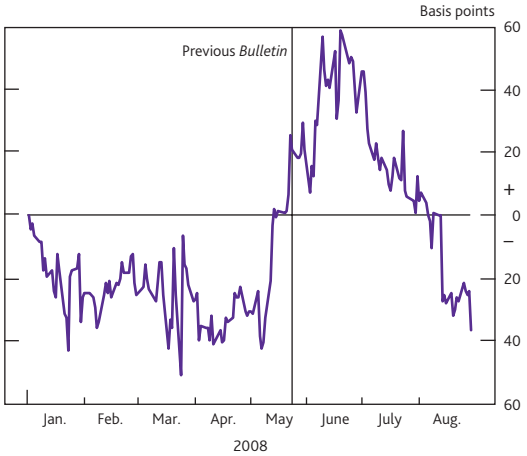
Recent developments in sterling capital markets

Short-term interest rates

There was a sharp swing in market-based short-term sterling interest rate expectations over the review period. The path for sterling interest rates implied from overnight index swaps (OIS) rose sharply in May and June (**Chart 1**), with market participants said to be particularly focused on domestic and global inflation pressures. However, short-term implied rates fell in the second half of the period following a series of weaker-than-expected macroeconomic data releases, a significant fall in commodity prices and renewed nervousness about banking system funding and capital constraints.

After rising further in June to reach a new peak, oil prices fell sharply in July and August (**Chart 2**). In dollar terms, the cost of oil for both near and long-dated delivery fell by between 10% and 15% over the period which at face value could have been consistent with a reassessment of global demand for oil.

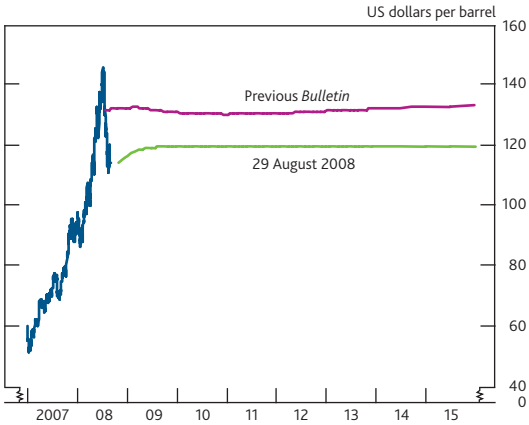
Chart 1 Cumulative changes in forward OIS rates since 1 January 2008(a)



Sources: Bloomberg and Bank calculations.

(a) Overnight index swap rate for one month, five months forward.

Chart 2 Brent oil futures prices(a)



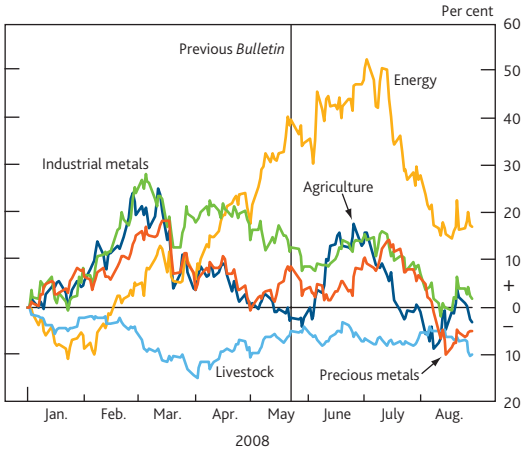
Source: Bloomberg.

(a) The dark blue line plots the evolution of the price of the generic futures contract that is closest to expiry.

(1) This article focuses on sterling capital market developments. The data cut-off for this section is 29 August.

Moreover, in contrast to earlier in 2008 — when oil prices rose rapidly and other commodity prices were broadly stable or falling — the recent decline in oil prices was part of a general decline in commodity prices (**Chart 3**). While some sector-specific explanations remained important — for example, improved supply conditions in some agricultural markets — the positive comovement across commodity prices seemed to reflect perceptions of a general slowdown in global economic activity. Consistent with that, Consensus forecasts for GDP growth in 2009 were generally revised down further in a number of countries, including in some emerging markets (**Chart 4**).

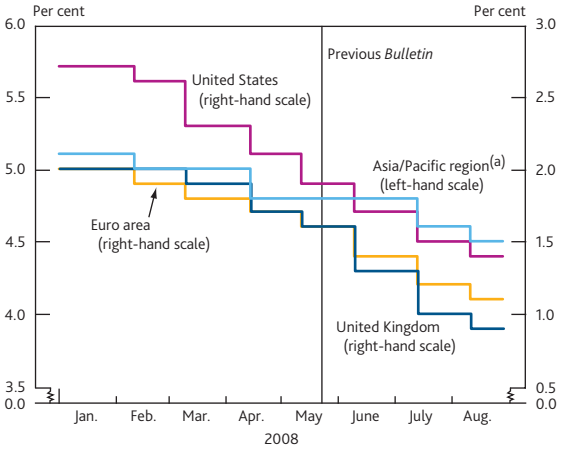
Chart 3 Cumulative changes in selected commodity price indices[a] since January 2008



Source: Standard and Poor's.

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

Chart 4 Expected real GDP growth for 2009

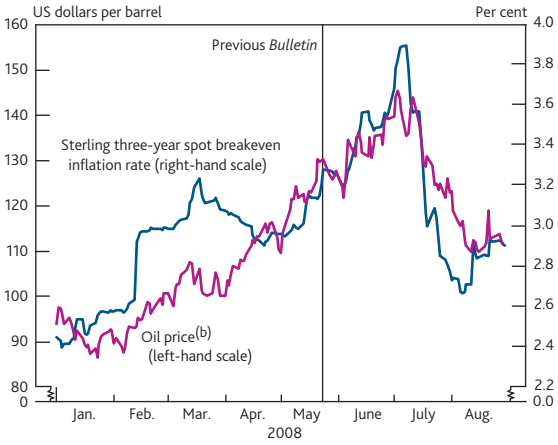


Source: Consensus Economics.

(a) Comprises 16 countries.

Reflecting market participants' focus on commodity prices, recent moves in near-term breakeven inflation rates, derived from the difference between conventional and index-linked bond yields, seemed to coincide with changes in oil prices (**Chart 5**). Historically, the comovement between the price of oil and short-term breakevens has not been particularly stable, but it has been stronger in recent months. Consistent with that, market contacts reported that concerns about the potential inflationary impact of changes in commodity prices was a significant factor behind the pickup in near-term breakeven inflation rates in the first half of this year, as well as their subsequent fall over the past couple of months.

Chart 5 Oil price and sterling breakeven inflation rates[a]

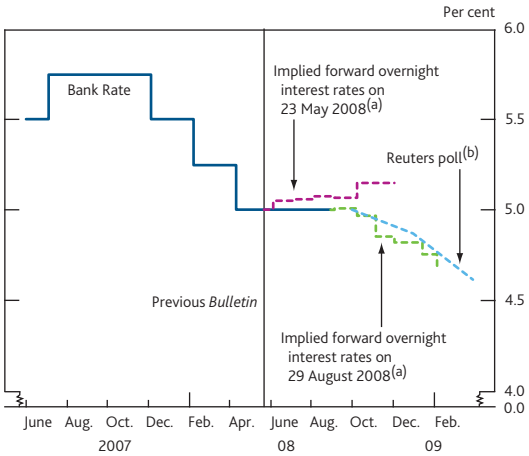


Sources: Bloomberg and Bank calculations.

(a) Breakeven inflation rates derived from the Bank's government liability curve.
(b) Price of generic Brent future that is closest to expiry.

Against that background, the path of Bank Rate implied by market interest rates ended the period around 30 to 40 basis points lower than the profile at the time of the previous *Bulletin*. This brought implied short-term sterling interest rates more into line with the views of economists surveyed by Reuters whose average modal expectation was for Bank Rate to be lowered by at least 25 basis points by early 2009 (**Chart 6**).

Chart 6 Bank Rate and forward market interest rates



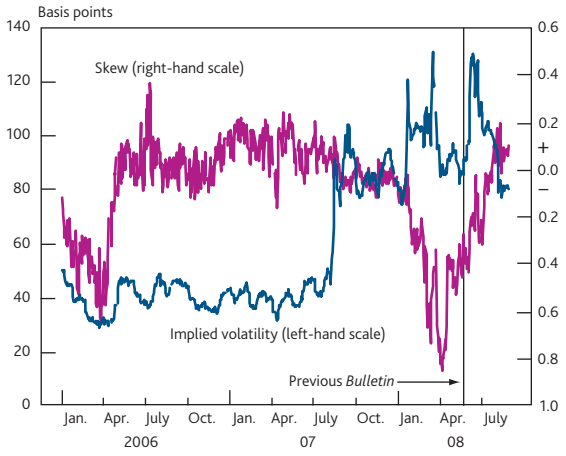
Sources: Bank of England, Bloomberg and Reuters.

(a) Derived from sterling overnight index average (SONIA) swaps.
(b) Reuters poll of economists' expectations for Bank Rate, taken on 28 August 2008.

However, the range of economists' views about the expected path for Bank Rate remained quite wide. Perhaps consistent

with continued uncertainty about the near-term outlook for the policy rate, measures of implied volatility derived from option prices increased sharply at the beginning of the review period, to levels previously reached in late 1999. They subsequently fell back, although they remained at quite elevated levels (**Chart 7**). One important caveat is that these implied volatility measures are derived from options that reference Libor[1] rates, and so will also reflect uncertainty about premia in Libor rates as well as uncertainty about the future path of Bank Rate.

Chart 7 Sterling six-month implied volatility and skew from interest rate options



Sources: Bank of England and Euronext.liffe.

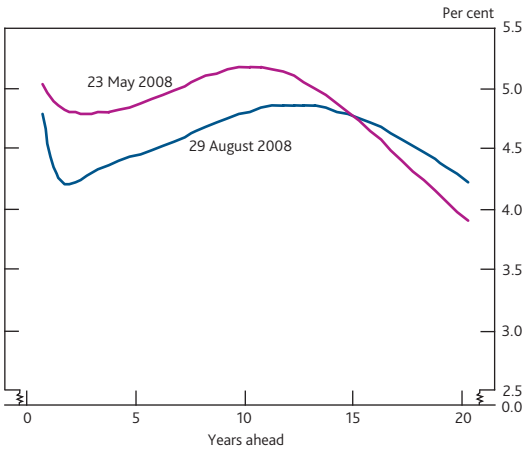
The skew of the implied distribution of future sterling interest rates shifted from negative to slightly positive (**Chart 7**). In other words, the risks around the expected path for Bank Rate were perceived to have become more balanced. In part, this may have reflected some of the downside risks to the UK economy crystallising and hence being incorporated in market participants' central expectations for the path of Bank Rate (**Chart 6**).

Long-term interest rates

At longer horizons, sterling nominal forward rates fell, at least up to maturities of fifteen years (**Chart 8**). These falls were more than accounted for by lower real forward rates; long-term inflation forward rates rose further over the past few months (**Chart 9**). These moves in real and inflation forward rates continued recent trends. And indeed over the period, five-year real rates five years forward reached historic lows while corresponding implied RPI inflation forward rates rose to their highest levels since 1997.

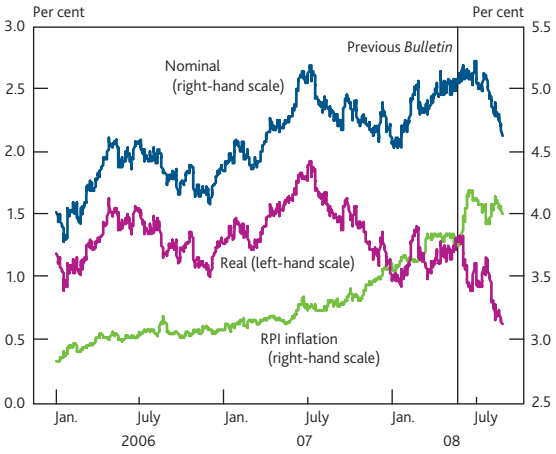
One possible explanation for the recent further falls in long-horizon real rates is that market participants reassessed their view of long-term UK economic growth. This might be consistent with, for example, perceptions of some lasting adverse effects on the efficient allocation of capital from the recent reduction in the availability of credit and/or a lack of full recovery in some financial markets, such as asset-backed securities. However, on its own, it is not clear why this should have led to corresponding increases in long-term inflation forwards, which in principle reflect long-term inflation expectations and compensation for future inflation uncertainty (ie inflation risk premia).

Chart 8 Sterling nominal forward rates[a]



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

Chart 9 Sterling five-year interest rates five years forward[a]



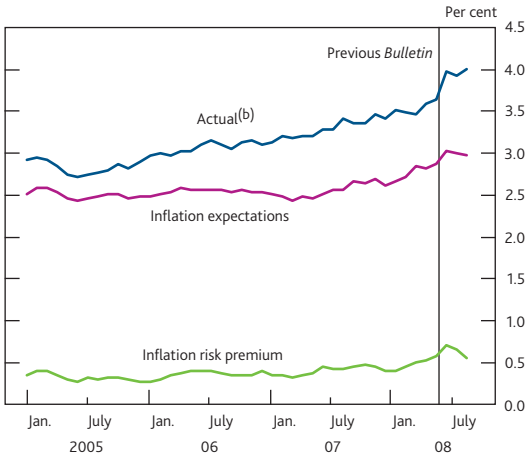
(a) Derived from the Bank's government liability curves.

Another possibility is that persistently high commodity prices led market participants to both increase their expectations of long-term inflation and/or inflation risk premia, and lower their estimates of trend economic growth in the United Kingdom. But overall, market contacts did not see much evidence to support this. In particular, they did not perceive long-run inflation expectations to have shifted materially higher.[2] And, while acknowledging that inflation risk premia may have changed, they did not think this

(1) London interbank offered rate.
(2) As discussed in the August *Inflation Report* on page 34, surveys also suggest little recent pickup in long-term inflation expectations.

accounted for all of the increases in derived long-term inflation forwards. That view seems broadly consistent with a model-based decomposition of sterling forward inflation rates.(1) The model suggests only a modest pickup in both inflation expectations and inflation risk premia since the start of the year (**Chart 10**).

Chart 10 Decomposition of sterling five-year inflation rates five years forward(a)



Source: Bank calculations.

(a) The method of decomposing inflation forward rates is described in the box on pages 14–15 of the 2008 Q1 *Bank of England Quarterly Bulletin*.
(b) Five-year inflation rates starting five years forward, derived from the Bank's swap curve.

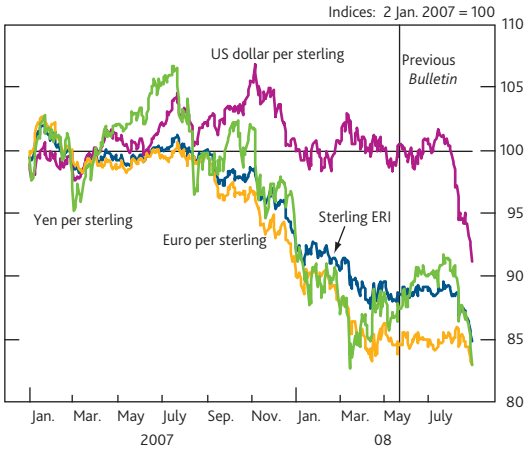
Instead, market contacts thought that the pickup in derived long-term breakeven inflation rates (and corresponding falls in real rates) continued to be exaggerated by institutional factors in the sterling index-linked gilt market. Specifically, contacts noted the continued lack of non-government supply of index-linked bonds in the presence of sustained pension fund demand, which in combination could have pushed up prices for long-dated index-linked instruments and lowered their yields. Moreover, with market participants facing additional financing constraints, liquidity in sterling inflation-linked markets remained low which may have meant prices were more reactive to investment flows than they would have been under normal circumstances.

Foreign exchange

Unsurprisingly, developments in relative interest rates seemed to influence moves in currency rates. In particular, from the middle of August sterling depreciated against the other major currencies (most notably against the US dollar) as sterling interest rates unexpectedly fell further against other currencies. As a result, the sterling effective exchange rate index fell by over 3% over the review period to reach its lowest level since 1996 and around 14% lower than a year ago (**Chart 11**).

However, the timing of the recent depreciation in sterling did not coincide very closely with shifts in relative yields on different assets across currencies (**Chart 12**). It could therefore

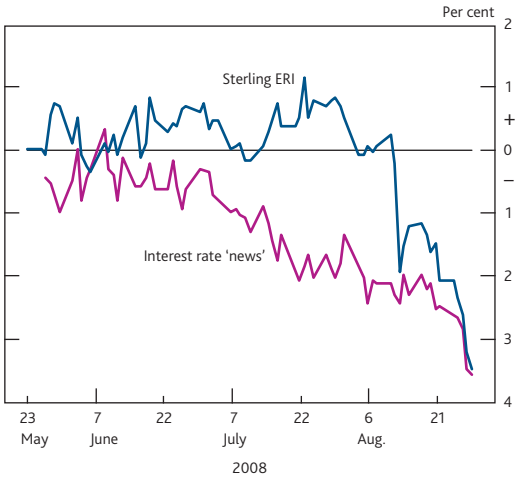
Chart 11 Cumulative changes in sterling exchange rates since 2 January 2007



Sources: Bank of England and Bloomberg.

be that investors also adjusted further their required risk compensation to hold sterling assets. The implied volatility inferred from exchange rate options on the sterling-dollar exchange rate did rise significantly in August and remained high (**Chart 13**). But implied volatility for the sterling-euro exchange rate ended the period lower than at the time of the previous *Bulletin*, which at face value, was hard to reconcile with a general further increase in risk premia on sterling assets relative to other currencies.

Chart 12 Implied contribution of interest rate 'news' to cumulative change in sterling ERI since previous *Bulletin*(a)

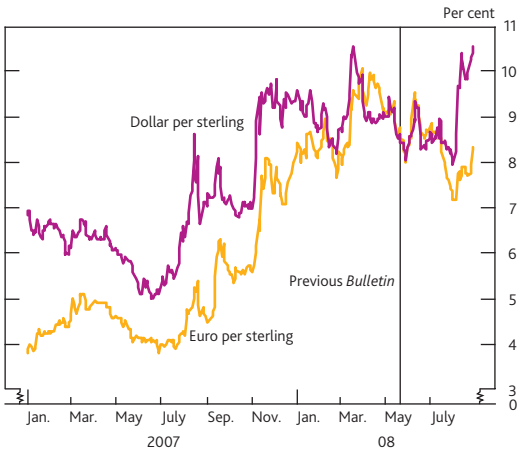


Source: Bank calculations.

(a) For more information on the analytics required to isolate the impact of interest rate 'news' on exchange rates, see Brigden, A, Martin, B and Salmon, C (1997), 'Decomposing exchange rate movements according to the uncovered interest rate parity condition', *Bank of England Quarterly Bulletin*, November, pages 337–89.

(1) See Joyce, M, Sorensen, S and Weeken, O (2008), 'Recent advances in extracting policy-relevant information from market interest rates', on pages 157–66 of the 2008 Q2 *Bulletin*.

Chart 13 Three-month implied sterling exchange rate volatility



Sources: ICAP and Bank calculations.

An alternative explanation for the renewed weakness in the value of sterling recently could be that market participants revised down their estimates of the long-term sustainable level of sterling. The latest *Merrill Lynch Fund Managers' Survey* indicated a pickup in perceptions that sterling may be overvalued relative to fundamentals. And looking ahead, market contacts generally thought that sterling was more likely to depreciate further than appreciate. However, according to the latest long-run Consensus survey, professional forecasters continued to expect sterling to strengthen over the medium term.

Finally, it may simply be that participants in foreign exchange markets took some time to digest fully the relative interest rate news. The sharp depreciation in sterling occurred around the time of the publication of the August *Inflation Report* and this might have prompted investors to reassess their views of the near-term outlook for growth and inflation in the United Kingdom and the associated prospects for returns on sterling assets. And UK macroeconomic data since the middle of August were generally a little weaker than market participants expected which could have reinforced the negative near-term sentiment towards sterling.

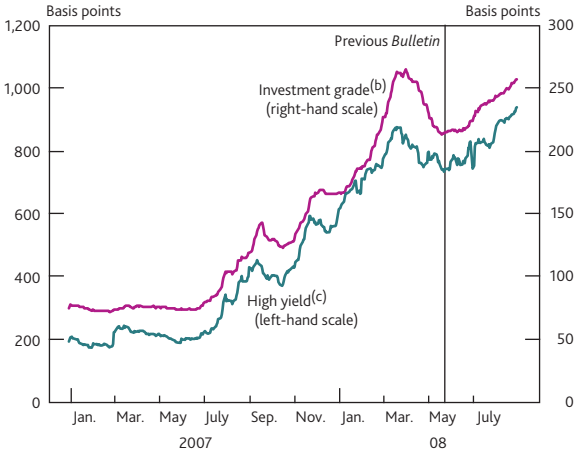
Equity and corporate debt markets

Perceptions of a worsening outlook for economic growth globally, including in the United Kingdom, were also reflected in lower equity indices and higher spreads on corporate debt. The main UK equity indices ended the period around 8% lower (**Chart 14**), and spreads on investment-grade and high-yield corporate bonds widened by 42 basis points and 196 basis points respectively (**Chart 15**). A decomposition of investment-grade sterling corporate bond spreads suggested that most of the recent widening reflected increased compensation for credit risk — both for expected defaults and recovery rates, as well as uncertainty around them (**Chart 16**).

Chart 14 Changes in UK equity indices since 2 January 2007

Sources: Bloomberg and Bank calculations.

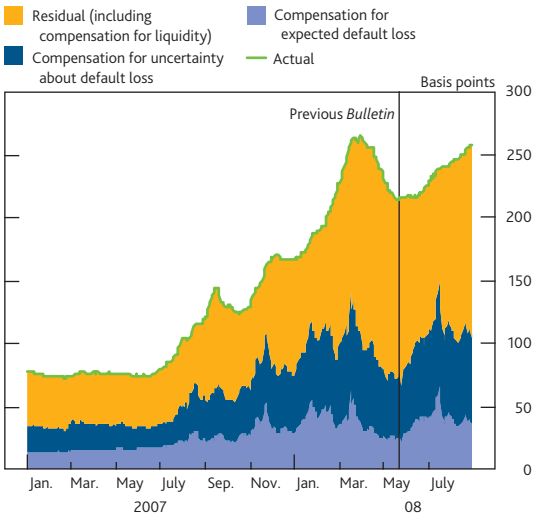
Chart 15 Sterling corporate bond spreads(a)



Source: Merrill Lynch.

(a) Spreads over sterling government bond yields.
(b) Aggregate of indices of bonds rated BBB3 or higher.
(c) Aggregate of indices of bonds rated lower than BBB3.

Chart 16 Decomposition of sterling-denominated investment-grade corporate bond spreads(a)

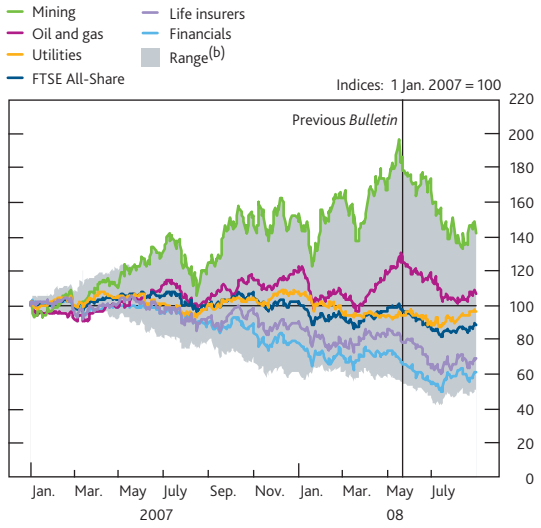


Sources: Bloomberg, Merrill Lynch, Thomson Datastream and Bank calculations.

(a) For details of the method of the decomposition, see Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 533–41.

The recent falls in equity prices seem to have been more broad-based than in preceding quarters (**Chart 17**). Oil and gas, as well as mining stocks, fell sharply, in contrast with earlier rises, which might have reflected investors' assessments that demand for energy and raw materials would likely be affected by a general slowdown in the global economy.

Chart 17 Selected sectoral UK equity indices[a]

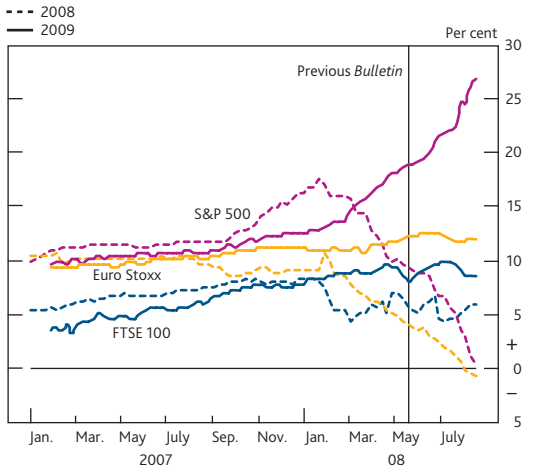


Sources: Bloomberg and Bank calculations.

(a) Selected components of the FTSE All-Share index.
(b) The shaded area represents the maximum-minimum range of selected sectoral equity price moves over the period. The sectoral components included are those that account for more than 1% of the market capitalisation of the FTSE All-Share index.

However, despite the worsening macroeconomic outlook, investment analysts' published projections for the earnings of FTSE 100 companies in 2008 and 2009 have not fallen materially — at least in aggregate (**Chart 18**). This seems slightly puzzling given the falls in earnings expectations for this year in other economies.

Chart 18 IBES earnings per share growth forecasts for 2008 and 2009[a][b]

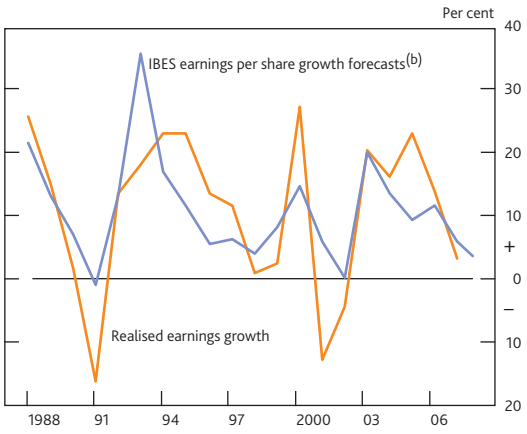


Source: Thomson Datastream.

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

It may be that analysts' forecasts take a while to be revised. According to the latest *Merrill Lynch Fund Managers' Survey*, the net balance of UK fund managers who thought that consensus estimates for company earnings in the coming year were too high increased significantly from 67% in May to 92% in August. Moreover, in previous periods when earnings fell substantially, analysts' forecasts tended to underestimate the magnitude of the falls (**Chart 19**).

Chart 19 IBES earnings per share growth forecasts relative to outturns[a]

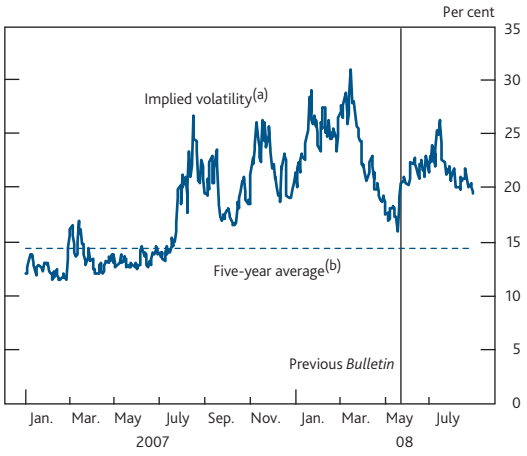


Source: Thomson Datastream.

(a) Realised earnings inferred from weekly price-earnings ratios (in March of each year) for companies included in the UK Datastream share price index.
(b) IBES earnings per share growth forecasts for each year as observed at the end of August of that year.

Consistent with increased concerns about the near-term prospects for corporate earnings, uncertainty surrounding UK equity prices, as measured by implied volatility, remained quite elevated (**Chart 20**). Furthermore, market contacts indicated a recent lack of willingness to increase exposure to equity price volatility through products such as variance swaps,[1] partly out

Chart 20 FTSE 100 implied volatility



Sources: Bloomberg, Euronext.liffe and Bank calculations.

(a) Three-month (constant maturity) implied volatility derived from options.
(b) Average of implied volatility since 30 August 2003.

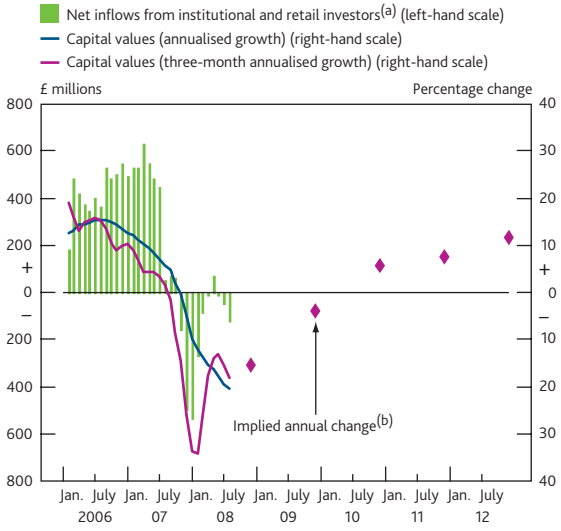
(1) For more information, see the box entitled 'Equity variance swaps', on page 127 of the Summer 2006 *Quarterly Bulletin*.

of reluctance to add new risky positions on trading books. According to market contacts, this may have limited any increase in implied volatility.

Commercial property and mortgage-backed securities markets

One sector that remained particularly vulnerable was commercial property. Property values continued to fall, and the pace of decline increased over recent months. Availability of financing for new transactions reportedly remained difficult and, while the refinancing of existing deals was generally possible, anecdotal evidence indicated that this was typically at more penal rates. Looking ahead, information from traded commercial property derivatives suggested that prices were likely to continue to fall, albeit at a slower rate, before stabilising around the middle of 2010 (**Chart 21**).

Chart 21 UK commercial property capital values and inflows into UK property funds



Sources: Fenics, Investment Management Association, Thomson Datastream and Bank calculations.

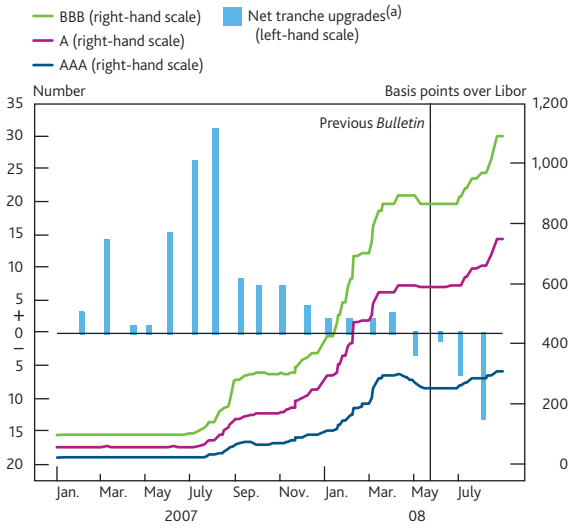
(a) Based on data compiled by the Investment Management Association (IMA) on 34 UK on-shore property funds with total funds under management of around £12.5 billion at the end of December 2007.
(b) Implied annual changes were calculated on 29 August 2008 by using the value of derivatives contracts on total returns adjusted for projected future income returns, which were assumed to revert to their long-run average over the next three years.

Market contacts attributed this renewed weakness in the commercial property sector to concerns about the UK economy, and weakening tenant demand. They continued to report heavy use of 'rent sweeteners' (free weeks, free fixtures and fittings etc) in a bid to avoid the breach of interest loan covenants.

Against this backdrop, the volume of rating downgrades of UK commercial mortgage-backed securities (CMBS) increasingly surpassed that of upgrades and spreads on CMBS widened further (**Chart 22**). Nonetheless, delinquencies remained low — S&P data show that only 0.25% of CMBS in Europe, Middle East and Africa were in breach of covenant and only 0.1% in default.(1)

Contacts suggested that investors continued to reduce risk and balance sheet size by seeking to sell CMBS assets to other investors, which may have contributed to wider spreads in secondary markets over the review period (**Chart 22**). Primary issuance of CMBS weakened further in Europe — €0.5 billion was issued over the review period compared to €3.5 billion between February and May 2008.

Chart 22 Five-year investment-grade UK CMBS spreads and ratings changes



Sources: Bloomberg and Lehman Brothers.

(a) Net tranche upgrades refer to the number of tranches of CMBS upgraded less those downgraded. The calculation includes rating actions by more than one agency on the same tranche.

The primary market for UK residential mortgage-backed securities (RMBS) remained largely closed, with only two deals (£500 million by HBOS and £400 million by Alliance and Leicester) placed publicly in the market during the review period. This reflected the ability to place only small transactions in response to reverse inquiries from investors. Spreads on UK RMBS also widened over the review period.

Bank funding markets

Partly reflecting the difficulty of publicly issuing securitised mortgages, funding markets for financial institutions remained under pressure. In addition to further write-downs on banks' trading books and continued reintermediation of assets onto their balance sheets, contacts reported growing concerns about future write-downs on banks' loan books given the worsening global economic outlook. As a result, banks sought to constrain the growth in the size of their balance sheets and closely monitored internal limits on lending to other banks.

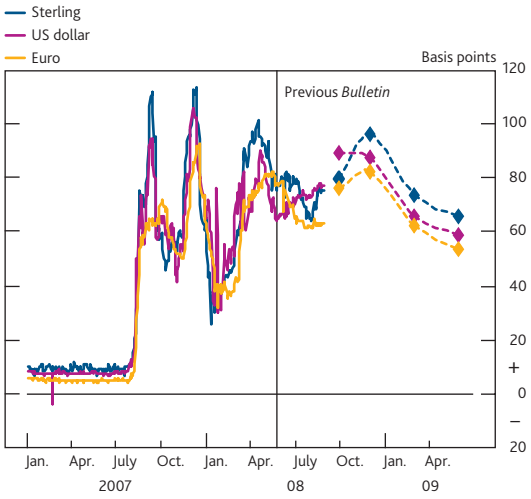
Many money market participants continued to report difficulties in obtaining unsecured funding at term maturities, with contacts noting very limited interbank lending activity at maturities exceeding three months. Reflecting this, term

(1) For more details, see Standard and Poor's *European CMBS Performance Review H1 2008*.

Libor rates in the major currencies remained elevated when compared with equivalent-maturity OIS rates.

Six and twelve-month Libor-OIS spreads rose further. And forward spreads — implied by derivatives settling on three-month Libor — widened, which contacts said reflected more pessimistic views about the likely persistence of the market turmoil and some increased concerns about funding conditions over the year end (**Chart 23**).

Chart 23 Three-month Libor rates relative to expected policy rates[a][b]

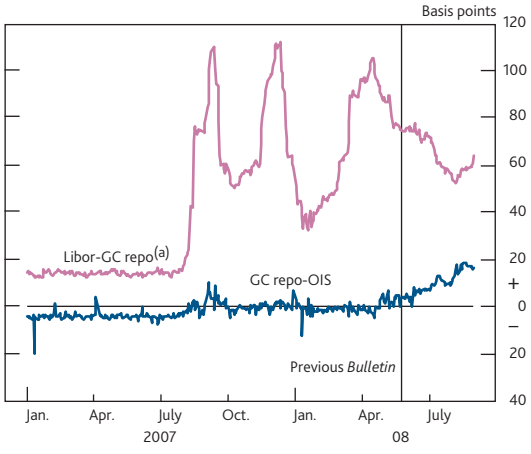


Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Spread of three-month Libor to three-month overnight index swap (OIS) rates. Dashed lines show implied forward spreads derived from forward rate agreements as at 29 August 2008.
(b) Compared with previous *Bulletins*, the term structure of forward spreads has been estimated using an improved method for deriving implied forward interest rates from OIS.

There was also a notable increase in the rates charged to borrow cash where the loan is secured on high-quality collateral — so-called repurchase or 'repo' transactions. Sterling secured borrowing rates rose relative to both Libor and OIS rates, with the positive spread between secured rates and OIS rates particularly unusual (**Chart 24**). Increases in

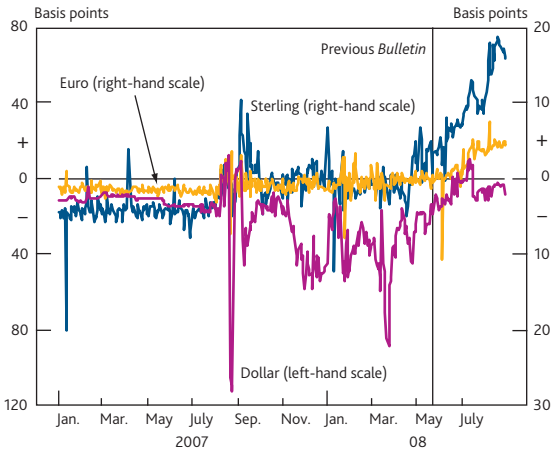
Chart 24 Spreads between sterling three-month secured and unsecured interest rates



Sources: Bloomberg and Bank calculations.

(a) GC repo refers to repo rates on government collateral.

Chart 25 International three-month secured spreads to OIS[a]



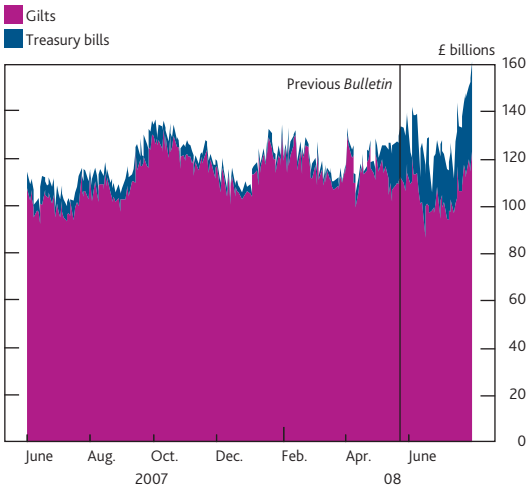
Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Spreads of three-month repo rates on government collateral to three-month rates on overnight index swaps.

secured rates relative to OIS rates were also evident, although to a lesser extent, in euro and US dollar markets (**Chart 25**).

As discussed in the box on page 260, market contacts suggested that one reason for the recent increases in secured rates was strong demand from banks and securities dealers for secured borrowing in the face of restricted supply of term money market funding. And indeed, data on aggregate lending secured against sterling government collateral processed through CREST picked up over recent months (**Chart 26**).

Chart 26 Secured borrowing against government collateral in CREST



Source: EuroclearCrest.

Furthermore, contacts reported increased use of so-called tri-party repo, where a third-party agent acts as collateral manager to facilitate repo for a wide range of counterparties. That was consistent with banks increasingly utilising all

Why have secured funding spreads increased recently?

Over a long period, secured borrowing rates have typically traded close to rates on equivalent-maturity overnight index swap (OIS) contracts since both are considered to reflect minimal risk premia and hence provide a close read on risk-free interest rates. This box discusses possible reasons for the recent widening in spreads between secured and OIS rates.

OIS settle on overnight unsecured lending rates, and since credit risk in overnight transactions should generally be small compared with longer-maturity deals they should embody minimal credit risk premia. Furthermore, any liquidity premia in OIS rates are likely to be small since OIS are derivative instruments that involve no exchange of cash at the inception of the trade. In comparison, while secured, or so-called repo transactions are also generally thought to contain little credit risk, since the exchange of collateral minimises this, they may still be affected by liquidity conditions in both cash and government bond (ie collateral) markets. Hence it would seem likely that the recent divergence between secured rates and OIS rates partly reflected liquidity premia due to conditions in cash and/or collateral markets.

Market contacts suggested that one reason for the recent increase in repo rates was strong demand from banks and securities dealers for secured borrowing in the face of limited appetite among banks to lend to each other. That could have boosted liquidity premia in secured borrowing rates. In part, this demand might have reflected borrowers' preferences if such funding was perceived to be less likely to be cut by lenders should credit concerns increase. And contacts suggest that banks also value the anonymity associated with some secured borrowing in times of stress. Furthermore, some financial institutions are only able to borrow in the secured cash market, either because of regulatory reasons or a rationing of unsecured credit, so a progressive increase in demand from these firms may have pushed up secured borrowing rates.

According to contacts, one manifestation of heightened demand for secured borrowing has been increased activity in trades that exchange government collateral for less liquid, more risky bonds. A bank or securities dealer may swap less liquid securities for government bonds, for example with an institutional asset manager via so-called 'collateral upgrade' trades.(1) Having obtained the government collateral, the bank or securities dealer can then on-lend the government bond in the repo market in exchange for cash. On the other side of the transaction, the cash may have been lent against illiquid collateral via tri-party repo.

This type of trade may also have affected conditions in collateral markets. In particular, if the upgrade trade mobilised government collateral for use in the repo market that would otherwise have been held to maturity by asset managers, this would have resulted in a net increase in the availability of such collateral. To the extent that the greater availability prompted a fall in the value of collateral when exchanged for cash, this would have tended to put upward pressure on repo rates.

Contacts also identified other reasons for changes in collateral market conditions which might have led to cheapening collateral values and corresponding increases in repo rates. First, many contacts linked the increases in secured rates to increased availability of government collateral as a result of central bank operations in a number of countries. For example, the increased use of non-government collateral in standard central bank operations may have meant relatively more government collateral was available for use in market repo. And in the United Kingdom, the Special Liquidity Scheme (SLS), that enables banks to exchange less liquid securities for Treasury bills, has increased the supply of collateral which in turn may be used by banks to raise cash in repo markets. Second, the perceived likelihood of slower economic growth may have increased expectations of further government bond issuance in a number of countries, and hence an increased supply of collateral for use in the repo market.

Greater availability of government collateral might in principle also have widened the spread between short-dated gilt yields and repo rates. This spread is volatile owing, according to contacts, to reportedly strong but irregular Asian central bank purchases of short-dated gilts. Nonetheless, in recent months sterling repo rates generally increased relative to short-maturity gilt yields which could perhaps be indicative of the impact of additional available collateral (**Chart A**).

Chart A Spreads between sterling secured rates and gilt yields(a)

Source: Bloomberg.

(a) Spread between rates on one-year GC repo transactions and yield on the gilt closest to one year to maturity.

(1) For more information on collateral upgrade trades, see the box on page 371 of the 2006 Q4 *Quarterly Bulletin*.

The mechanics of the tri-party repo market

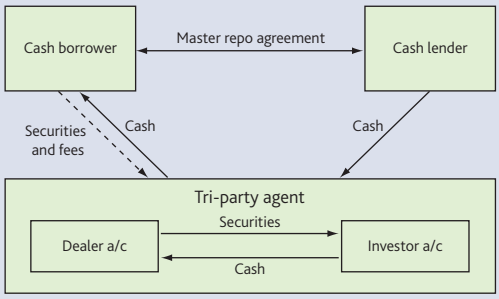
Contacts report that volumes of business in the tri-party repo market generally increased over the past year, as market participants mobilised previously unused collateral. In particular, contacts noted the increased use of non-government, higher-yielding assets. Furthermore, according to contacts, tri-party repo transactions were increasingly used to facilitate collateral upgrade trades.(1) This box describes the mechanics of the tri-party repo market.

In a tri-party sale and repurchase agreement (repo), a neutral third party stands between the repo counterparties and physically controls the securities offered as collateral. This enables access to the repo markets for a greater number of participants, mainly due to the efficiency of outsourcing of collateral management to the agent.

Tri-party repo differs from central counterparty (CCP) clearing. In the former, the original counterparties remain as principals, whereas in centrally cleared trades the CCP (such as LCH.Clearnet) becomes the legally substituted buyer or seller for every deal.

The three participants in a tri-party repo agreement interact as shown in **Figure 1**.

Figure 1 Tri-party repo structure (start of deal)



The cash borrower is an institution looking to finance assets in its trading book. These include broker-dealers looking to finance inventories; bank treasurers wishing to secure funding from existing portfolios; and emerging market commercial banks looking to diversify their sources of finance and lower their costs without having to establish their own dedicated repo operations.

The cash lender is an institution looking to put funds to work on a secured basis in a low-cost environment. The main users include central banks and supranationals, smaller commercial banks, money market funds, and other financial institutions that experience irregular cash flows and require flexibility of tenor, such as insurance companies.

The third-party agent is a clearing agent or custodian bank with access to extensive collateral management facilities. The largest agents are Clearstream and Euroclear in Europe, and Bank of New York Mellon and JPMorgan Chase in the United States. Contacts have said that none of the four main agents dominate the global tri-party repo market.

When entering a tri-party repo transaction, the cash borrower and cash lender agree on the terms, such as the maturity, interest rate and general nature of the collateral. For the trade to proceed, both counterparties must have an account with the same third-party agent.

The securities dealer then delivers collateral to the agent,(2) which transfers cash and securities between the counterparties' segregated accounts. The cash borrower maintains control over which specific securities are in its account, and multiple collateral substitutions are permitted so long as it does not violate the agreed terms. But the cash lender holds 'perfect title' over the collateral so that in the case of defaults, full ownership of the collateral passes to the lender.

As well as acting as custodian, the agent is responsible for valuing the collateral, often daily on a mark-to-market basis, to ensure that the cash investment remains fully collateralised by securities of suitable quality.

The agent receives a fee from the cash borrower for providing the service, though payment of the fee is often shared between the two counterparties. And it has been increasingly common for agents to use automated algorithms and unlimited collateral substitution to re-hypothecate tri-party repo collateral; to reuse the security in other repo transactions.

(1) For more information on collateral upgrade trades, see the box on page 371 of the 2006 Q4 *Quarterly Bulletin*.
(2) In practice, securities will remain with the third-party agent from deal to deal.

available sources of secured funding. The box on page 261 describes the mechanics of tri-party repo in more detail.

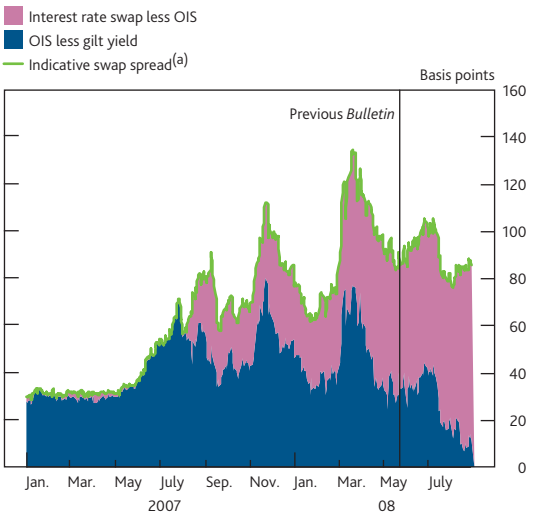
To the extent that any shift in activity away from unsecured towards secured funding contributed to increased availability of government bonds used as collateral, the value attached to this type of collateral in repo transactions may have fallen. In turn this could have put further upward pressure on secured lending rates as discussed in the box on page 260.

In well-functioning markets, one might expect the positive spread between secured and OIS rates to be temporary, as participants could generate profits by borrowing unsecured and lending secured. But recently, there may have been considerable barriers to arbitrage, notably from constraints on financial institutions' balance sheets. Contacts reported that lower internal limits — particularly around accounting period ends — prevented some banks from seeking to profit from the inverted spread, and some institutions faced difficulties putting in place the necessary bilateral repo agreements to access the secured markets.

The increase in secured rates relative to unsecured rates may also have contributed to the narrowing in sterling interest rate swap spreads in July, unwinding the widening earlier in the period (**Chart 27**). In theory, swap spreads should reflect the expected difference between yields on government bonds and an equivalent flow of payments linked to Libor.(1) Since Libor includes some compensation for counterparty risk, at face value narrower sterling swaps spreads could *inter alia* indicate reduced investor worries about the credit risk attached to banks in the sterling Libor reporting panel. However, decomposing two-year sterling swap spreads into the spread between Libor and OIS rates and the spread between OIS and gilt yields, suggests that the recent narrowing was accounted for by a narrowing in the OIS-gilt yield spread. The Libor-OIS spread narrowed only slightly. As such, the recent narrowing in sterling swap spreads probably said more about liquidity conditions in collateral markets than changes in investors' perceptions about the risks associated with lending to UK banks.

Outside of interbank lending markets, contacts at money market funds (MMFs) continued to report that term lending to banks was well below levels prior to the dislocation in credit markets that began last summer. Although total assets under management continued to increase (**Chart 28**), MMFs preferred to keep a large stock of short-term assets to insure against redemptions.

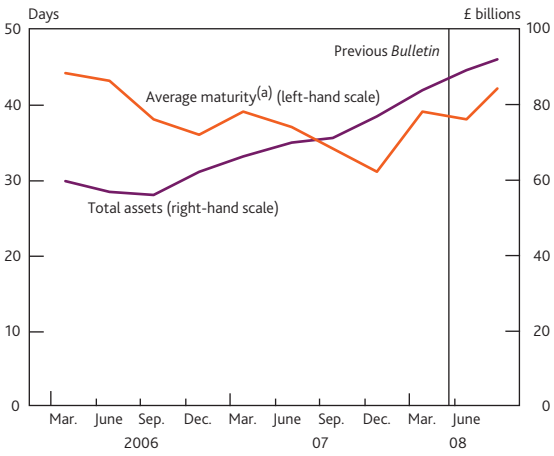
Chart 27 Indicative decomposition of the two-year sterling swap spread



Source: Bloomberg.

(a) Approximate swap spread calculated as: (two-year interest rate swap rate settling on six-month Libor – two-year OIS rate) + (two-year OIS rate – two-year generic gilt yield). It may not match traded swap spreads exactly.

Chart 28 Total assets and maturity profile of sterling money market funds



Source: iMoneyNet.

(a) Simple average of value-weighted average maturities of assets in each fund.

However, industry data suggest that the weighted-average maturity (WAM) of MMF assets was little changed from a year ago (**Chart 28**). Contacts noted that the overall stable WAM could have reflected fund managers balancing the cash and other short-term holdings in their portfolios with some longer-maturity instruments.

In terms of longer-term funding, UK banks raised further capital over the period to boost their regulatory capital ratios. However, contacts expressed some concern that banks could be constrained in issuing additional capital in the near term. The issuance of hybrid capital instruments reportedly remained an option, but investors were focused on the need for core Tier 1 capital. Meanwhile, the prospects for common equity issuance had reportedly been weakened by the difficult rights issue process earlier this year for some UK banks.

(1) For more discussion of the determinants of swap spreads see Cortes, F (2003), 'Understanding and modelling swap spreads', *Bank of England Quarterly Bulletin*, Winter, pages 407–16.

Developments in market structure

BBA proposal regarding Libor fixings

The British Bankers' Association (BBA) announced in June plans to strengthen the governance of its arrangements for producing the London interbank offered rate (Libor) fixings it publishes daily. These fixings are the most widely referenced interest rate benchmarks. But recently they have been questioned as an accurate barometer of the rates at which banks can in fact borrow in the interbank markets.

The main changes announced were:

- wider membership of the Foreign Exchange and Money Markets Committee, the independent body which oversees the process, to include non-contributing banks and other rate users from Europe, the United States and elsewhere;
- tighter scrutiny of the rates contributed by banks into the setting mechanism, so that any discrepancies in the rates must be justified by individual contributing banks; and
- greater numbers of contributors to some of the rate-setting panels.

The BBA also launched a public consultation on strengthening Libor, from which it released feedback on 5 August. The main conclusions were that Libor remained an established and accepted benchmark and that the contributors to rate-setting panels captured the majority of the market in London in the relevant currency.

The BBA acknowledged concerns in the market about whether there should be a second rate-fixing process for US dollar Libor after US market opening. However, it decided that no second US dollar fix would be introduced. Separately, an alternative measure of US dollar lending rates based on information from banks in New York was introduced by ICAP. According to contacts, the similarity of this measure compared with Libor rates to some extent validated US dollar Libor fixings.

EONIA futures on Euronext.liffe

Markets for overnight index swaps (OIS) have grown in recent years and provide participants with a useful tool for hedging or speculating on future interest rates, as well as giving policymakers a good gauge of expected future policy rates.(1) OIS settle on indices of overnight interest rates, which are compiled daily to reflect the weighted average of unsecured overnight transactions in the interbank market. For sterling, this is the sterling overnight index average (SONIA), for euro, the euro overnight index average (EONIA), and for the US dollar, the Fed funds effective rate.

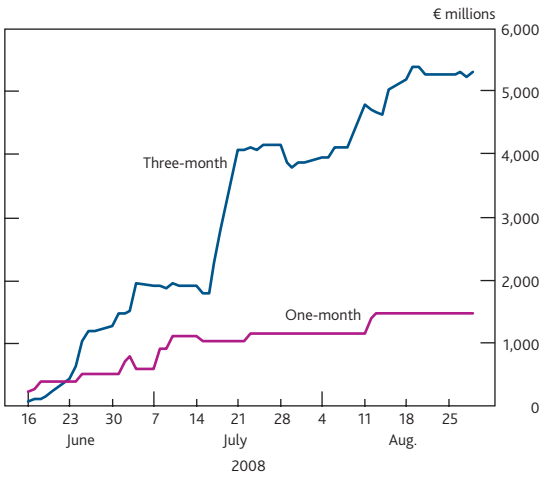
As noted in the box on page 260 risk premia embedded in OIS rates should generally be small. Hence, in principle, OIS rates provide a clear read on expected future risk-free rates.

Euronext.liffe introduced on 16 June new one-month and three-month futures contracts that settle on EONIA. The one-month contracts are referenced to EONIA over a period that coincides with European Central Bank (ECB) reserve maintenance periods; and hence to ECB monetary policy meetings. Three-month contracts settle on the rates on three-month OIS.

These new exchange-traded futures contracts trade alongside existing markets for OIS, which are traded bilaterally between counterparties, and should complement the OIS market. The futures enhance the hedging opportunities for short-term money market traders and should improve liquidity in the EONIA market as a whole.

The first few months of trading in the new contracts saw open interest increase over time (**Chart 29**). Contacts reported that activity reflected trading by a number of participants, not just by market makers. The three-month contracts saw the bulk of trading, which was said to reflect their comparability with existing futures that settle on three-month euro interbank rates (three-month Euribor) and that participants can use the contracts to take or hedge basis risk between Euribor and EONIA. As for most futures, trading of the contract nearest to maturity was most significant (**Chart 30**). But open interest remained small relative to the Euribor futures market and indeed to the euro OIS market.

Chart 29 Notional value of open interest in EONIA futures(a)

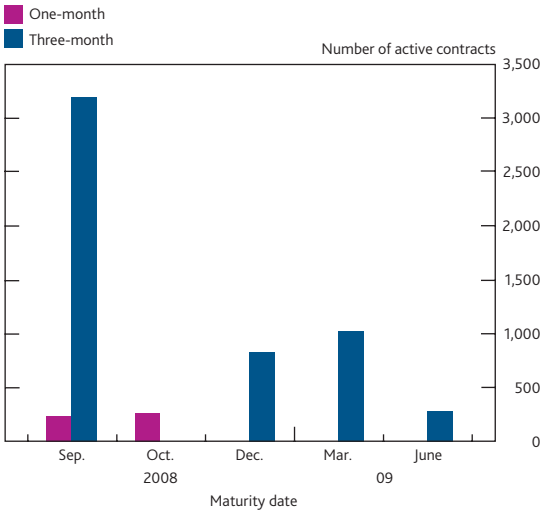


Source: Bloomberg.

(a) Total number of active contracts multiplied by contract size.

(1) For further information, see the box entitled 'Overnight index swaps' on page 281 of this *Bulletin*.

Chart 30 Open interest in EONIA futures[a]



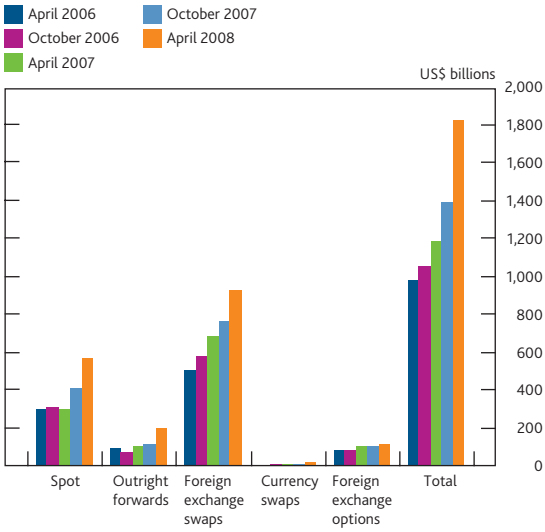
Source: Bloomberg.

(a) Total number of active contracts as at 29 August 2008.

UK foreign exchange turnover survey

Results of the April 2008 Foreign Exchange Joint Standing Committee (FXJSC) survey were published on 28 July. The survey continued to show strong growth in foreign exchange turnover in London. Average daily turnover recorded in the April 2008 survey was $1,820 billion, 31% higher than the October 2007 survey, and 54% higher than in April 2007; the largest increase in turnover since the survey began (**Chart 31**). Turnover in spot and outright forward products rose markedly.

Chart 31 UK foreign exchange daily average turnover by instrument



Source: London Foreign Exchange Joint Standing Committee.

The top five banks accounted for 46% of turnover, a concentration level last seen in 2006. This was largely driven by an increase in market share among the top five banks in the outright forward market.

Bank of England official operations

The Bank's balance sheet is managed in accordance with its policy purposes. These relate to the implementation of monetary policy; management of the Bank's foreign exchange reserves; provision of payment services for the UK financial system and the wider economy; provision of banking services to other central banks; and management of the Bank's free capital and cash ratio deposits from financial institutions.

Sterling monetary framework

This section reviews three full monthly maintenance periods between 8 May and 6 August.

Reserves targets

The Bank's operations in the sterling money markets aim to keep overnight market interest rates in line with Bank Rate. They do so by ensuring a net supply of reserves sufficient for the banking system, in aggregate, to meet targets chosen by the banks themselves for average balances held at the Bank of England over a maintenance period running from one MPC decision date until the next.

Each month, ahead of the start of a reserves maintenance period, reserves banks in the United Kingdom have the opportunity to set new reserves targets, and the Bank undertakes to supply the reserves that banks in aggregate need to meet those targets. Thus the monthly resetting of reserves targets provides an opportunity for banks individually, and the banking system as a whole, to obtain extra liquidity from the Bank in the light, *inter alia*, of their evaluation of the likelihood of payment shocks.

In the first maintenance period under review, reserves banks in aggregate chose targets of £24.7 billion. In the June–July maintenance period, this rose to £26.1 billion before increasing in the subsequent maintenance period to £26.7 billion. Ahead of the August–September maintenance period, the aggregate

Chart 32 Aggregate reserves targets

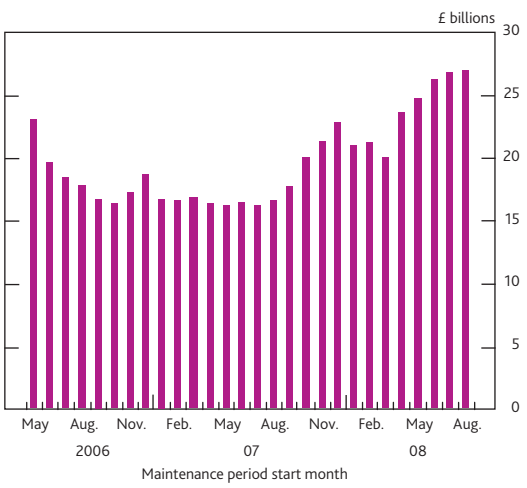
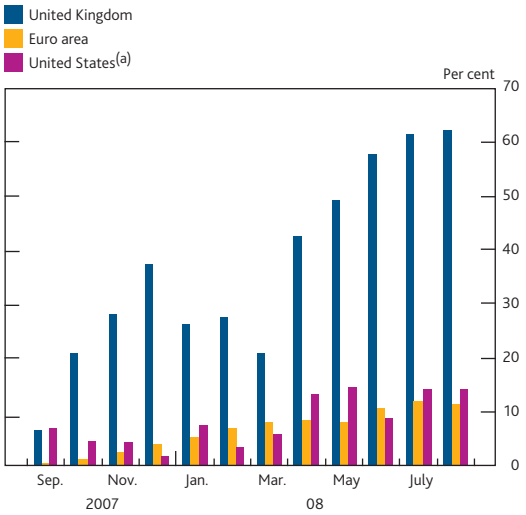


Chart 33 Cumulative increase in aggregate reserves targets since August 2007



Sources: Bank of England, Board of Governors of the Federal Reserve System and European Central Bank.

(a) Required reserves less vault cash used to satisfy reserves plus required clearing balances.

target rose again to £26.8 billion. Since August 2007, aggregate reserves targets have risen by 63% (**Charts 32** and **33**).

Reserves target ranges

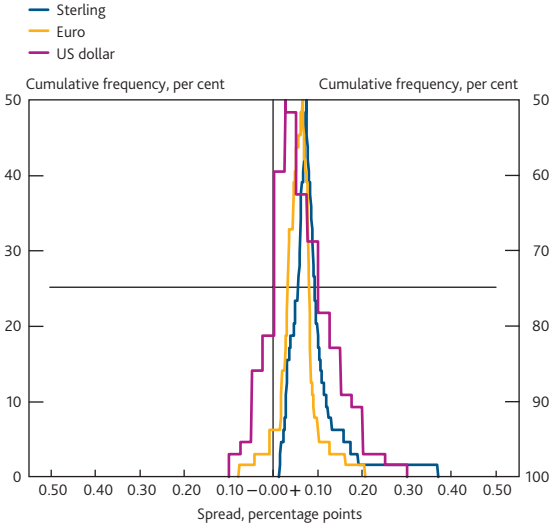
Reserves balances are remunerated at Bank Rate within a range around each bank's individual reserves target. As explained in previous *Bulletins*, remunerating reserves within a range about point targets helps to stabilise market interest rates.(1) Between the introduction of the Bank's current framework for its money market operations, in May 2006, and September 2007, this range was set at ±1%. The range was widened to ±30% between October 2007 and June 2008. Ahead of the July–August maintenance period it was announced that the range would be set at ±20%. Reserves banks have indicated that they were able comfortably to manage their reserves accounts balances within the slightly narrower range, which was retained for the August–September maintenance period.

One measure of the extent of active management of reserves is the degree to which actual reserves balances deviate from reserves targets during a maintenance period. Active management of reserves accounts would generally be associated with reserves banks choosing to hold balances that varied from their targets. The degree of active management, on this measure, was similar to the two previous maintenance periods, when the range within which reserves were remunerated was ±30%.

Short-dated interest rates

The Bank's operations in the sterling money markets aim to keep overnight market interest rates in line with Bank Rate, so that there is a flat risk-free money market yield curve, consistent with Bank Rate, out to the next MPC decision date. For the three maintenance periods under review, sterling overnight market interest rates tended to be comparably close to policy rates as euro and US dollar overnight rates (**Charts 34** and **35**).

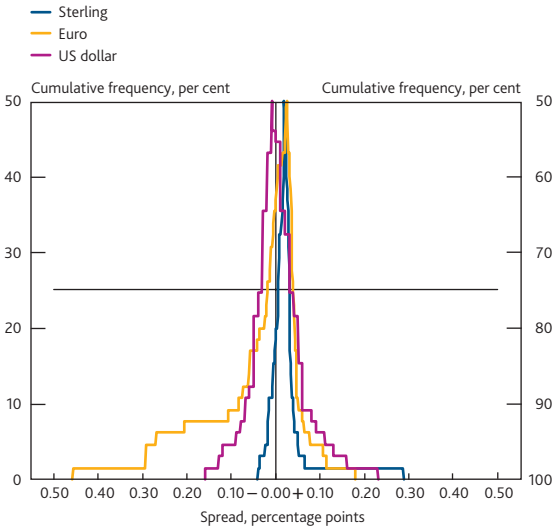
Chart 34 Folded cumulative distribution(a) of spread of international secured overnight interest rates to official interest rates for period 8 May–6 August 2008



Sources: ICAP and Bank calculations.

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

Chart 35 Folded cumulative distribution(a) of spread of international unsecured overnight interest rates to official interest rates for period 8 May–6 August 2008



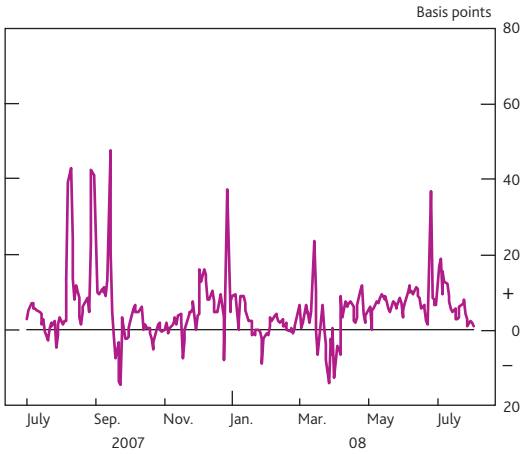
Sources: Wholesale Market Brokers' Association and Bank calculations.

(a) Distribution of the spreads 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.

(1) See Mac Gorain, S (2005), 'Stabilising short-term interest rates', *Bank of England Quarterly Bulletin*, Winter, pages 462–70.

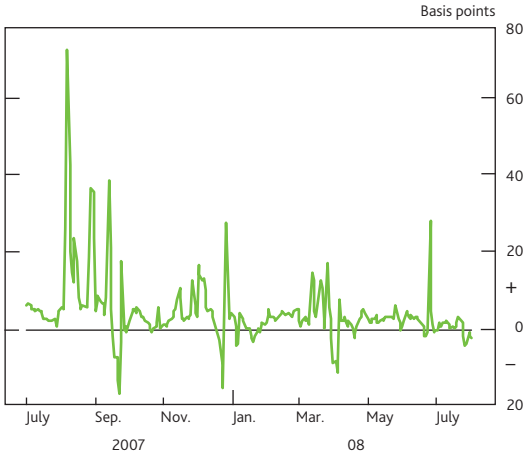
In the maintenance period beginning on 8 May, secured and unsecured overnight market interest rates were generally stable and close to Bank Rate (**Charts 36** and **37**).

Chart 36 Spread to Bank Rate of secured sterling overnight interest rate



Sources: BrokerTec and Bank calculations.

Chart 37 Spread to Bank Rate of unsecured sterling overnight interest rate



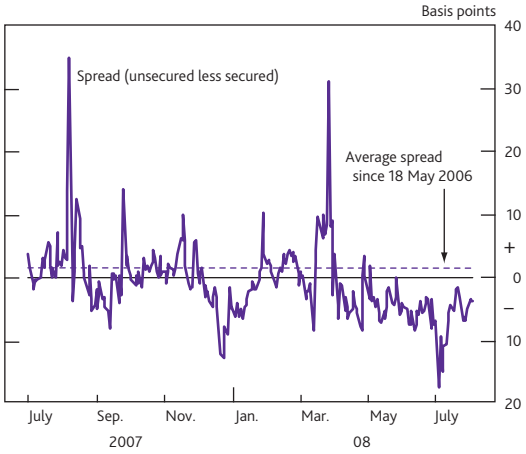
Sources: Wholesale Market Brokers' Association and Bank calculations.

In contrast, throughout the June–July maintenance period, there tended to be a wider spread between secured overnight interest rates and Bank Rate. And, unusually, secured overnight rates were higher than equivalent unsecured rates (**Chart 38**). The elevated spread of secured interest rates to Bank Rate was particularly evident around the half-year end when a temporary increase in the unsecured overnight rate was also evident.

The effectiveness of the reserves scheme in keeping market rates in line with Bank Rate depends on the willingness of reserves scheme members actively to manage their reserves balances in response to changes in market interest rates.

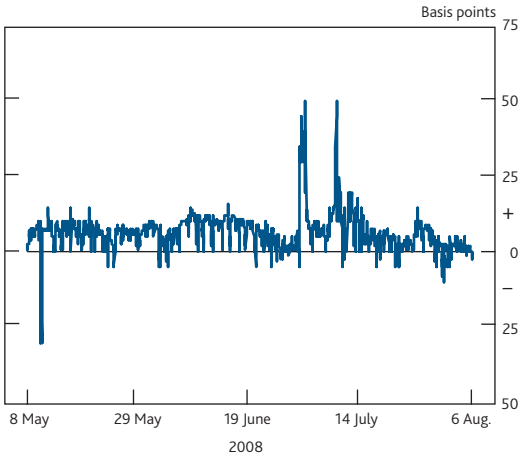
When secured rates rise significantly above Bank Rate, reserves banks have an incentive to run down their reserves balances and lend at the higher market rates. However, heightened uncertainty and balance sheet constraints associated with the half-year end may have led to some reserves scheme members preferring to hold higher reserves balances as a precautionary measure over this period. Further to this, some banks may have placed limits on interbank lending in order to reduce the size of their risk-weighted assets, as reported to regulators and published at the half-year end. Such a reduced willingness to lend would tend to place upward pressure on market interest rates. This period of elevated secured market rates continued for some days after the half-year end had passed, and after unsecured market rates had fallen back (**Chart 39**).

Chart 38 Spread between secured and unsecured sterling overnight interest rates



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

Chart 39 Spread to Bank Rate of intraday secured sterling overnight interest rate



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 equivalent maturity. However, overnight secured interest rates have tended to be higher than equivalent unsecured rates throughout the review period (**Chart 38**).

With secured overnight market interest rates above unsecured, market participants might be expected to utilise the unsecured market to finance secured lending and earn a 'risk-less' spread. However, money markets are typically fragmented, which may reduce the likelihood that such trades would be undertaken. For example, some financial institutions are generally able to participate only in the secured repo markets, while other institutions may predominantly be active in unsecured markets. In addition, those financial institutions best placed to take advantage of such a position may be prevented from doing so by balance sheet constraints, particularly around accounting period ends. As discussed in the box on page 260, such factors may also have contributed to the recent increases in term secured rates relative to OIS rates.

The spread between secured and unsecured market rates was most pronounced between the quarter end and the end of the June–July maintenance period, perhaps illustrating the persistence of balance sheet pressures amid a background of reduced market liquidity around the US holiday on 4 July.

Following the launch of the Special Liquidity Scheme (SLS) (see box on page 142 of the 2008 Q2 *Bulletin*), market contacts perceived that Treasury bills drawn under the SLS would add to the stock of collateral available to deliver against secured borrowings. This may have reduced the value attached to that collateral when used in repo transactions, and therefore increased secured rates. Some market contacts said that uncertainty about the quantity of bills created under the Scheme may also have contributed to the increase in secured rates, as holders of SLS bills financed these assets in the secured repo market.

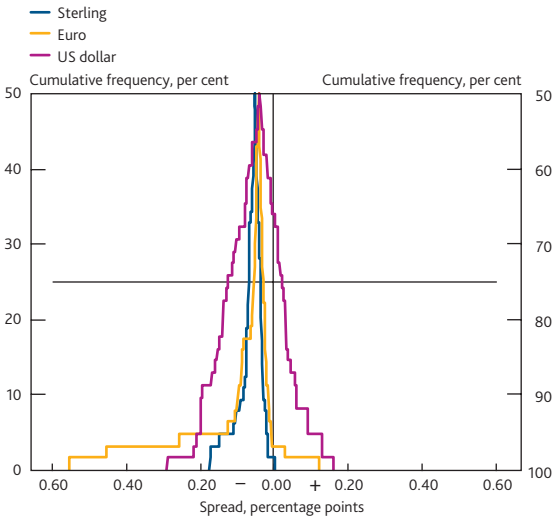
The spread between secured and unsecured overnight rates was not, however, just a sterling phenomenon. Euro secured overnight rates were also unusually high relative to both the equivalent unsecured rate and the euro-area policy rate reflecting the existence of balance sheet pressures across financial institutions globally (**Chart 40**).

The June–July maintenance period was also characterised by a more pronounced period of intraday volatility as secured rates traded above Bank Rate earlier in the day before easing in the afternoon. Such a trend may reflect intraday frictions brought about by continued market uncertainty, which may have reduced the propensity of market participants to enter the market until later in the day when liquidity positions were clear. However, while intraday rates were volatile around this period, the majority of transactions were at rates relatively close to Bank Rate.

In the July–August maintenance period, both secured and unsecured overnight rates traded closer to Bank Rate. Reflecting this, the distribution of secured market interest rates to Bank Rate was narrower than in the preceding maintenance period (**Chart 41**).

Secured rates with a maturity greater than overnight but shorter than the next MPC decision date also rose relative to policy rates (**Chart 42**). This was part of a general increase in secured borrowing rates, relative to other money market rates (as discussed earlier).

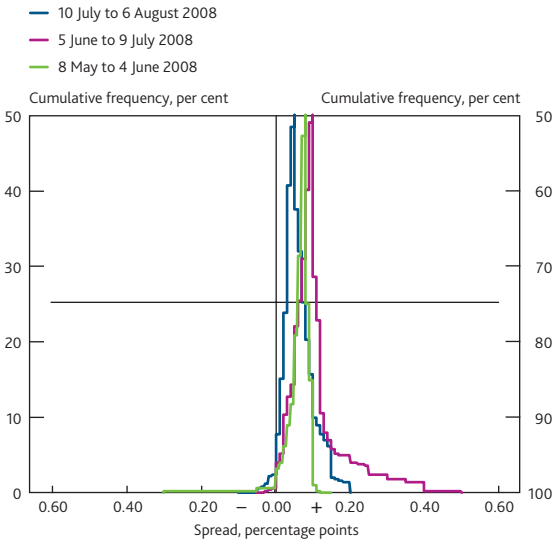
Chart 40 Folded cumulative distribution[(a)] of spread of international secured to unsecured overnight interest rates for period 8 May–6 August 2008



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

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

Chart 41 Folded cumulative distribution[(a)] of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate

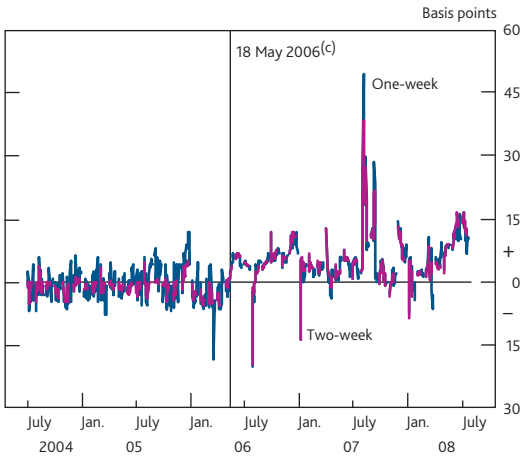


Sources: BrokerTec and Bank calculations.

(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.

Given their minimal credit and liquidity premia, swaps that settle on the OIS rates may offer the clearest read on expected future risk-free overnight market rates.(1) One and two-week sterling OIS rates averaged 3.4 and 3.8 basis points above Bank Rate over the review period respectively, consistent with a fairly flat profile for expectations of the future unsecured overnight rate (**Chart 43**).

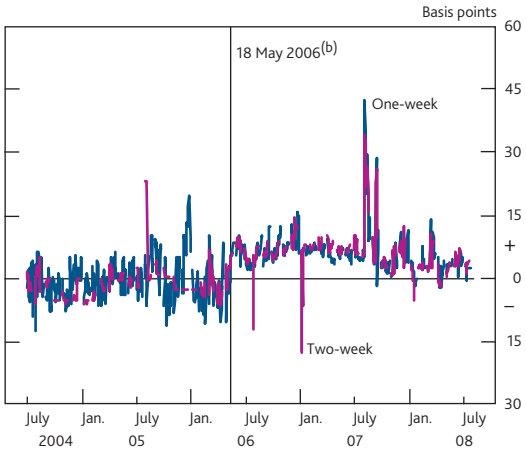
Chart 42 Spread to Bank Rate of one and two-week secured sterling market interest rates(a)(b)



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

(a) Uses BBA repo rates.
(b) When the one or two-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.
(c) Launch of the Bank's Sterling Monetary Framework.

Chart 43 Spread to Bank Rate of one and two-week sterling overnight index swap rates(a)



Sources: Bloomberg and Bank calculations.

(a) When the one or two-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.
(b) Launch of the Bank's Sterling Monetary Framework.

Open market operations

On 13 May the Bank announced, alongside the scheduled announcement of the size of the following week's long-term repo OMO, that it would maintain its expanded-collateral three-month long-term repo OMOs in its scheduled operations on 17 June and 15 July; and that, following the introduction of the Special Liquidity Scheme, these would be reduced in size to £5 billion. The wider range of high-quality collateral was the same as that accepted in the March and April operations and the structure of the operations was also the same. The May long-term repo OMO was offered against the same collateral as is eligible in the Bank's regular OMOs. All operations were covered at all maturities (**Table A**).

Table A Long-term repo operations

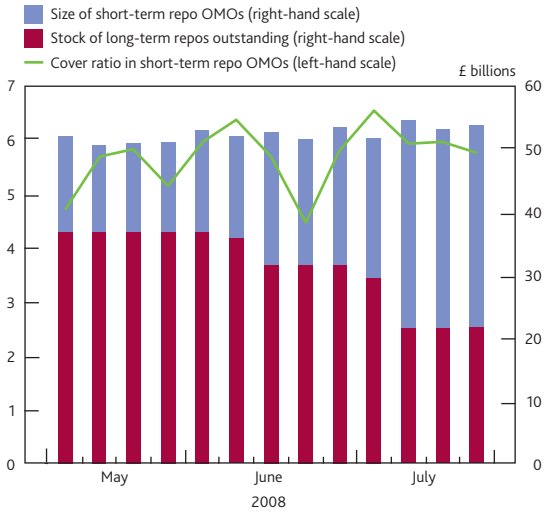
	Three-month	Six-month	Nine-month	Twelve-month
20 May 2008				
On offer (£ millions)	1,600	750	400	200
Cover	2.48	2.25	2.76	3.33
Weighted average rate(a)	5.095	5.093	5.130	5.155
Highest accepted rate(a)	5.150	5.105	5.130	5.155
Lowest accepted rate(a)	5.051	5.050	5.130	5.155
Tail(b)	4.38	4.30	0.00	0.00
17 June 2008				
On offer (£ millions)	5,000(c)	750	400	200
Cover	2.59	2.72	2.24	3.45
Weighted average rate(a)	5.579	5.420	5.480	5.632
Highest accepted rate(a)	5.845	5.600	5.700	5.850
Lowest accepted rate(a)	5.320	5.331	5.450	5.560
Tail(b)	25.90	8.87	3.00	7.20
15 July 2008				
On offer (£ millions)	5,000(c)	750	400	200
Cover	2.31	2.32	2.48	4.80
Weighted average rate(a)	5.500	5.483	5.505	5.701
Highest accepted rate(a)	5.800	5.750	5.750	5.800
Lowest accepted rate(a)	5.395	5.290	5.245	5.600
Tail(b)	10.50	19.32	26.03	10.05

(a) Per cent.
(b) The yield tail measures, in basis points, the difference between the weighted average accepted rate and the lowest accepted rate.
(c) June and July long-term repos were held against an expanded range of high-quality collateral.

The Bank aims to provide reserves sufficient for banks to meet their aggregate reserves targets over the maintenance period as a whole. The size of short-term repo OMOs therefore reflects the size of aggregate reserves targets, the provision of reserves through other operations and other flows (autonomous factors) across the Bank's balance sheet. The increase in aggregate reserves targets over the review period therefore contributed to an increase in the size of short-term repo OMOs. The reduction in the amounts offered in the longer-term repo operations mentioned above also contributed to an increase in the supply of short-term repo OMOs, with weekly operations rising in size to over £30 billion towards the end of the July–August maintenance period (**Chart 44**).

(1) See box on page 144 of the 2008 Q2 *Bulletin*.

Chart 44 Liquidity provided in OMOs and short-term OMO cover ratio(a)

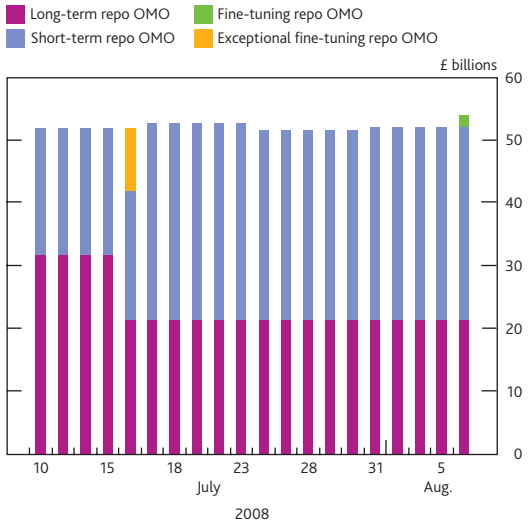


(a) Size of OMOs shown as weekly average amounts outstanding.

There was an end-maintenance period fine-tune at the end of each of the maintenance periods during this review period. In each case the operation was to supply liquidity. Fine-tunes held at the end of the May–June and July–August maintenance periods were fully covered. In the fine-tune held at the end of the June–July maintenance period, the Bank offered to supply £8.2 billion and received aggregate bids of £7.6 billion.

The reduction in the size of the expanded-collateral long-term repo OMO in July resulted in a difference between the value of the funds maturing on Wednesday 16 July from the April three-month long-term repo operation (£15 billion) and the size of July's three-month long-term repo operation (up to £5 billion). The Bank would, in any case, have offered to provide the difference in its scheduled short-term repo OMO on Thursday 17 July, consistent with the Bank's objective of supplying the quantity of reserves necessary for reserve banks, in aggregate, to meet their reserves targets for the maintenance period. However, in view of the large temporary reduction in the quantity of sterling reserves, the Bank offered to supply £10 billion of reserves at Bank Rate in an overnight exceptional fine-tuning OMO on 16 July (**Chart 45**). The 'Red Book' contains a provision for the Bank to conduct exceptional fine-tune operations 'if circumstances are such that this is needed to ensure a smooth pattern of reserves supply and so to achieve its rate-setting objectives'.(1) The fine-tune operation was oversubscribed, so the additional reserves offered were all supplied.

Chart 45 Outstanding OMOs on each day of the July–August maintenance period



Bond-purchase OMOs

As well as conducting short and long-term repo OMOs the Bank, in January 2008, began to provide reserves through bond-purchase OMOs.(2) Over the review period the Bank conducted three OMOs for the outright purchases of bonds, in accordance with screen announcements made on 1 April and 1 July. The May and July bond-purchase OMOs were fully covered at all maturities (**Table B**). The June OMO was very slightly uncovered in the medium sector, and the spreads between the highest accepted price and the lowest accepted price were higher in this sector relative to the other sectors.

The Bank intends, in due course, to begin providing reserves by holding OMOs to purchase high-quality foreign-currency denominated bonds, with the cash flows swapped into fixed-rate sterling. This will ensure that the Bank's purchases of gilts do not put undue pressure on the gilt market. The box on page 272 explains one feature of these operations.

Foreign currency reserves

There have been no significant developments in the Bank's holdings of foreign exchange reserves over the review period. The reserves now comprise around £2 billion of assets, funded by two, $2 billion three-year issues, under the Bank's programme of annual bond issuance which commenced in March 2007. With the third bond issue in the programme, due in early 2009, the Bank's reserves will reach the planned steady-state level of around £3 billion.

Facilitating the provision of payment services

In May, as previously reported, the Bank ceased to be a direct member of TARGET, the euro-area wholesale payments system. Prior to this, to facilitate UK participation in TARGET, the Bank held euro-denominated assets that were lent out each day by the Bank to generate intraday liquidity. These assets were funded by a series of Euro Notes of which the final one, for €3 billion nominal, will mature on 27 January 2009.

(1) See *The Framework for the Bank of England's Operations in the Sterling Money Markets* (the 'Red Book') available at www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.
(2) See box on pages 22–23 of the 2008 Q1 *Bulletin*.

Table B Issue Department gilt-purchase OMO

	Amount purchased (£ millions)	Sector cover ratio	Weighted average accepted price	Highest accepted price	Lowest accepted price	Tail[a]
2 June 2008						
Short		4.64				
UKT 5.25% 07/06/12	80.99		101.289	101.310	101.280	0.021
UKT 8% 27/09/13	102.92		114.157	114.210	114.090	0.053
Medium		6.93				
UKT 4.75% 07/03/20	47.11		97.423	97.440	97.390	0.017
UKT 8% 07/06/21	76.79		127.649	127.670	127.610	0.021
Long		7.16				
UKT 4.25% 07/12/27	38.49		91.678	91.680	91.660	0.002
UKT 6% 07/12/28	53.46		113.802	113.860	113.750	0.058
Total purchased[b]	399.76					
23 June 2008						
Short		3.29				
UKT 5.25% 07/06/12	114.95		99.886	99.899	99.875	0.013
UKT 8% 27/09/13	68.99		112.285	112.300	112.250	0.015
Medium		0.99				
UKT 4.75% 07/03/20	122.47		96.571	96.649	96.500	0.078
Long		3.29				
UKT 5% 07/03/25	45.93		99.018	99.020	99.000	0.002
UKT 6% 07/12/28	45.91		112.527	112.625	112.519	0.098
Total purchased[b]	398.25					
28 July 2008						
Short		4.56				
UKT 5.25% 07/06/12	114.92		101.134	101.140	101.124	0.006
UKT 8% 27/09/13	69.01		113.881	113.900	113.850	0.019
Medium		2.71				
UKT 4.75% 07/03/20	123.93		97.444	97.469	97.430	0.025
Long		3.90				
UKT 4.25% 07/12/27	38.07		91.577	91.634	91.570	0.057
UKT 6% 07/12/28	53.87		113.766	113.797	113.760	0.031
Total purchased[b]	399.80					

(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.

Balance sheet

Notwithstanding the rise in aggregate reserves targets for the period under review, the size of the Bank's liabilities fell between the first and last days of the review period. This was mainly on account of a small decrease in aggregate reserves balances and a fall in foreign currency liabilities (**Table C**).

As described above, balance sheet developments over the review period largely reflected changes in composition rather than aggregate size. This included a reduction in the stock of long-term repo OMOs outstanding, offset by an increase in the stock of short-term repo OMOs on the Bank's balance sheet.

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. The Bank's 'free' capital and cash ratio deposits are invested in a portfolio of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity; nevertheless sales may be made from time to time, reflecting for example, risk management, liquidity management or changes in investment policy.

The bond portfolio currently includes around £3 billion of gilts and £1 billion of other debt securities. Purchases are generally made each month with purchase details announced in advance on the Bank's wire service pages. Over the current review period, gilt purchases were made in accordance with the announcements on 25 March and 1 July: £20 million each in May, June and July.

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

During the review period, legislation was passed to implement a change in the cash ratio deposits ratio from 0.15% to 0.11% of eligible liabilities.[1] In consequence, the amount of cash ratio deposits held by the Bank fell by around £650 million. Other things being equal, the repayment would have caused a reduction in the size of short-term repo OMOs. However, as described above, this was more than offset by other factors which served to increase the size of those operations.

(1) The results of HM Treasury's review into the Cash Ratio Deposit Scheme can be found at www.hm-treasury.gov.uk/media/6/8/consult_cashratiodeposits020408.pdf.

Table C Simplified version of Bank of England consolidated balance sheet[a][b]

£ billions

Liabilities	6 Aug.	7 May	Assets	6 Aug.	7 May
Banknote issue	43	42	Short-term sterling reverse repo	34	20
Reserves account balances	29	31	Long-term sterling reverse repo	22	37
Standing facility deposits	0	0	Ways and Means advance	0	0
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	12	13	Standing facility assets	0	0
Foreign currency denominated liabilities	12	15	Other sterling-denominated assets	26	27
			Foreign currency denominated assets	14	17
Total[c]	**96**	**101**	**Total**[c]	**96**	**101**

(a) The Bank Charter Act 1844 requires the Bank of England to separate the note issue function from its other activities. Accordingly, the Bank has two balance sheets: for Issue Department and Banking Department. See 'Components of the Bank of England's balance sheet' (2003), *Bank of England Quarterly Bulletin*, Spring, page 18.
(b) Based on published weekly Bank Returns. The Bank also uses currency, foreign exchange and interest rate swaps to hedge and manage currency and non-sterling interest rate exposures — see the Bank's 2006 *Annual Report*, pages 36–37.
(c) Figures may not sum to totals due to rounding.

Assessing the relative value of offers for foreign currency bonds in the Bank's OMOs

In January 2008, the Bank introduced open market operations (OMOs) to inject reserves via the outright purchase of bonds.(1) To date, these operations have involved the purchase of UK government bonds (gilts) but the Bank intends to start purchasing high-quality foreign-currency denominated bonds with the cash flows swapped into fixed-rate sterling payments. This box explains how the Bank will assess the attractiveness of offers received in the tenders, and hence decide which to accept.

For an individual bond, offers can easily be ranked against each other. But the Bank also considers the 'relative value' of offers across different bonds. This helps to ensure that OMOs have broadly neutral effects on relative asset prices. For example, if a specific bond was temporarily in relatively short supply or subject to high demand, it may be desirable to buy less of this bond and more of a close substitute. However, the Bank will consider relative value only across bonds of similar maturities, consistent with not taking views on the shape of the yield curve.

Structure of tenders

Tenders for foreign currency bonds will be conducted in the same way as for gilts.(2) To spread purchases across different maturity segments of the yield curve, in each OMO the Bank will buy up to two bonds from each of three segments (1–7 years, 8–13 years and 14–21 years). And where possible the Bank will choose pairs of bonds with similar maturities (ie within the same two or three-year maturity bucket). If more than two bonds are eligible for purchase within a maturity bucket, one week before the tender the Bank will choose two on the basis of their relative richness or cheapness to a fitted UK government curve (ie a risk-free sterling yield curve as the Bank will effectively be buying high-quality fixed-rate sterling assets).

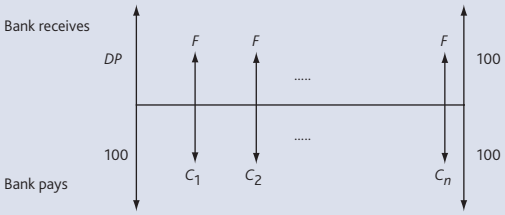
In bond-purchase OMOs, the Bank will offer to purchase a fixed total value of bonds in each maturity bucket. A predefined minimum amount of each bond will be purchased, but the remaining amount will be allocated on the basis of 'relative value'. Specifically, offers will be ranked based on their attractiveness relative to market prices at the close of the tender. For gilt tenders, these market prices are sourced from the UK Debt Management Office. However, there is no comparable source for market rates on asset-swapped foreign currency bonds, so these will be estimated by the Bank.

Evaluating market rates for asset-swapped foreign currency bonds

By purchasing an asset-swapped foreign currency bond, the Bank will effectively be buying a 'package' of transactions that result in a future stream of fixed-rate sterling payments. Although market quotes for such packages are not readily observable from data providers, market rates for each of the constituent parts of the package are available. Hence the Bank can estimate a market price for each asset-swap package.

Specifically, evaluating each asset-swap package involves calculating the fixed interest rate, F, which delivers a stream of sterling cash flows equivalent (at the time of valuation) to the stream of foreign currency payments on the underlying bond. **Figure 1** outlines the overall structure of the package. The Bank will pay par, or 100, for a bond with a 'dirty price',(3) DP, that pays a series of fixed coupons, C. And the asset-swap package will ensure that the Bank receives sterling cash flows, F, until the bond is redeemed at par. To construct these packages, counterparties will arrange to swap the fixed cash flows from foreign currency bonds into floating payments, then swap these into floating sterling payments, and finally swap these into fixed sterling cash flows.

Figure 1 Illustrative cash flows on a foreign currency bond asset swap



To estimate F the Bank will equate the net present value (NPV) of each side of **Figure 1**, such that the stream of sterling cash flows are equivalent to foreign currency payments on the bond based on market rates at the time of valuation. To evaluate NPV the different cash flows are discounted using a yield curve for the appropriate currency; ie sterling cash flows will be discounted using a sterling yield curve, euro cash flows using a euro curve, etc. These curves are derived using instruments that settle on Libor fixings, using a cubic interpolation technique that seeks to fit all observed market prices. In addition, account will be taken of the cost, or basis, associated with the currency swap element of the transaction, which can be observed from market prices of so-called basis swaps.

Discussions with market contacts suggest that the method to be used by the Bank for calculating market rates for asset-swap packages is consistent with market practice.

(1) See box on pages 22–23 of the 2008 Q1 *Bulletin*.
(2) See *The Framework for the Bank of England's Operations in the Sterling Money Markets*, www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.
(3) A bond's dirty price includes interest accrued between coupon dates. The Bank pays par because the tenders will be for so-called 'par-par' asset swaps, where the sterling payments at purchase and maturity of the swap are derived from the nominal (rather than market) value of the foreign currency bond. This reflects feedback from market participants following the Bank's public consultation on outright purchases (see www.bankofengland.co.uk/markets/money/omo/outright_purchases.htm).