

Quarterly Bulletin

2009 Q2 | Volume 49 No. 2



BANK OF ENGLAND





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Foreword

The Monetary Policy Committee (MPC) has responded to the financial crisis and ensuing recession with an aggressive easing in monetary policy. Over a matter of months, Bank Rate has been cut from 5% to an historic low of just 0.5%. In addition, the MPC has begun a programme of large-scale asset purchases sometimes termed 'quantitative easing'. The aim of these purchases is to boost nominal spending in order to keep inflation on track to meet the 2% inflation target. The article 'Quantitative easing' in this edition of the *Quarterly Bulletin*, explains the rationale for using asset purchases and describes the different channels through which they may work to increase nominal spending. It also discusses the different factors that will determine how effective these channels might be. As with Bank Rate, the MPC will continue to monitor the effectiveness of this policy action and review the appropriate scale of asset purchases at its monthly policy meetings.

The regular *Markets and operations* report in this edition of the *Bulletin* reviews recent developments in sterling financial markets and the Bank's official operations, including the Bank's implementation of the MPC's asset purchase programme. Market contacts reported the prices of riskier assets, such as equities and corporate bonds, had been helped by an increase in investors' willingness to hold these assets. Conditions in bank funding markets eased, with short-term interbank borrowing spreads narrowing, although contacts cautioned that the improvement remained fragile.

Inflation expectations play a key role in determining the path of inflation and the MPC monitors surveys of inflation expectations closely. The Committee also pays close attention to the way in which households and companies form their expectations, since this can affect the persistence of any deviation of inflation from target. Since 1999, the Bank has conducted a quarterly survey of inflation expectations which provides a valuable source of information. The most recent results, discussed in this edition, indicate that households' near-term inflation expectations have fallen markedly over the past year in response to a range of economic factors. Longer-term inflation expectations, which are more closely anchored to the inflation target, were somewhat higher.

The housing market weakened significantly during 2008 and by Spring 2009 nominal house prices had fallen by the largest amount on record. Lower house prices can push some households into negative equity, meaning the current value of their house is less than their mortgage. In addition to the considerable financial and personal difficulties that may arise for households faced with this situation, the extent of negative equity can have wider economic and financial consequences. As such, it is important for the Bank and the Monetary Policy Committee to be able to measure and monitor developments in negative equity. Unfortunately, since there are no accurate data measuring the scale of negative equity it is necessary to estimate it. The article in this edition discusses the potential macroeconomic and financial implications of negative equity and presents three different approaches to estimating its scale. The estimates, all of which are imperfect, suggest that between 7%–11% of UK owner-occupier mortgagors were in negative equity in the first quarter of this year. However, the estimates show that the vast majority of households in our economy had substantial equity in their homes and, for the majority of households who were in negative equity, the size of that negative equity was relatively small.

This edition also includes a review of the work of the London Foreign Exchange Joint Standing Committee in 2008. The Committee was established in 1973, under the auspices of the Bank of England, as a forum for bankers and brokers to discuss broad market issues.

A handwritten signature in dark ink that reads "Spencer Dale". The signature is written in a cursive, flowing style with a long horizontal stroke at the bottom.

Spencer Dale

Chief Economist and Executive Director — Monetary Analysis and Statistics.

Research work published by the Bank is intended to contribute to debate, and does not necessarily reflect the views of the Bank or of MPC members.

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The contents page, with links to the articles in PDF, is available at
www.bankofengland.co.uk/publications/quarterlybulletin/index.htm

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The speeches contained in the *Bulletin* can be found at
www.bankofengland.co.uk/publications/speeches/index.htm

Except where otherwise stated, the source of the data used in charts and tables is the Bank of England or the Office for National Statistics (ONS). All data, apart from financial markets data, are seasonally adjusted.

Recent economic and financial developments



Markets and operations

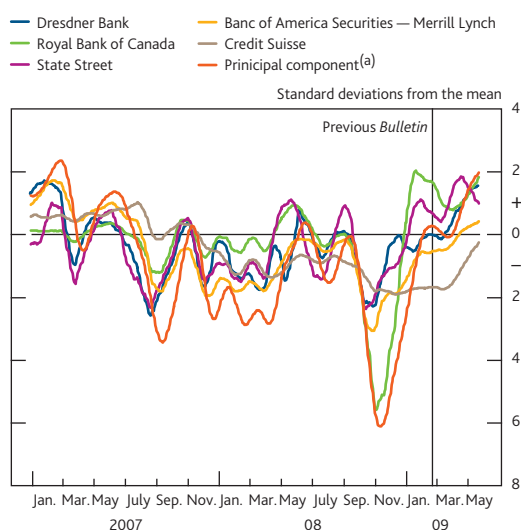
This article reviews developments in sterling financial markets since the 2009 Q1 *Quarterly Bulletin* up to 22 May 2009. The article also reviews the Bank's official operations during this period.

Sterling financial markets⁽¹⁾

Overview

Financial markets generally recovered from their recent lows in early March, amid signs that the rate of contraction of economic activity in the United Kingdom and elsewhere may have slowed and reduced concerns about the fragility of banks. Conditions in bank funding markets reportedly improved a little, with short-term interbank borrowing spreads narrowing toward levels observed prior to the failure of Lehman Brothers last September. More generally, contacts reported some modest pickup in investor risk appetite (Chart 1), which helped to boost the prices of risky assets such as equities and corporate bonds both in the United Kingdom and other countries. This was accompanied by a pickup in capital market issuance as firms raised alternative forms of finance to bank credit.

Chart 1 Proxy measures of risk appetite



Sources: Banc of America Securities — Merrill Lynch, Credit Suisse, Dresdner Bank, Royal Bank of Canada, State Street and Bank calculations.

(a) Principal component analysis was applied to 20-day rolling moving averages of the five individual measures of risk appetite produced by selected financial institutions.

UK government bond yields were volatile, which contacts said partly reflected news about actual and prospective sales and purchases of gilts by the official sector. In particular, the Bank

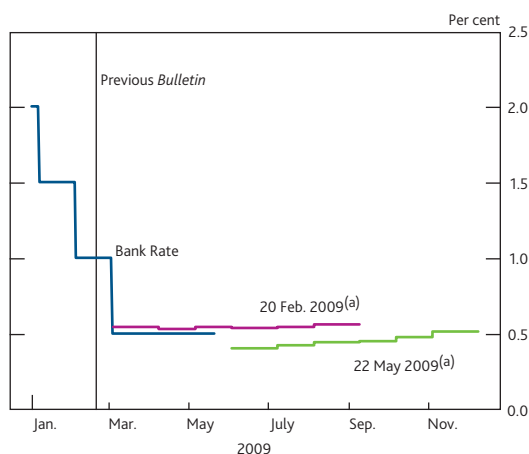
commenced its programme of asset purchases financed by central bank reserves in March and the planned scale of these purchases was subsequently increased by the Bank of England's Monetary Policy Committee (MPC) at its May meeting. In addition, the UK Government outlined its plans for increased public sector borrowing.

The UK (and global) macroeconomic outlook, however, remained highly uncertain with significant upside and downside risks. As a result, contacts suggested that sentiment in sterling markets remained fragile and that the actions of the UK authorities to support financial systems and ease overall credit conditions remained important to sustaining the improvement in the outlook for the UK economy.

Recent developments in sterling capital markets Monetary policy implementation

The MPC announced on 5 March that Bank Rate would be reduced by 0.5 percentage points to 0.5%. Interest rates on sterling overnight index swaps (OIS) suggested that market participants expected Bank Rate to remain at 0.5% until at least the end of 2009 (Chart 2).

Chart 2 Bank Rate and forward market interest rates



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

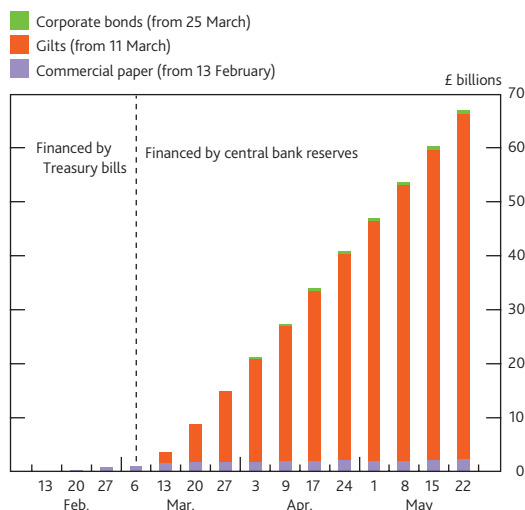
(1) The data cut-off for this section is 22 May.

Earlier in the year, the Bank had established an Asset Purchase Facility (APF) with the initial objective to improve the functioning of corporate credit markets by making purchases of high-quality private sector assets financed by the issuance of Treasury bills. In addition to reducing Bank Rate on 5 March, the MPC also announced that the Bank would use the APF as a monetary policy tool and undertake a programme of asset purchases financed by the issuance of central bank reserves.⁽¹⁾ This purchase programme involved purchasing £75 billion of assets within three months. Subsequently, on 7 May the MPC voted to increase the scale of purchases by £50 billion to a total of £125 billion by early August.

The purpose of these asset purchases was to boost the supply of money in the economy, ease conditions in corporate credit markets and, ultimately, to raise the rate of growth of nominal demand to ensure inflation meets the 2% inflation target in the medium term.⁽²⁾ To this end, the Bank started buying UK government debt and high-quality private sector assets. In order to reach the specified total for asset purchases, the majority of purchases were UK gilts.

As of 22 May, asset purchases totalled about £67 billion, of which about £66 billion were financed by central bank reserves (Chart 3). And further asset purchases were made in the final week of May to bring the total of assets purchased to £73.5 billion. More details of these purchases are provided on pages 81–83. In addition, the box on pages 70–71 reviews the APF's purchases of private sector assets.

Chart 3 Cumulative APF asset purchases by type



Changes to the Bank's sterling monetary framework

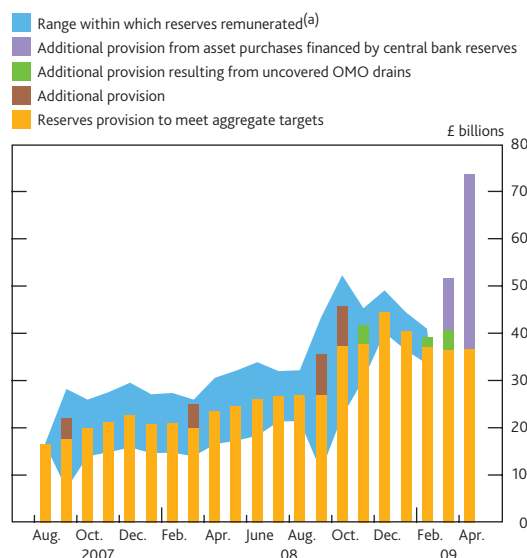
As a consequence of the MPC's decision to finance asset purchases through the issuance of central bank reserves, the Bank announced a number of changes to the sterling monetary framework. In particular, with effect from 5 March, *all* reserves balances held by commercial banks at the Bank were remunerated at Bank Rate. And the usual system, in which

these banks choose monthly reserves targets to achieve on average over a maintenance period, was suspended.⁽³⁾

The Bank also announced that its operational approach would be, broadly, to ensure a net supply of reserves around the aggregate level of reserves targets initially set by participants for the March maintenance period, plus the amount of reserves injected via the Bank's programme of asset purchases.

Prior to these changes, aggregate reserves targets for the February maintenance period decreased but remained high relative to their average since the launch of the reserves scheme in May 2006 (Chart 4). Reserves subsequently increased broadly in line with the amount injected by asset purchases. The Bank's market operations are described in more detail on pages 81–86.

Chart 4 Aggregate reserves targets and reserves provision



(a) With effect from 5 March, all reserves balances held by reserves banks were remunerated at Bank Rate.

Short-dated market interest rates

Before the changes to the sterling monetary framework described above, with the exception of a brief spike on 16 February, sterling secured overnight interest rates tended to trade a little below Bank Rate during the February maintenance period (Chart 5).

The decision to remunerate any positive level of reserves balances at Bank Rate removed the interest rate incentive for reserves scheme members to lend funds in the overnight

- (1) The Asset Purchase Facility is described in more detail on page 26 of the 'Markets and operations' article in the 2009 Q1 *Quarterly Bulletin*.
- (2) This use of asset purchases for monetary policy purposes is described in the May 2009 *Inflation Report*, pages 16–17 and the February 2009 *Inflation Report*, pages 44–45 and is discussed in more depth in the article on pages 90–100 of this *Quarterly Bulletin*.
- (3) However, this article continues to use the term 'maintenance period' for convenience to refer to the period between one MPC decision date and the next.

Purchases of private sector assets by the Bank's Asset Purchase Facility

The objective of the Bank's purchases of high-quality private sector assets is to improve the liquidity in, and increase the flow of, corporate credit. This box reviews the purchases of private sector assets, and describes some measures that may help to assess progress against the objectives of the Asset Purchase Facility (APF).

The Bank began purchasing commercial paper (CP) on 13 February and the first purchases of corporate bonds were made on 25 March. Initial purchases of CP were financed by the issuance of Treasury bills. Since 6 March, private sector asset purchases were financed by the issuance of central bank reserves.⁽¹⁾

Commercial paper facility

The APF offers to purchase, at a minimum spread over risk-free rates, CP in the primary market via dealers, and from other eligible counterparties in the secondary market. The aim is to channel funds directly to parts of the corporate sector in the United Kingdom while also underpinning secondary market activity, and so removing obstacles to corporate access to capital markets. In particular, it was anticipated that issuers could sell CP to the APF if it were economic for them to do so. But if spreads demanded by other investors were to fall, in due course corporates' usage of the APF might decline.

As of 21 May, net purchases of CP amounted to £2.2 billion. The vast majority of purchases were in primary markets. On average, the total amount outstanding of non-bank sterling CP was a little higher than in the period before the previous *Bulletin*, but the sterling corporate CP market remained small (**Chart A**).

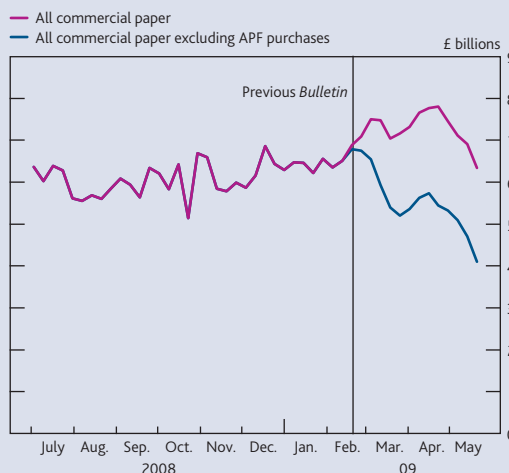
The APF offers to purchase CP with a minimum short-term credit rating of A3/P3/F3. The stock of lower-rated CP outstanding increased, suggesting the APF facilitated access to short-term finance for these issuers. The APF's purchases of higher-rated CP have, in contrast, partly substituted for issuance to other investors, suggesting that the APF reduced the cost of funding for issuers of those securities.

Indicative data for issuance prices of CP in primary markets to non-APF investors suggests that spreads narrowed, particularly for lower-rated corporates, towards the rates at which the APF offers to purchase CP. Some corporates benefited from issuing to other investors at these lower rates.

Corporate bond secondary market scheme

On 25 March the Bank began purchases of high-quality corporate bonds. The focus of the corporate bond scheme is

Chart A Sterling commercial paper outstanding for UK corporates and non-bank financial firms^(a)



Sources: CP Ware and Bank calculations.

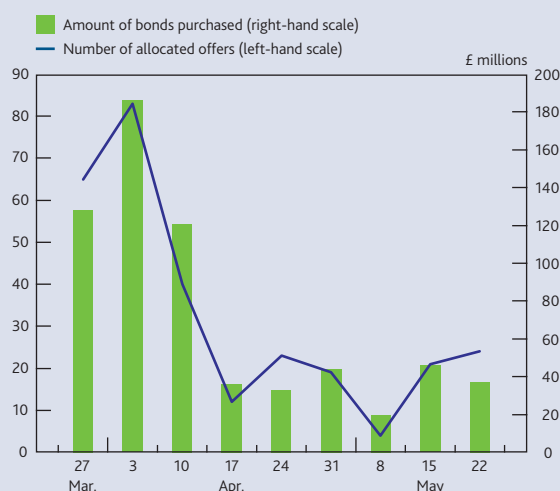
(a) Public issues recorded in Euroclear.

to facilitate secondary market activity, to help to reduce liquidity premia on high-quality corporate bonds, and so improve firms' access to capital markets. Secondary markets for corporate bonds had become impaired during the financial crisis partly due to greater reluctance by banks to hold bonds on their balance sheets between buying bonds and selling them to other investors. This resulted in the pricing of securities becoming increasingly opaque. It was anticipated that the APF could help to improve price discovery and transparency by offering to make regular small purchases of a wide range of high-quality corporate bonds. This would help to establish pricing points and potentially improve secondary market liquidity. In turn this should act to reduce illiquidity premia in corporate spreads and so the cost of finance to corporates in the primary issuance markets.

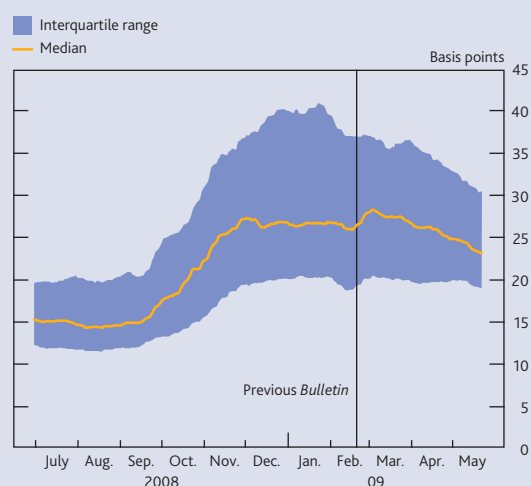
Consistent with the objective to make frequent but small purchases, in the first three weeks of the Scheme, the APF established prices for on average of around 60 bonds per week. These initial sales allowed holders of those bonds to readjust their portfolios. Subsequently, the APF on average made around 17 purchases a week (**Chart B**).

There is some evidence that the Bank's purchases helped to improve price transparency in secondary markets. Contacts reported that the disclosure of auction results reduced the uncertainty for all investors in valuing their portfolios. Consistent with that, the distribution of dealers' offers within the auctions for each security narrowed. And there were some indications that bid-ask spreads for eligible sterling corporate bonds started to narrow slightly (**Chart C**).

Sterling corporate bond spreads declined over the period of the scheme. However, the reduction in spreads occurred

Chart B Weekly purchases of sterling corporate bonds

Source: CP Ware.

Chart C Bid-ask spreads on sterling corporate bonds^(a)

Source: UBS Delta

(a) Ten-day moving average of bid-ask spreads for sterling corporate bonds eligible for the APF.

alongside an overall improvement in sentiment in global credit markets (Chart 17 on page 78) and the improvement in liquidity conditions in the sterling corporate bond market may not simply reflect the increased demand for bonds linked to the Bank's purchases. Primary issuance was strong since the beginning of 2009 and this trend continued since the launch of the APF. Market contacts suggested that credit market functioning improved more generally. And lower-rated corporates were seen to be better able to issue and there were tentative signs of new issuance premia starting to fall.

Credit Guarantee Scheme bonds

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

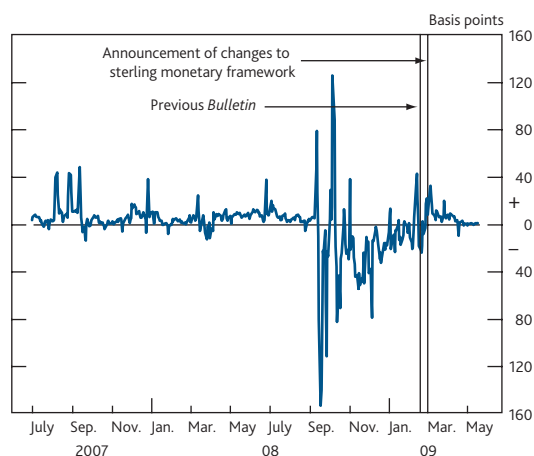
Proposals for working capital facilities

On 8 June, the Bank released a consultative paper setting out proposed extensions to the APF. The Bank announced that it intended to introduce in the near future a secured commercial paper facility to support the provision of working capital to a broad population of companies. The facility would be designed to contribute to the APF's objectives of improving liquidity in credit markets that were not functioning normally.⁽²⁾

(1) This use of asset purchases for monetary policy purposes is described in the May 2009 *Inflation Report*, pages 16–17 and the February 2009 *Inflation Report*, pages 44–45 and is discussed in more depth in the article on pages 90–100 of this *Quarterly Bulletin*.

(2) For further details see www.bankofengland.co.uk/markets/apf/consultation090608.pdf.

Chart 5 Spread to Bank Rate of secured sterling overnight interest rate



Sources: BrokerTec and Bank calculations.

market at rates below Bank Rate. On the other hand, the rate paid on the Bank's Operational Standing Deposit Facility was reduced to zero, so non-reserves scheme members would have found it attractive to lend overnight at any positive interest rate.

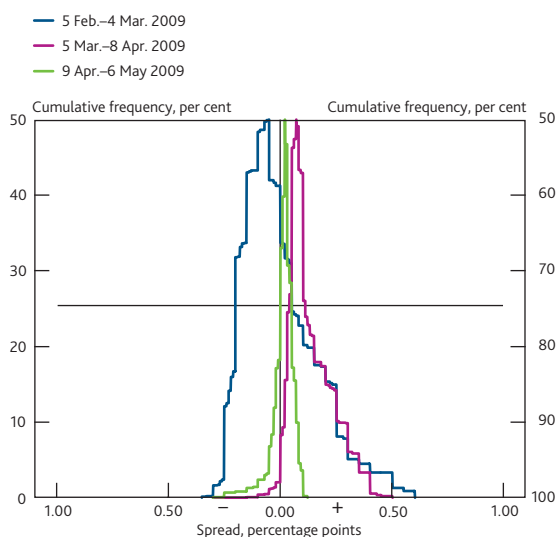
On balance, sterling secured overnight rates generally traded above Bank Rate during March. But as an increasing amount of reserves was supplied through the asset purchase programme, the secured overnight rate fell and traded close to Bank Rate during April and May (Chart 5). There was also a narrowing in the distribution of the spread of sterling secured overnight interest rates to Bank Rate (Chart 6).

Secured overnight interest rates continued to be higher than unsecured overnight interest rates, as measured by sterling overnight index average (SONIA) rates (Chart 7). In principle, one might expect market participants to finance secured lending by borrowing in the unsecured market in order to profit from this difference, which would tend to eliminate or at least reduce such a spread. As mentioned in previous *Bulletins*, fragmentation of money markets may have prevented this.⁽¹⁾ In particular, the type of participant in each market may influence observed market interest rates. For example, borrowers whose access to unsecured funds has been restricted due to credit concerns may have been constrained to borrow in the secured market. At the same time, unsecured markets may contain proportionately more participants without access to reserves accounts at the Bank, such as non-bank financial institutions, seeking to lend cash balances. Taken together, both factors may have lowered unsecured rates relative to secured rates.

However, an alternative measure of sterling unsecured funding rates — the overnight London interbank offered rate (Libor) — tended to be closer to secured rates than SONIA. This may have reflected differences in the way the two measures of

unsecured overnight rates are compiled. Specifically, SONIA is a weighted average of interest rates on transactions conducted via brokers each day. In contrast, overnight Libor reflects quoted interest rates collated across a panel of 16 banks which are surveyed at a particular time each morning.

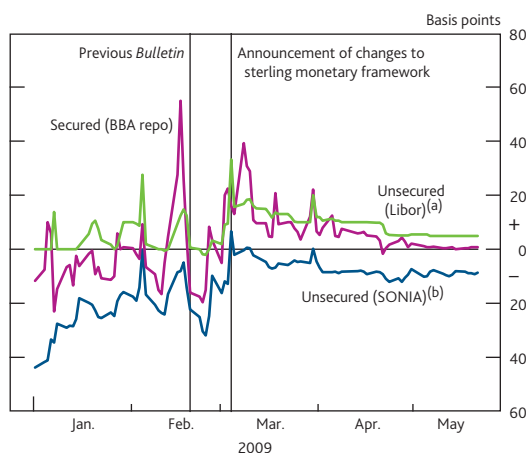
Chart 6 Folded cumulative distribution^(a) of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate



Sources: BrokerTec and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and Bank 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 7 Spread to Bank Rate of sterling overnight interest rates



Sources: Bloomberg and Bank calculations.

(a) London interbank offered rate.
(b) Sterling overnight index average.

Bank funding markets

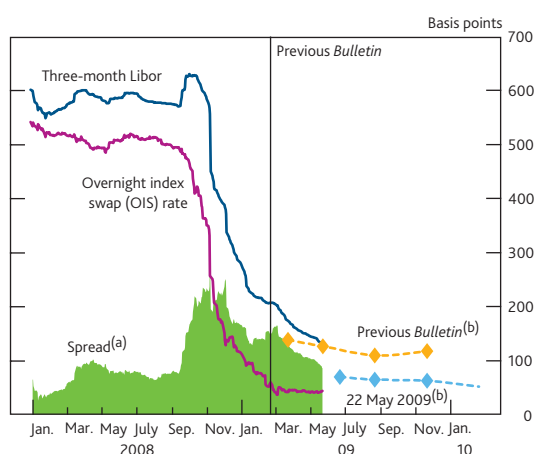
Conditions in sterling interbank money markets at slightly longer maturities reportedly improved noticeably over recent

(1) For example, see the box, 'Why have secured funding spreads increased recently?', on page 260 of 2008 Q3 *Quarterly Bulletin*.

months. And perhaps consistent with that, there was reduced demand for three-month loans in the Bank's May long-term repo operations against extended collateral. The results of these operations are reported on pages 83–84.

Three-month Libor fell further and the spread to equivalent maturity OIS rates narrowed towards levels observed before the failure of Lehman Brothers in September 2008 (**Chart 8**).

Chart 8 Three-month interbank rates and spreads relative to OIS rates



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

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

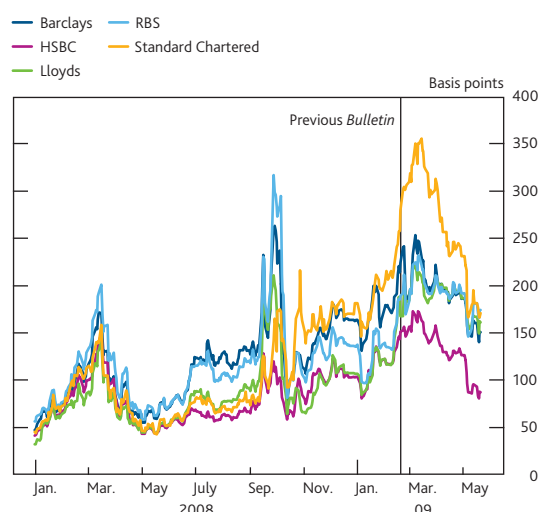
(b) Three-month Libor forward spreads over equivalent-maturity forward OIS rates.

Contacts suggested a number of reasons for the narrowing of this spread. The general improvement in market sentiment and risk appetite may have lowered the required risk compensation for lending to other banks. Some contacts also suggested that APF purchases from asset managers may have resulted in part of the proceeds being placed as term deposits with banks. Similarly, the sharp increase in banks' holdings of central bank reserves (**Chart 4**), as a result of the Bank's asset purchases, might have made banks more comfortable with lending, or reduced their need to borrow, at short horizons in the term interbank market.

Contacts reported, however, that the scale of lending, particularly at maturities beyond three to six months, remained limited. And the dispersion in borrowing rates submitted by banks that make up the sterling Libor panel increased, indicating continued differentiation across borrowers in interbank markets.

Alongside the compression in Libor-OIS spreads, major UK banks' credit default swap (CDS) premia fell, but remained elevated (**Chart 9**). Contacts attributed these recent falls at least in part to the various official policy measures which appeared to stabilise perceptions about the creditworthiness of the UK banking sector.

Chart 9 Selected major UK banks' credit default swap premia^(a)

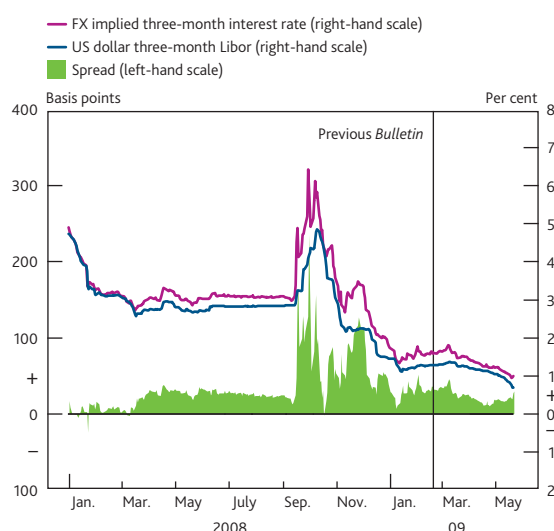


Source: Markit Group Limited.

(a) Five-year, senior CDS premia.

Pressures associated with obtaining US dollar funding in cross-currency swap markets also continued to abate, albeit only gradually. Indicative of that, the spread between the implied interest cost of borrowing US dollars via cross-currency swaps and US dollar Libor narrowed, having widened in early March (**Chart 10**). Participation in the Bank's US dollar repo operations also fell (**Chart 33** on page 86).

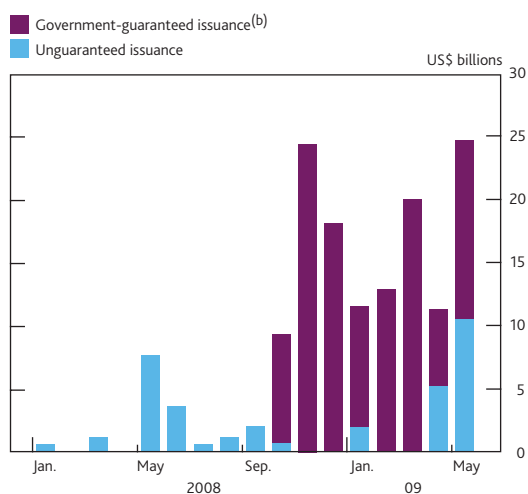
Chart 10 Three-month US dollar Libor rates and implied three-month rates from exchange rate forwards^(a)



Sources: Bloomberg, Reuters and Bank calculations.

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

Funding conditions for banks also improved in debt markets. Senior debt issuance by UK banks continued. Moreover, in contrast to previous months, a larger proportion of this debt was issued without a government guarantee (**Chart 11**).

Chart 11 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.

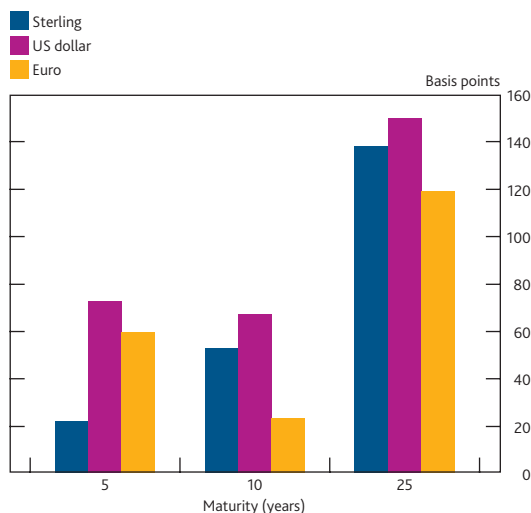
Despite these signs of improved funding conditions, securitisation markets, which had been an important source of longer-term funding for banks prior to the financial crisis, displayed few signs of recovery. The primary market for UK residential mortgage-backed securities (RMBS) remained closed. Likewise there was only limited activity in secondary markets.

In April, the UK Government announced a guarantee scheme for newly issued RMBS backed by UK mortgages. For a fee, eligible issuers can choose between a credit guarantee (ensuring the timely payments of all amounts due) and a liquidity guarantee (whereby in the event that the issuer fails to meet a call or purchase obligation, the Treasury will purchase the instrument from the holder). RMBS issued under this scheme will be guaranteed for up to five years.

Long-term interest rates

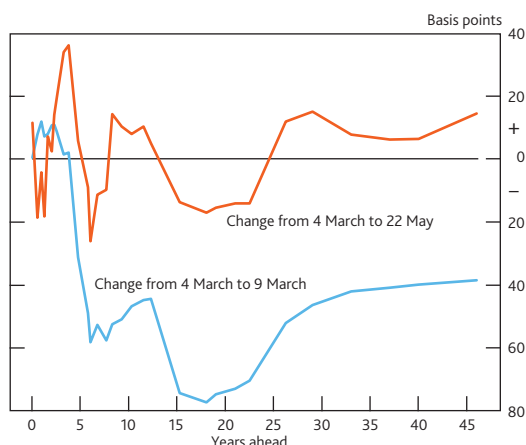
Gilt yields, which reflect the cost of borrowing for the UK Government, were volatile but ended the period higher at all but the very shortest horizons. These developments were echoed in US dollar and euro government bond markets as yield curves steepened internationally. In particular, similar upward moves were observed for long-term forward rates at maturities beyond 20 years (Chart 12).

Contacts suggested the changes in international yield curves reflected some portfolio adjustments in favour of riskier assets as investor risk appetite improved, as well as a global re-evaluation of fiscal prospects in the major economies. In the United Kingdom, the Government revised up its projected borrowing in its 2009 Budget and the UK Debt Management Office subsequently announced £220 billion of gilt issuance this financial year (well above earlier market forecasts).

Chart 12 Changes in international nominal forward rates since previous *Bulletin*^(a)

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

Market contacts also suggested that gilt yields were affected by news about the Bank's programme of gilt purchases through the APF. Following the announcement of the Bank's programme of gilt purchases in early March, yields fell substantially, particularly at the maturities eligible for purchase (5–25 years) (Chart 13). And since the previous *Bulletin*, gilt yields at short to medium maturities (including the range of maturities eligible for purchase by the APF) increased by significantly less than at longer maturities (Chart 14).

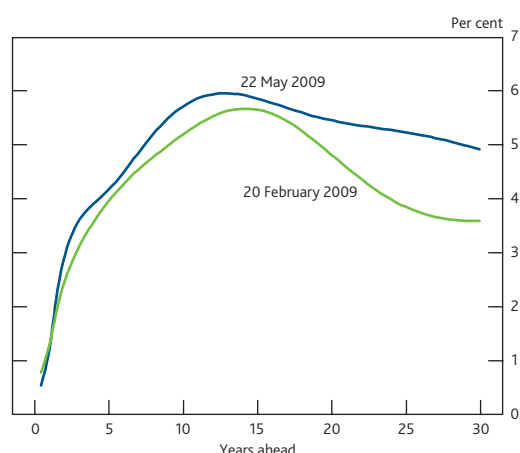
Chart 13 Changes in sterling government bond yields since the announcement of APF gilt purchases

Sources: Bloomberg and Bank calculations.

Finance theory would suggest that if financial markets operated perfectly yields would only react to news about 'official sector' gilt sales and purchases if the information prompted investors to revise their expectations about future short-term interest rates, or adjust their required

compensation for the uncertainty associated with future interest rates. That might have occurred if investors reassessed the prospect of higher desired savings to meet the increased financing needs of the government. And investors may have focused more on how the injection of central bank reserves via the Bank's asset purchases would, if appropriate for meeting the UK inflation target, ultimately be withdrawn.

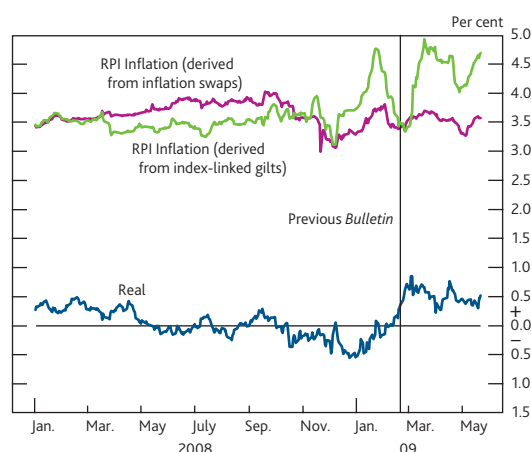
Chart 14 Sterling nominal forward rates^(a)



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

However, long-term real interest rates remained low. Similarly, while long-horizon implied inflation rates (that reflect both expected inflation plus any associated inflation risk premia) inferred from index-linked gilts increased, corresponding long-term forward inflation rates derived from inflation swaps remained broadly stable (**Chart 15**). According to contacts, inflation swaps were less affected by changes in market conditions over recent months. And survey evidence also indicated little change in medium-term inflation expectations.

Chart 15 Sterling 25-year real forward interest rates and forward inflation^{(a)(b)}



(a) Instantaneous real forward rates derived from the Bank's government liability curve.
(b) Instantaneous forward inflation rates derived from the Bank's government liability and inflation swap curves.

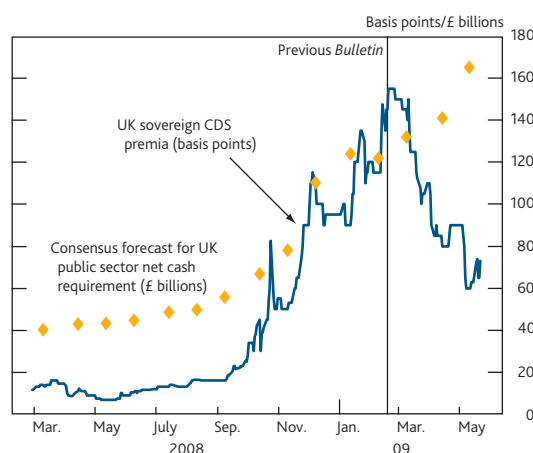
Contacts indicated that news about the Bank's gilt purchases limited recent upward moves in gilt yields. To the extent that investors prefer to hold particular bonds, perhaps to match the duration of their own liabilities, bonds of different maturities may be imperfect substitutes. As a result, investors might be prepared to pay more for those bonds relative to others and, other things being equal, lower their yield. In this way, by changing the mix of available gilts the Bank's purchases may have affected the required premia on UK government bonds at different maturities.

Moreover, although the gilt market is typically liquid (at least compared to other asset classes) it is possible that changes in demand and supply of gilts could have affected investors' perceptions about their ability to buy and sell them in the future. That is, the recent moves in gilt yields could have reflected shifts in required liquidity premia on gilts. This is discussed in the box on pages 76–77.

Another possible contributory factor to the recent moves in gilt yields could be that investors perceived that the credit risk associated with UK government debt increased. For example, investors may have reassessed the likelihood of future downgrades to the UK government's credit standing. Indeed, gilt yields picked up in late May following a decision by S&P to lower its medium-term outlook on the triple-A rating for the United Kingdom's debt to 'negative' from 'stable'.

But any investor concerns about the ease with which the UK Government could service a higher level of debt did not seem to affect financial markets significantly. For example, gilt yields did not move substantially more than yields on other developed countries' government bonds, and CDS premia on UK government debt fell markedly since the previous *Bulletin*, largely reversing the increases since last autumn (**Chart 16**).

Chart 16 UK sovereign CDS premia and Consensus forecast for the UK public sector deficit in 2009/10



Sources: Bloomberg and Consensus Economics Inc.

Liquidity in the gilt market

In general the liquidity of an asset — such as a government bond — refers to the ease with which that asset can be transformed into money without loss of value. But measuring this concept can be difficult in practice. One common proxy measure is the bid-ask spread — the difference between the prices quoted by market makers to buy and sell an asset. This spread corresponds to the transaction cost faced by an investor trading the asset and will reflect, to some extent, the ease with which the market maker can match buyers and sellers.

However, quoted bid-ask spreads will typically only be valid for relatively small transactions and so may not give a good guide to the ease with which large quantities of an asset can be sold (or bought), and hence the depth of liquidity in the market. One way to gauge depth of liquidity is by looking at the quantity of the asset that is transacted in the market on a regular basis — the market turnover.

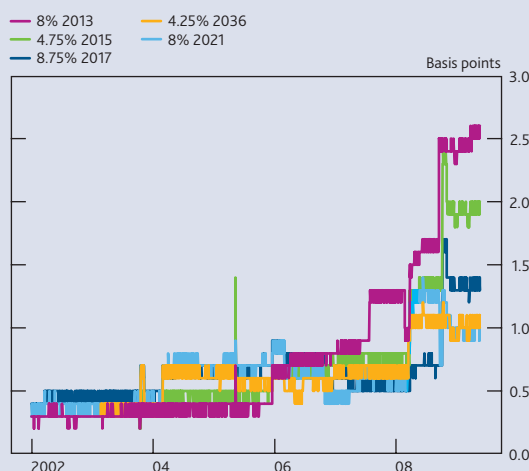
Measures such as bid-ask spreads and market turnover provide indicators of *current* market liquidity, but investors might also demand a premium for expected *future* illiquidity and the uncertainty around those expectations. This liquidity premium, which is typically positive, will be reflected in the yield on the asset.

Measures of current gilt market liquidity

Charts A and B show the bid-ask spreads for a range of conventional and index-linked gilts at different maturities. Bid-ask spreads for gilts were fairly stable from 2002 until mid-2007, at around 0.5 basis points for conventional (nominal) bonds and 1 basis point for index-linked. But following the start of the financial turmoil in August 2007, bid-ask spreads generally widened. This increase in transaction costs for gilts was particularly significant following the collapse of Lehman Brothers in September 2008, suggesting liquidity conditions deteriorated quite sharply, and wider bid-ask spreads have generally persisted since. One factor behind this could have been increased balance sheet constraints faced by banks which prompted gilt market makers to reduce the scale of their activities.

The widening in spreads was most pronounced in the index-linked gilt market. Spreads on conventional gilts, though wider than previously, remained narrow compared to other sterling asset markets suggesting this continued to be a liquid market. For example, prior to the financial crisis the average bid-ask spread on sterling investment-grade corporate bonds was around 6 basis points. That was more than double the recent levels of bid-ask spreads on conventional gilts.

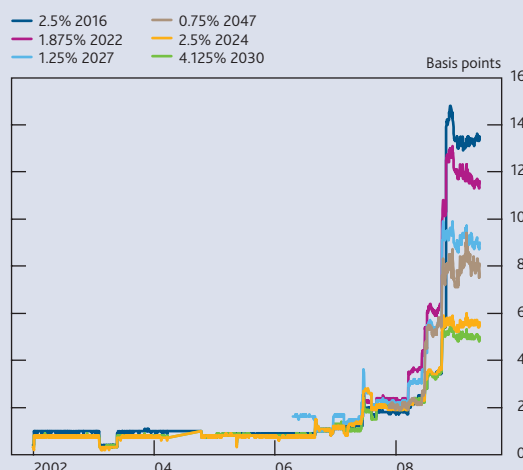
Chart A Quoted nominal gilt bid-ask spreads^(a)



Source: Bloomberg.

(a) Bid-ask spread in yield-to-maturity.

Chart B Quoted index-linked bid-ask spreads^(a)

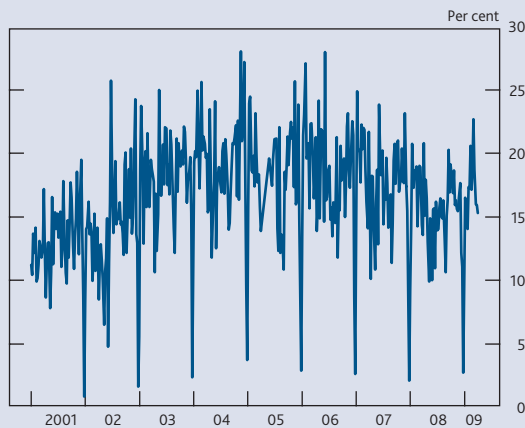


Source: Bloomberg.

(a) Bid-ask spread in yield-to-maturity.

Chart C shows weekly gilt market turnover, combining trade in conventional and index-linked bonds, measured as a proportion of total gilts outstanding. The pattern of turnover is clearly seasonal, with amounts traded generally lower during the summer and Christmas periods. But looking through that seasonal pattern suggests two distinct sustained phases. From 2001 to 2005, gilt market turnover increased steadily, almost doubling over the period. After 2005, the level of turnover started to decline as net issuance increased. Most recently, since the start of February 2009, turnover picked up again. This recent increase could have been due to portfolio rebalancing by investors in anticipation of purchases of gilts by the Bank's Asset Purchase Facility (APF). And this higher level of turnover appears to have been sustained during March when the APF began making purchases.

Chart C Weekly gilt market turnover as a proportion of total gilts outstanding^{(a)(b)}



Source: DMO.

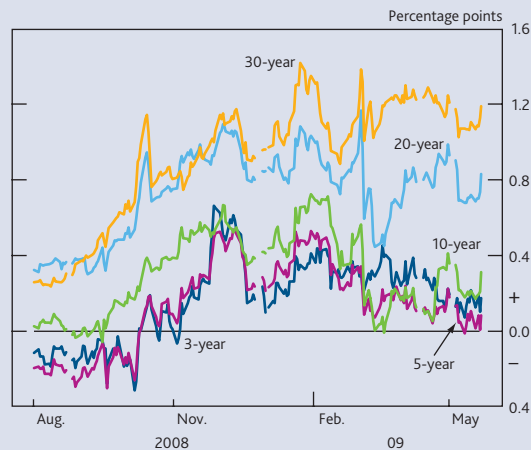
(a) Calculated using monthly issuance data.
(b) Data to end-2009 Q1.

Measures of gilt market liquidity premia

As noted above, gilt prices (and therefore yields) will also incorporate investor perceptions about future illiquidity. One way to estimate such liquidity premia is to compare the yield on a gilt with a sterling interest rate that does not contain material liquidity or credit premia. A common benchmark measure for such comparisons is the rate implied by overnight index swaps (OIS). OIS are swaps where one party exchanges a compounded floating overnight interest rate for a fixed rate determined in advance with the counterparty. The swap is collateralised and has no upfront payment and so, as the overnight rate has very little credit risk associated with it, the fixed rate on the swap is likely to be a close to a genuinely risk-free interest rate.⁽¹⁾ Moves in gilt-OIS spreads may therefore proxy changes in liquidity premia in gilt prices, although they could also reflect changes in investors' preferences and other risks associated with holding gilts.

Chart D shows the spread between gilt yields and OIS rates at various maturities. Moves in gilt-OIS spreads suggest that premia in gilt yields have been volatile since last summer. They increased following the collapse of Lehman Brothers in September 2008, perhaps reflecting greater uncertainty about future gilt market liquidity. Spreads between gilt yields and OIS rates initially decreased somewhat following the announcement that the APF would purchase gilts, possibly consistent with increased demand for gilts eligible for purchase by the APF, although they remained volatile.

Chart D Gilt-OIS spreads



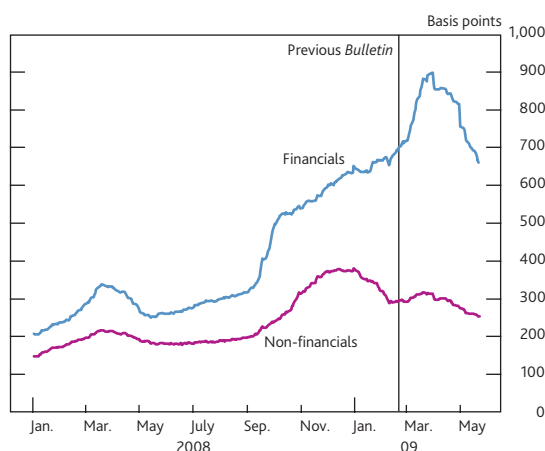
Sources: Bloomberg and Bank calculations.

(1) At longer maturities this may be less true, as these OIS contracts can be much less well-traded and so may themselves include liquidity premia. For more details on OIS, see the box, 'Overnight index swaps' on page 281 of the 2008 Q3 *Quarterly Bulletin*.

Corporate credit

Despite the pickup in gilt yields, the cost of debt capital for firms fell, albeit modestly, as corporate credit spreads ended the period narrower than earlier in the year. Sterling-denominated investment-grade corporate bond spreads initially widened in late February and early March, as weak macroeconomic data and corporate earnings results hit investor confidence. However, credit spreads narrowed thereafter, particularly for financial firms (**Chart 17**), in tandem with the general improvement in investor risk appetite.

Chart 17 Sterling investment-grade corporate bond spreads by sector



Sources: iBoxx indices, UBS Delta and Bank calculations.

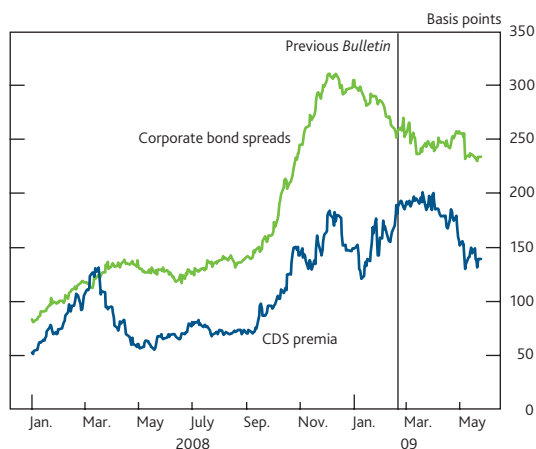
In fact, CDS premia fell by more than corresponding corporate bond spreads (**Chart 18**). To some extent this could have been due to moves in bond spreads lagging their more liquid CDS counterparts — previous Bank research found that, in the short run at least, price discovery typically takes place faster in CDS markets compared with corporate bond markets.⁽¹⁾

Alternatively, a widening in the difference between CDS premia and corporate bond spreads could have reflected an increase in investors' desired compensation for liquidity risk associated with holding sterling corporate bonds. However, as noted in the box on pages 76–77 in relation to gilts, measuring liquidity conditions in asset markets is difficult.

One metric for gauging current liquidity conditions is the bid-ask spreads on secondary market transactions. These narrowed slightly for sterling corporate bonds, which may suggest improved secondary market conditions, possibly linked to the Bank's purchases of corporate bonds via the APF (as described in the box on pages 70–71).

The narrowing in corporate credit spreads coincided with further gross corporate bond issuance by UK companies (**Chart 19**). Though issuance remained skewed towards higher-rated borrowers, contacts reported increased interest

Chart 18 Non-bank companies' sterling denominated corporate bond spreads and corresponding CDS premia^{(a)(b)}

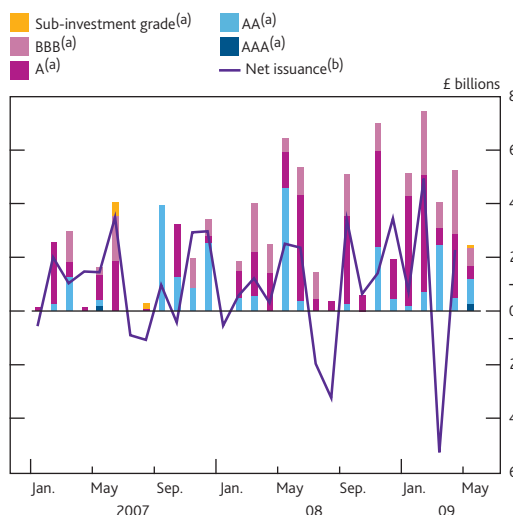


Source: UBS Delta.

- (a) Based on 144 investment-grade sterling bonds issued by non-bank firms.
(b) The maturity of the chosen bond may not necessarily match that maturity of the CDS, as data are typically only available for five-year CDS.

on the part of lower-rated companies to issue into the market. Indeed, May saw the first sub-investment grade issuance by a UK firm since June 2007. However, in part the increased bond issuance offset debt repayments. Net bond issuance, which takes account of repayments, was more subdued.

Chart 19 Gross^(a) and net bond issuance by UK non-financial corporates (all currencies)



Sources: Bank of England, Dealogic and Bank calculations.

- (a) Gross issuance data refer to bond issuance by UK private non-financial corporations (PNFCs) in all currencies by rating. Data for May 2009 include issuance until 22 May.
(b) Net issuance data cover bond issuance by UK resident companies and sterling-denominated bonds issued in the United Kingdom by non-resident companies.

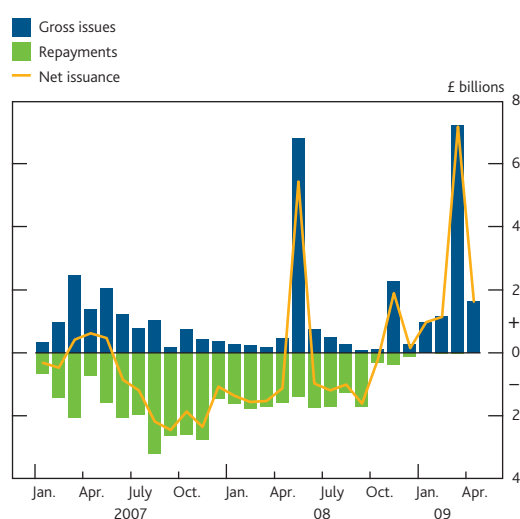
(1) For more details see Blanco, R, Brennan, S and Marsh, I (2004), 'An empirical analysis of the dynamic relationship between investment-grade bonds and credit default swaps', Bank of England Working Paper no. 211.

To some extent, the increased gross corporate bond issuance could have been due to firms making the most of investor demand by front-loading their 2009 issuance. However, increases in gross primary issuance could be part of a more persistent move in favour of capital market funding given the on-going constraints on the availability of bank credit.

Equities

Consistent with greater use of capital market finance by companies, total equity issuance picked up sharply, largely due to a number of rights issues (**Chart 20**). Contacts reported that firms, including some from sectors that had earlier struggled to access corporate debt markets, were able to raise equity finance.

Chart 20 Equity issuance and repayments by UK PNFCs^(a) (all currencies)



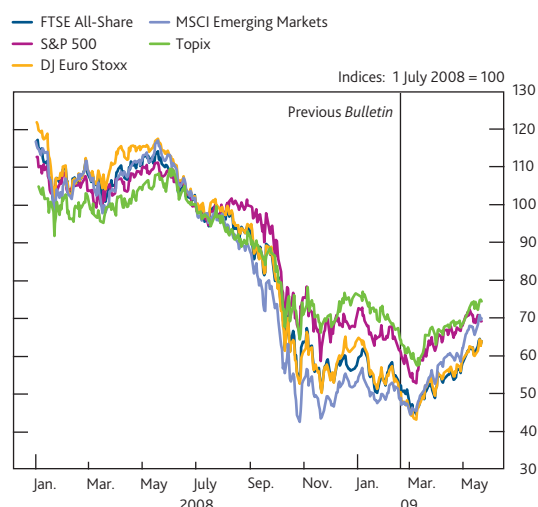
(a) Private non-financial corporations.

Alongside increased equity issuance, UK equity prices rebounded sharply during April and May, albeit to levels well below those observed prior to the failure of Lehman Brothers. This pickup in UK equity prices was part of a global recovery in equity markets following a period of retrenchment that lasted until early March (**Chart 21**).

Among firms in the FTSE 350 index, the equity prices of mining companies, banks and life insurance companies increased most (**Chart 22**). Contacts reported that reduced fears about the failure of financial institutions, as official sector actions were implemented, generally increased investor confidence in financial company stocks. In addition, contacts noted the improved trading performance of some large banks, which posted stronger-than-expected trading updates.

More generally, a Bank of America/Merrill Lynch survey suggested that global fund managers' expectations for earnings improved in May. And the prices of dividend swaps (albeit for firms in the Euro Stoxx index) increased (**Chart 23**),

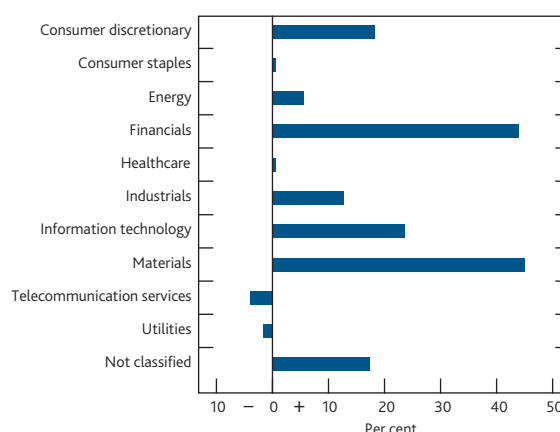
Chart 21 International equity indices (in US dollars)^(a)



Sources: Bank of England and Bloomberg.

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

Chart 22 Changes in UK equity prices by sector since previous *Bulletin*^(a)



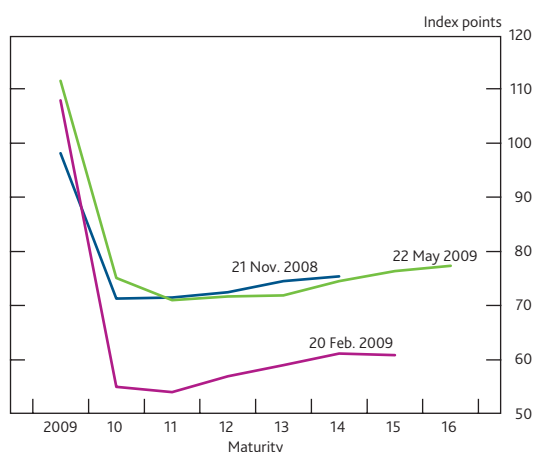
Sources: Bloomberg and Bank calculations.

(a) Using share prices for FTSE 350 companies weighted by their market capitalisation. The FTSE 350 index accounts for around 99% of the FTSE All-Share index by value.

suggesting that investors perceived the outlook for corporate earnings to have improved (either because earnings expectations increased or the uncertainty about those future earnings fell). A caveat is that the market for dividend swaps is relatively new and continued to react to changes in market liquidity.

Surveys of financial analysts' expectations of UK companies' earnings growth were, however, revised down, at least for short horizons. Earnings per share for FTSE 100 companies were expected to decline by 34% in 2009, compared with declines of 14% and 19% for S&P 500 companies and Euro Stoxx companies respectively.

Abstracting from changes in earnings expectations, about which there were mixed signals, equity price changes should

Chart 23 DJ Euro Stoxx dividend swap prices^{(a)(b)}

Sources: Bloomberg and Bank calculations.

(a) From exchange-traded futures contracts.

(b) For more details on dividend swaps see the box 'Dividend swaps' on page 371 of the 2008 Q4 Quarterly Bulletin.

reflect changes in risk premia and/or moves in default-free interest rates. Given that government bond yields generally rose, most of the recovery in the FTSE 100 index over the past few months seems likely to be accounted for by falls in implied equity risk premia. Perhaps consistent with that, the implied volatility derived from options on futures for the FTSE 100 index fell, toward levels last seen prior to the collapse of Lehman Brothers, echoing similar developments in overseas equity markets (Chart 24).

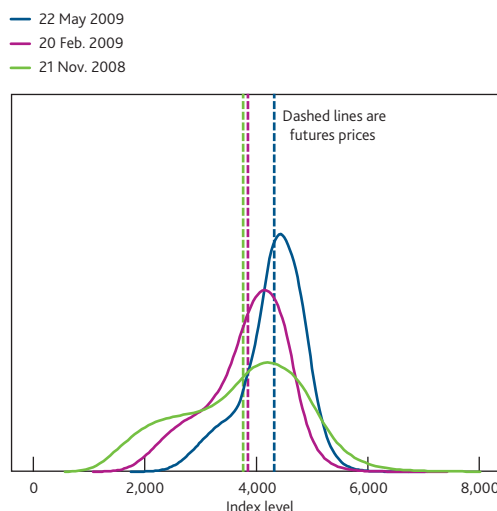
Chart 24 Implied volatilities for international equity indices^(a)

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

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

As a result, the implied probability distribution for UK equity prices narrowed (Chart 25), which would tend to suggest that equity price uncertainty fell. In addition, the implied distribution became less negatively skewed, suggesting that investors became less worried about a large fall in the

FTSE 100 index relative to a large rise. Contacts also noted a lack of institutional demand for hedging.

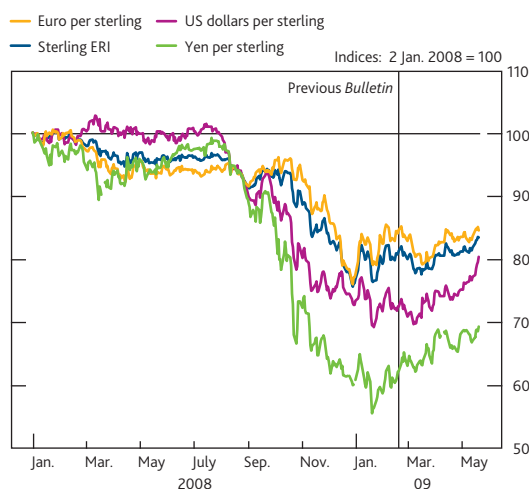
Chart 25 Three-month option-implied FTSE 100 probability density functions^(a)

Sources: Euronext.liffe and Bank calculations.

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

Foreign exchange

The sterling effective exchange rate index (ERI) rose by 2.7% since the previous *Bulletin*, partly recovering its falls during the latter part of 2008. Sterling appreciated against both the US dollar and the yen (by around 11% and 12% respectively) but was largely unchanged against the euro (Chart 26).

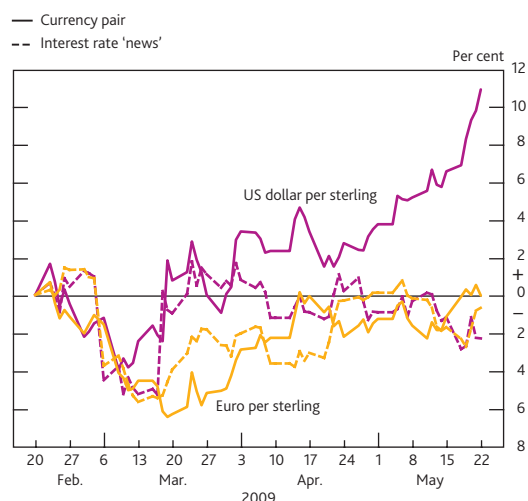
Chart 26 Cumulative changes in sterling exchange rates since 2 January 2008

Sources: Bloomberg and Bank calculations.

Developments in relative interest rates, as indicated by movements in international yield curves, seemed broadly to account for most of the moves in sterling against the euro

through the period. However, sterling appreciated by more against the US dollar than would be suggested by the shifts in relative interest rates, especially since late March (**Chart 27**). A possible explanation could be that investors revised downwards their required risk compensation to hold sterling assets relative to dollar assets. Consistent with this, estimates of such currency risk premia, based on combining information on interest rate differentials and surveys of forecasts for exchange rates, indicated that sterling risk premia fell marginally for the sterling-dollar bilateral exchange rate. In contrast, implied risk premia for the sterling-euro exchange rate were little changed (**Chart 28**).

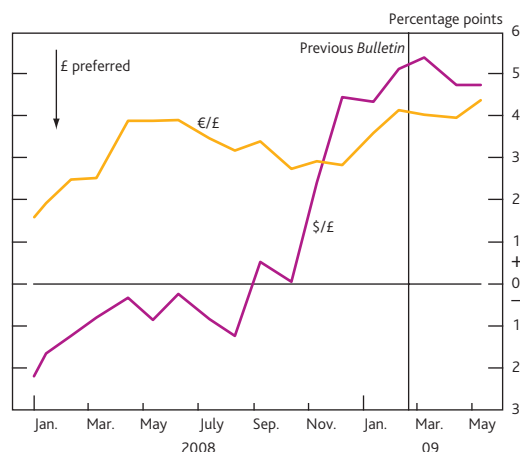
Chart 27 Implied contribution of interest rate 'news' to cumulative changes in the sterling bilateral exchange rates since the previous *Bulletin*^(a)



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 parity condition', *Bank of England Quarterly Bulletin*, November, pages 337–89.

Chart 28 Three to 24-month risk premia estimates for sterling exchange rates^(a)



Sources: Consensus Economics Inc. 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.

Similarly, forward-looking measures of currency uncertainty inferred from options — which might provide an alternative read on investors' perceptions of risk associated with holding sterling assets — decreased markedly. However, implied volatilities also fell for all the other sterling bilateral exchange rates. According to market contacts, the recent depreciation of the US dollar against sterling could perhaps have reflected investors switching back into sterling-denominated assets following a 'flight to liquidity' (with US dollar assets considered more liquid) during the second half of 2008 and early 2009.

Bank of England operations

Asset purchases

Purchases of assets under the Asset Purchase Facility (APF) were made by the Bank of England Asset Purchase Facility Fund (BEAPFF), a wholly-owned subsidiary of the Bank. They were financed via a deposit from the Bank. Initially, this deposit was financed in turn through the issuance of Treasury bills by the Debt Management Office (DMO). Following the decision by the MPC on 5 March to use the APF as a monetary policy tool, the deposit was financed by the issuance of central bank reserves.⁽¹⁾ **Chart 3** on page 69 and **Table A** summarise the assets purchased each week.

Commercial paper

Purchases of commercial paper (CP) began on 13 February. Initially these purchases were financed through the issuance of Treasury bills by the DMO. But from 6 March they were financed by the issuance of central bank reserves. The aims of the Bank's purchases of CP and developments in the CP markets are described in the box on pages 70–71.

The Bank offered to purchase sterling-denominated CP issued by companies (including their finance subsidiaries) that make a material contribution to economic activity in the United Kingdom. The CP required a minimum short-term credit rating of A3/P3/F3 from at least one of S&P, Moody's and Fitch, but issuers with split ratings where one or more rating was below the minimum were not eligible.⁽²⁾

The Bank purchased newly issued eligible CP in the primary market via dealers at a specified spread above the OIS curve. This spread varied according to the credit rating of the issuer (**Table B**). The Bank also offered to purchase previously issued CP in the secondary market.

(1) For further details of the Asset Purchase Facility and changes to the sterling monetary framework see *Bank of England Quarterly Bulletin*, 2009 Q1, page 26.

(2) For more information see the Bank's Market Notice of 13 February 2009 at: www.bankofengland.co.uk/markets/marketnotice090213.pdf.

Table A Asset purchase by type (£ million)

Week ending ^(a)	Commercial paper	Gilts	Corporate bonds	Total ^(b)
19 February 2009	340	0	0	340
26 February 2009	480	0	0	480
5 March 2009	164	0	0	164
12 March 2009	561	2,000	0	2,561
19 March 2009	345	4,993	0	5,337
26 March 2009	76	6,000	128	6,204
2 April 2009	50	6,000	186	6,236
9 April 2009	15	6,000	121	6,136
16 April 2009	345	6,503	36	6,884
23 April 2009	125	6,503	33	6,661
30 April 2009	0	6,508	44	6,552
7 May 2009	50	6,501	20	6,571
14 May 2009	174	6,493	46	6,713
21 May 2009	394	6,494	37	6,925
Total financed by Treasury bills ^(c)	784	–	–	784
Total financed by central bank reserves ^(c)	1,456	63,994	625	66,074
Total asset purchases	2,240	63,994	625	66,859

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

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

(c) In terms of proceeds paid to counterparties less redemptions at initial purchase price on a settled basis.

Table B Primary purchase spreads

	Rating		
	A1/P1/F1	A2/P2/F2	A3/P3/F3
Spread to maturity matched OIS rate	75 basis points	125 basis points	300 basis points

As of 21 May, purchases of CP net of maturities amounted to £2.2 billion, of which around 65% were financed by central bank reserves. The majority of the Bank's purchases were in the primary market.

Gilts

In order to meet the MPC's objective for total asset purchases, it was announced on 5 March that the Bank would also buy gilts in the secondary market. These purchases, financed by the issuance of central bank reserves, began on 11 March.

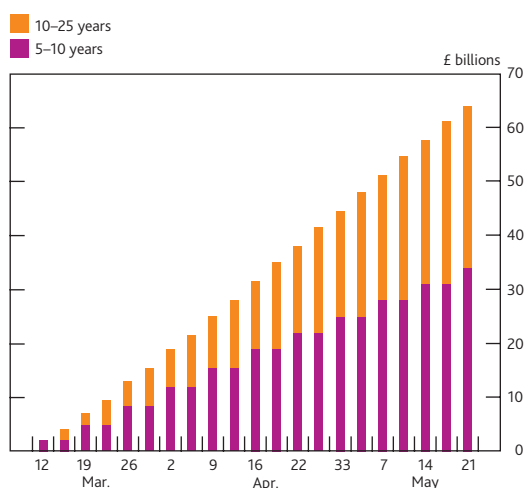
The Bank made these purchases via a series of reverse auctions, for conventional gilts with a minimum residual maturity of five years and a maximum residual maturity of 25 years. In each auction the Bank offered to buy a fixed total of gilts, but the amount of each stock the Bank bought was not pre-determined.

Each auction had both a competitive and a non-competitive element. In the competitive auction, offers for different stocks were allocated based on their attractiveness relative to market yields for each stock, as published by the DMO, at the close of the auction. Purchases were undertaken at prices determined

in a variable-rate auction on a discriminatory-price basis. There was no minimum allocation to a particular stock.

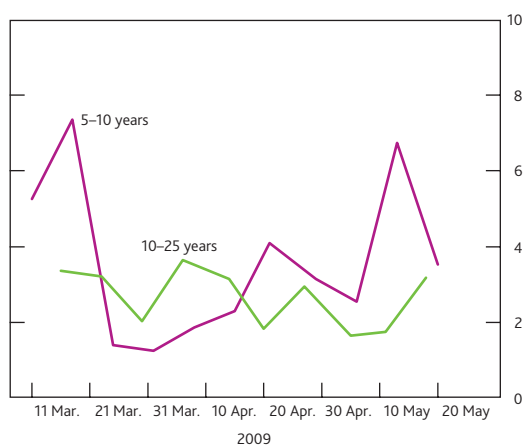
Non-competitive offers for each stock were also invited, and the aggregate amount allocated to non-competitive offers announced, ahead of the start of the competitive auction. Offers in the non-competitive part of the auction were subsequently accepted at the weighted-average price at which the relevant stock was allocated in the competitive auction.

As of 21 May, £64 billion of gilts had been purchased, of which £34 billion were in the 5–10 year residual maturity range and £30 billion in the 10–25 year range (**Chart 29**).

Chart 29 Cumulative gilt purchases^(a) by maturity

(a) Data based on settlement transactions

These gilt purchases took place over 21 auctions, which varied in size up to a maximum of £3.5 billion. Cover in the auctions varied but averaged 3.2 (**Chart 30**).

Chart 30 Cover ratios in gilt auctions

Corporate bonds

On 25 March the Bank began purchasing of high-quality corporate bonds, financed by the issuance of central bank reserves. The objectives and details of these purchases, as well as developments in sterling corporate bond markets, are described further in the box on pages 70–71.

A wide range of corporate bonds were eligible for purchase by the Bank. Eligibility criteria and other details were set out in the Bank's Market Notice of 19 March.⁽¹⁾ This included the specification that bonds should be sterling denominated and issued by companies (including their finance subsidiaries) that make a material contribution to economic activity in the United Kingdom.

The Bank made regular small purchases of corporate bonds via a series of reverse auctions. In each auction the Bank stood ready to buy up to £2 million of each bond from issues with under £250 million outstanding and up to £5 million of each bond from issues with £250 million or more outstanding.

Auctions were undertaken on a uniform price basis so that all successful offers in any individual bond were allocated at the same price. The Bank privately set, for each security, a minimum spread to the yield on a specified reference gilt and did not purchase securities at offers below this spread. Offers above this minimum spread were ranked and allocated until the fixed quantity the Bank was willing to purchase had been allocated, with offers at the clearing price pro-rated if necessary.

As of 21 May, total corporate bond purchases were £0.63 billion. Reflecting the aim of the programme to make frequent but relatively small purchases to help improve the functioning of the corporate bond secondary market, the Bank made 186 purchases of 91 different securities, buying the bonds of 42 different issuers.

Credit Guarantee Scheme

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

Proposals for working capital facilities

On 8 June, the Bank released a consultation paper setting out proposed extensions to the APF, to include a secured commercial paper facility.⁽²⁾

Operations within the sterling monetary framework

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.

Since beginning to purchase assets financed by reserves, the Bank continued to provide reserves in its long-term repo OMOs, and also continued to drain reserves via the issuance of one-week Bank of England bills. The Bank's operational approach was to ensure a net supply of reserves around the aggregate level of reserves targets initially set by participants for the March maintenance period, plus the amount of reserves injected via the Bank's programme of asset purchases.

Gilt-purchase OMOs

Ordinarily, the Bank conducts monthly OMOs to purchase gilts, in order to invest part of the proceeds of the note issue in longer-term assets.⁽³⁾ Following the Bank's announcement that it would purchase gilts through the APF the Bank suspended these operations. During the period from 5 February to 6 May, the Bank conducted one gilt-purchase OMO, on 23 February (Table C).

Table C Issue Department gilt-purchase OMOs

	Amount purchased (£ millions)	Sector cover ratio	Weighted average accepted price	Highest accepted price	Lowest accepted price	Tail ^(a)
23 February 2009						
Short		4.05				
UKT 8% 27/09/13	105.91		124.748	124.760	124.730	0.012
UKT 5% 07/09/14	63.98		112.315	112.329	112.300	0.014
Medium		3.83				
UKT 8.75% 25/08/17	133.89		140.074	140.140	140.050	0.066
Long		2.27				
UKT 6% 07/12/28	95.92		123.111	123.160	123.075	0.049
Total purchased ^(b)	399.70					

(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.

Long-term repo OMOs

Over the same period, the Bank offered to provide reserves in long-term repo OMOs according to its published monthly schedule. Repo operations at six, nine and twelve-month maturities were offered against routine OMO collateral. With the exception of the operation at six-month maturity on 14 April, all operations were fully covered (Table D)

(1) See www.bankofengland.co.uk/markets/marketnotice090319.pdf.

(2) For further details see www.bankofengland.co.uk/markets/apf/consultation090608.pdf.

(3) Gilt-purchase OMOs are described in more detail in the box on pages 22–23 of the 'Markets and operations' article in the 2008 Q1 *Quarterly Bulletin*.

Table D Long-term repo operations

	Six-month	Nine-month	Twelve-month
17 February 2009			
On offer (£ millions)	750	400	150
Cover	2.31	1.88	4.93
Weighted average rate ^(a)	0.660	0.700	0.75
Highest accepted rate ^(a)	0.660	0.700	0.750
Lowest accepted rate ^(a)	0.660	0.700	0.750
Tail ^(b)	0.00	0.00	0.00
17 March 2009			
On offer (£ millions)	750	400	200
Cover	2.47	1.30	3.63
Weighted average rate ^(a)	0.735	0.660	0.861
Highest accepted rate ^(a)	0.860	0.750	0.870
Lowest accepted rate ^(a)	0.689	0.622	0.860
Tail ^(b)	0.05	0.04	0.00
14 April 2009			
On offer (£ millions)	750	400	200
Cover	0.89	1.25	2.25
Weighted average rate ^(a)	0.507	0.510	0.694
Highest accepted rate ^(a)	0.740	0.542	0.850
Lowest accepted rate ^(a)	0.340	0.456	0.642
Tail ^(b)	0.17	0.05	0.05

(a) Per cent.

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

In order to provide additional liquidity insurance, the Bank has since December 2007 held three-month long-term repo OMOs secured against a broader range of eligible collateral. Following the operation on 14 April, the Bank announced on 29 April that it would continue to hold these extended-collateral long-term repo OMOs regularly up to, and including, the scheduled operation on 14 July 2009.

This announcement included a change in the process for determining the minimum bid rate for extended-collateral long-term repo OMOs. For bids against routine OMO collateral, the minimum bid rate — which was previously set equal to the equivalent-maturity OIS rate shortly before the operation — was changed to the higher of the equivalent-maturity OIS rate and the maximum bid rate in the Bank's short-term OMOs to drain reserves via the issuance of one-week Bank of England sterling bills (currently, Bank Rate plus 10 basis points). For bids against the wider collateral pool, the minimum bid rate remained 50 basis points higher than that for collateral routinely accepted in short-term repo OMOs. The results of these operations are shown in **Table E**.

Draining reserves via Bank of England bills

Gilt-purchase and long-term repo OMOs provide reserves for the maintenance period in which they are settled and for all subsequent maintenance periods until maturity.

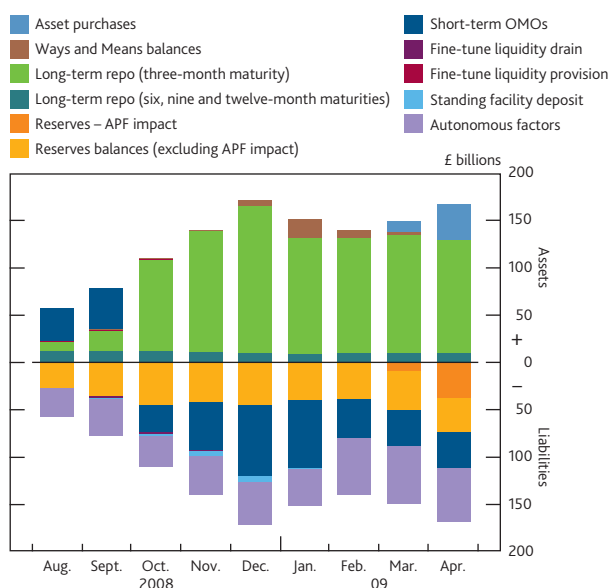
Since October 2008, reserves provided in extended-collateral long-term OMOs increased substantially (**Chart 31**). Following this, the Bank ceased to lend in its weekly short-term OMOs and instead sought to drain reserves.

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

17 February 2009	
On offer (£ millions)	20,000
Cover	1.79
Weighted average rate ^(a)	0.859
Lowest accepted rate ^(a)	0.622
Tail ^(b)	24.00
3 March 2009	
On offer (£ millions)	20,000
Cover	1.55
Weighted average rate ^(a)	0.579
Lowest accepted rate ^(a)	0.475
Tail ^(b)	10.00
17 March 2009	
On offer (£ millions)	20,000
Cover	1.06
Weighted average rate ^(a)	0.649
Lowest accepted rate ^(a)	0.530
Tail ^(b)	12.00
31 March 2009	
On offer (£ millions)	20,000
Cover	1.15
Weighted average rate ^(a)	0.579
Lowest accepted rate ^(a)	0.524
Tail ^(b)	5.00
14 April 2009	
On offer (£ millions)	20,000
Cover	1.17
Weighted average rate ^(a)	0.595
Lowest accepted rate ^(a)	0.510
Tail ^(b)	8.00
5 May 2009	
On offer (£ millions)	20,000
Cover	0.55
Weighted average rate ^(a)	0.885
Lowest accepted rate ^(a)	0.600
Tail ^(b)	29.00

(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 31 Factors affecting the supply of reserves (maintenance period averages)

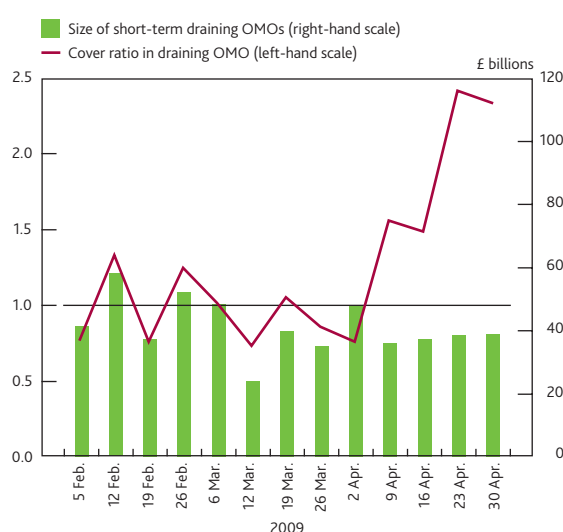
During the February maintenance period, the Bank continued to issue one-week Bank of England sterling bills to ensure that the net supply of reserves was consistent with the aggregate level of reserves targets. The Bank also held a routine fine-tuning operation to drain reserves at the end of the February maintenance period.

As announced in the Market Notice on 5 March, with the system of reserves averaging suspended, the Bank did not conduct a routine fine-tuning OMO on the final day of the March and April maintenance periods. However, the Bank continued to hold weekly OMOs to drain reserves to keep the net supply of reserves around the aggregate level of reserves targets initially set by participants for the maintenance period starting on 5 March, plus the amount of reserves injected via the purchase of assets in the APF.

As part of these changes, the Bank's weekly OMOs to drain reserves were from the second such operation in the March maintenance period changed from fixed rate to variable rate subject to a maximum bid rate announced by the Bank prior to each operation. In the operations to date, this has been set at Bank Rate plus 10 basis points.

Cover in these operations was low during the March maintenance period. It rose during the April maintenance period as the increased injection of reserves through the APF made it more attractive for reserves scheme participants to receive a higher rate than they would receive by leaving reserves on their reserves accounts (**Chart 32**).

Chart 32 Size of short-term draining OMOs and cover ratio^(a)



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

Operational Standing Facilities

As part of the changes to the sterling monetary framework the Bank announced on 5 March that, if Bank Rate was set at 0.5%

or below, the rate paid on the Operational Standing Deposit Facility would be zero, while the rate charged on the Operational Standing Lending Facility would continue to be set at 25 basis points above Bank Rate.

As a result of the change to remunerate all reserves balances at Bank Rate and (given the level of Bank Rate) the reduction in the rate paid on the Operational Standing Deposit Facility to zero, usage of the deposit facility fell from a daily average of £886 million in the February maintenance period to zero in the March maintenance period. Average daily usage of the lending facility was £43 million in each of the February and March maintenance periods.

Ways and Means

On 29 December 2008, loans that the Bank had made to the Financial Services Compensation Scheme (FSCS) and to Bradford & Bingley were repaid. To fund this repayment, the government borrowed temporarily from the Bank using the 'Ways and Means' facility — its overdraft facility with the Bank. Following three partial repayments in February, HM Treasury repaid the remainder of the 29 December borrowing on 2 April. These repayments had the effect of draining reserves, thus reducing the amount that needed to be drained via the scale of Bank bills (**Chart 31**).

Discount Window Facility

In October 2008 the Bank introduced a Discount Window Facility (DWF) as part of the framework for its operations in the sterling money markets.⁽¹⁾ The DWF is a permanent facility to provide liquidity insurance to the banking system and allows eligible banks and building societies to borrow gilts against a wide range of collateral. In line with its published disclosure arrangements, on 7 April the Bank reported that there had been no use of the facility for the period between 20 October and 31 December 2008.

Other market operations

One objective of the Bank's market operations is to reduce the cost of disruption to the liquidity and payments services supplied by commercial banks. The Bank does this by balancing the provision of liquidity insurance against the costs of creating incentives for banks to take greater risk, and subject to the need to control the risk to its balance sheet.

Within the sterling monetary framework, the Bank provides liquidity insurance through the provision of reserves accounts, extended-collateral long-term repo OMOs and the Discount Window Facility described above. In addition, operations outside the sterling monetary framework, including US dollar repo operations and the Special Liquidity Scheme have also been employed.

(1) See the box 'Consultative document on the Development of the Bank of England's Market Operations' on page 380 of the 2008 Q4 *Quarterly Bulletin*.

Special Liquidity Scheme

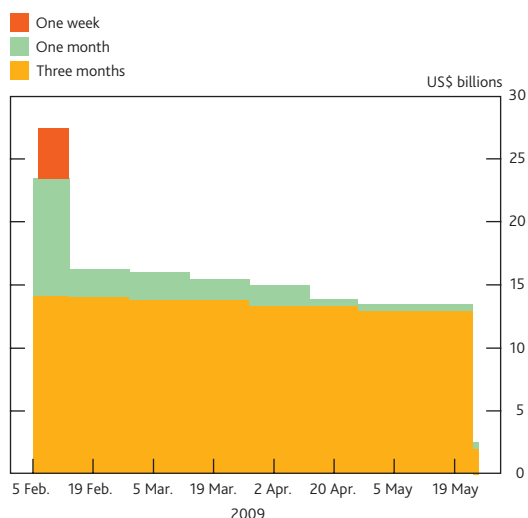
As previously announced the drawdown period for the Special Liquidity Scheme (SLS) closed on 30 January 2009. Although the drawdown window to access the SLS has closed, the Scheme will remain in place for three years, thereby providing participating institutions with continuing liquidity support and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

US dollar repo operations

In concert with other central banks, since 18 September 2008, the Bank has offered US dollar financing to financial institutions funded by a swap with the Federal Reserve. These measures are designed to improve the liquidity conditions in global financial markets. US dollar financing is currently offered at one-week, one-month and three-month maturities.

Since the previous *Bulletin*, there were no bids in the Bank's one-week US dollar operations. Bids also declined for funds at longer maturities. This led to a corresponding fall in the total stock outstanding; most recently in May, when funds offered in February matured (Chart 33).

Chart 33 US dollar repo: stock outstanding by maturity^(a)



(a) Stock outstanding is shown from settlement date.

On 6 April the Bank announced, in co-ordination with other central banks, swap arrangements that would enable the provision of foreign currency liquidity by the Federal Reserve to US financial institutions. Should it be required, the Bank would provide sterling via a swap arrangement with the Federal Reserve, similar to that which underpins the Bank's US dollar repo operations. Both swap arrangements run until 30 October 2009.

Foreign exchange reserves

In March, the Bank issued a \$2 billion three-year bond and purchased an equivalent value of euro and US dollar-denominated assets with the proceeds. This was the

third bond issued by the Bank under the annual dollar bond issuance programme and completes the transition to financing the Bank's foreign exchange reserves via three three-year bond issues.

The new bond issue was announced on 27 February and executed on 10 March. The transaction which was marketed via BNP Paribas, Goldman Sachs International, HSBC and Morgan Stanley, priced 37 basis points above mid-swaps. The issue was successful, attracting a broad order book, with orders totalling \$3.5 billion. It sold to investors in Europe, the Middle East and Africa (52%), Asia (33%), and the Americas (14%). As with earlier issues in the programme, central banks and official institutions were the predominant buyers (45%), with bonds also being sold to commercial banks (37%), and the remainder sold principally to asset managers, insurance and pension funds (17%).

At the end of April the Bank's foreign exchange reserves comprised £4.1 billion of assets.

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 Bank for International Settlements and European Central Bank, 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 £2.5 billion of gilts and £1 billion of other debt securities. Purchases had generally been made once each month, with purchase details announced in advance on the Bank's wire service pages. Reflecting developments in the Bank's capital reserves and aggregate cash ratio deposits, these purchases have been increased in frequency and size. Over the period from 5 February to 6 May, gilt purchases were made in accordance with the quarterly announcement on 2 January 2009 (£20 million each in February and March) and 1 April 2009 (two purchase of £43 million each in April and in May).

Bank of England balance sheet

The total size of the Bank of England's balance sheet averaged about £175 billion during the February maintenance period, down from a high of about £292 billion the week ending 22 October 2008. This reduction reflected the reduced frequency and size of extended-collateral long-term repo OMOs and the maturity of the reserves offered during 2008 Q4, along with the decreasing size of the Bank of England's US dollar swap facility with the Federal Reserve.

Purchases of commercial paper, corporate bonds and gilts under the APF were the main factor in the subsequent expansion of the Bank's balance sheet. Purchases were made by the Bank of England Asset Purchase Facility Fund (BEAPFF), a wholly-owned subsidiary of the Bank. Since 5 March, asset purchases were financed through a loan to the BEAPFF using central bank reserves. This loan to the BEAPFF was recorded as an asset, and the reserves provision was recorded as a liability, of the Bank's Banking Department.

Developments in market structure

CLS/Traiana joint venture

CLS Group and ICAP plc announced a joint venture to provide trade aggregation services to participants active in the over-the-counter FX market. The aggregation service will sum the 'buys' of a currency and the 'sells' of a currency between two eligible participants. Details of the aggregated trades will then be passed back to the banks for them to process through their systems as well as send to CLS for settlement.

The new service is designed to reduce the operational risk and costs associated with high volume FX trading. The joint venture will be a CLS subsidiary, 51% owned by CLS Group and 49% owned by ICAP, operating within the CLS regulatory framework. The trade aggregation service is expected, subject to regulatory approval, to become operational later this year.

CDS protocol

On 8 April 2009, the International Swaps and Derivatives Association (ISDA) announced the successful implementation of changes to contracts and trading conventions for credit default swaps (CDS).

Three key changes were made to global CDS contracts:

1. Standardising the auction methodology used to establish investor pay-outs should there be a credit event in the reference entity. Only specific auction settlement terms for each credit event will be determined shortly prior to the auction.
2. Creating event determination committees, formed to make binding decisions of whether credit and succession events have occurred, as well as the settlement terms of any auction.
3. Changing the effective date for all CDS contracts to the current day less 60 days for credit events, and the current day less 90 days for succession events. Previously, protection against a credit event began only on the business day following the trade date.

The changes regarding auction method and determination committees took effect on 8 April 2009 for new and legacy transactions.⁽¹⁾ The changes regarding effective dates took effect for new transactions from 8 April, and are expected to take effect from 20 June for relevant legacy trades.

In addition, changes were introduced regarding new North American CDS. Specifically:

1. All single name CDS will trade with a fixed coupon.
2. CDS buyers will have to make a full coupon payment on the first payment date.
3. Standardisation of the restructuring clause to 'No Restructuring'.

The aims of the changes are to improve market transparency, facilitate the reduction of CDS gross notional amounts via trade compression, aid in the transition to same-day trade matching, and support central clearing of CDS contracts.

Proposals for the use of central counterparty (CCP) clearing in CDS markets have also advanced. Currently, ICE Trust is operating CCP clearing for US CDS indices and has cleared more than \$250 billion of CDS. Also, the Chicago Mercantile Exchange received approval to clear US CDS, though its launch was delayed until some larger investors in the market signed on as stakeholders. LCH.Clearnet launched a CDS clearing service in the United Kingdom, and both LCH.Clearnet and Eurex plan on launching a euro-based service.

Furthermore, the US Treasury released proposals for regulating the over-the-counter (OTC) derivatives market. Under the proposals, standardised OTC derivatives would be required to be cleared through a CCP, the regulatory framework would be strengthened, trade reporting enhanced and regulators given authority to set position limits to prevent market abuses.

FTSE 100 dividend index futures

Liffe introduced the first FTSE 100 dividend index futures contract in May. The contract allows the trading and clearing of the dividend component of the FTSE 100 index on an independent basis, and enables investors to segregate trading and hedging of dividends (one of the principal determinants of equity valuations) into a separate asset class.

Dividend futures were introduced for the first time last year, on the DJ Euro Stoxx 50, by Eurex. Over time, these contracts have become increasingly liquid, currently seeing an average daily volume of 8,000 contracts. Eurex will launch four new dividend futures on European stock indices in June 2009.

⁽¹⁾ Changes affect legacy transactions for the 2,023 parties that agreed to make changes retroactively.

Research and analysis



Quantitative easing

By James Benford, Stuart Berry, Kalin Nikolov and Chris Young of the Bank's Monetary Analysis Division and Mark Robson of the Bank's Notes Division.

The Monetary Policy Committee's recent decision to expand the money supply through large-scale asset purchases (or 'quantitative easing') shifted the focus of monetary policy towards the quantity of money as well as the price of money. With Bank Rate close to zero, asset purchases should provide an additional stimulus to nominal spending and so help meet the inflation target. This should come about through their impact on asset prices, expectations and the availability of credit. However, there is considerable uncertainty about the strength and pace with which these effects will feed through. That will depend in part on what sellers do with the money they receive in exchange for the assets they sell to the Bank of England and the response of banks to the additional liquidity they obtain. The MPC will be monitoring a range of indicators in order to assess the impact of its asset purchases and therefore judge the appropriate stance of monetary policy.

Introduction

On 5 March, the Monetary Policy Committee (MPC) decided to reduce Bank Rate to 0.5% and to undertake what is sometimes called 'quantitative easing'. This meant that it began purchasing public and private sector assets using central bank money. In this way, the Committee is injecting money into the economy to provide an additional stimulus to nominal spending in order to meet the inflation target. This article sets out in more detail how asset purchases are expected to work, building on the information provided in the MPC minutes, the *Inflation Report* and a range of speeches by MPC members.

The conventional way for the MPC to conduct monetary policy is by setting Bank Rate. The introduction of asset purchases has shifted the focus of monetary policy, but the objectives have not changed. The MPC's remit is still to maintain price stability — defined as an inflation rate of 2% on the CPI measure — and, subject to that, to support the Government's economic policy, including its objectives for growth and employment. Asset purchases provide an additional tool to help the Committee meet those objectives. The MPC continues to decide on the appropriate level of Bank Rate each month and is independent of the Government in formulating monetary policy.

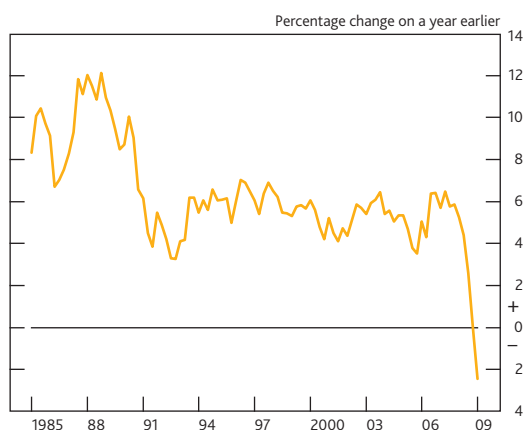
The next section discusses the reasons for undertaking asset purchases, while subsequent sections look at how they are expected to work, and the factors that will determine their

effectiveness. The article then briefly considers the framework through which policymakers will decide to expand and unwind asset purchases before concluding. The article does not assess the impact of asset purchases so far. This is covered in policy documents such as the *Inflation Report* and the minutes of the MPC meetings, although the 'Markets and operations' article in this *Quarterly Bulletin* provides some commentary on recent market developments.

Why is the MPC undertaking asset purchases?

The inflation target is symmetric. If inflation looks set to rise above target, then the MPC tightens monetary policy to slow spending and reduce inflation. Similarly, if inflation looks set to fall below 2%, the Bank loosens monetary policy to boost spending and inflation. Indeed, the MPC reduced Bank Rate rapidly in response to the sharp tightening in credit conditions and a global slump in confidence following the collapse of Lehman Brothers in September 2008. By March 2009, Bank Rate was at 0.5%.

Despite the substantial stimulus already in the pipeline from monetary policy and other factors, such as fiscal policy and the sharp depreciation of sterling, the MPC judged at its March meeting that a further monetary loosening was required. In particular, it was concerned that nominal spending in the economy would otherwise be too weak to meet the inflation target in the medium term. Four-quarter growth in nominal GDP fell to -2.4% in 2009 Q1 (**Chart 1**), its lowest level since the quarterly series began in 1955.

Chart 1 Nominal GDP^(a)

(a) At current market prices.

Nominal interest rates cannot generally be negative. If they were, there would be an incentive to hold cash, which delivers a zero return, rather than deposit money.⁽¹⁾ So with Bank Rate close to zero, a further stimulus could no longer be provided through a reduction in the policy rate.⁽²⁾ Instead, it required what King (2009) describes as 'unconventional measures'.

When the MPC sets Bank Rate, it is influencing the price of money. Banks hold central bank money in the form of reserve balances held at the Bank of England and they receive interest on those reserves at Bank Rate. Banks then face the choice of holding reserves or lending them out in the market, and so market interest rates are influenced by the level of Bank Rate. This then feeds through to a whole range of interest rates faced by households and companies which in turn affects their spending decisions.

Asset purchases are a natural extension of the Bank's conventional monetary policy operations. In normal circumstances, the Bank of England provides reserves according to the demand from banks at the prevailing level of Bank Rate.⁽³⁾ When conducting asset purchases, the Bank is seeking to influence the quantity of money in the economy by injecting additional reserves.⁽⁴⁾ This does not mean though that the Bank no longer has influence over market interest rates. Market interest rates will continue to be affected both by the level of Bank Rate and, in addition, by the amount of reserves that the Bank is injecting as investors react to the additional money that they hold in their portfolios (as discussed further in the section on economic channels below).

In practice, there are a number of ways of increasing the supply of money in the economy, and a wider range of 'unconventional measures' that a central bank may undertake when interest rates are very low (see Yates (2003) for a review). This is evident in the different approaches taken by central banks in other countries (see the box on page 92). The approaches adopted in different countries will in part reflect the different structures of those economies and in particular

how companies and households obtain finance. The next section looks at how quantitative easing is expected to work in the United Kingdom.

How do asset purchases work?

Injecting money into the economy

The aim of quantitative easing is to inject money into the economy in order to revive nominal spending. The Bank is doing that by purchasing financial assets from the private sector. When it pays for those assets with new central bank money, in addition to boosting the amount of central bank money held by banks, it is also likely to boost the amount of deposits held by firms and households. This additional money then works through a number of channels, discussed later, to increase spending.

The Bank of England is the sole supplier of central bank money in sterling. As well as banknotes, central bank money takes the form of reserve balances held by banks at the Bank of England. These balances are used to make payments between different banks. The Bank can create new money electronically by increasing the balance on a reserve account. So when the Bank purchases an asset from a bank, for example, it simply credits that bank's reserve account with the additional funds. This generates an expansion in the supply of central bank money.

Commercial banks hold deposits for their customers, which can be used by households and companies to buy goods and services or assets. These deposits form the bulk of what is known as 'broad money'.⁽⁵⁾ If the Bank of England purchases an asset from a non-bank company, it pays for the asset via the seller's bank. It credits the reserve account of the seller's bank with the funds, and the bank credits the account of the seller with a deposit. A stylised illustration of this flow of funds is shown in **Figure 1**. This means that while asset purchases from banks increase the monetary base (or 'narrow money'), purchases from non-banks increase the monetary base and broad money at the same time. The expansion of broad money is a key part of the transmission mechanism for quantitative easing. It should ultimately lead to an increase in asset prices and spending and therefore bring inflation back to target.

(1) Yates (2002) notes that if the storage costs of holding cash were significant, that could reduce the return below zero and so in principle interest rates could be slightly negative.

(2) In the minutes of its March meeting, the Committee highlighted its concerns about further reductions in Bank Rate: there might be adverse effects on bank and building society profits and hence their future lending capacity; and, a sustained period of very low interest rates could impair the functioning of money markets, creating difficulties in the future, when interest rates needed to rise.

(3) For more details see *The framework for the Bank of England's operations in the sterling money markets*, available at

www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.

(4) Under both forms of monetary policy, the Bank provides banknotes according to demand.

(5) The standard UK measure of broad money is M4. This includes the UK non-bank private sector's holdings of notes and coin, sterling deposits and other sterling short-term instruments issued by banks and building societies, but excludes reserve balances held by banks at the Bank of England.

Asset purchases in other countries

The global nature of the economic slowdown has led to monetary policy being loosened around the world. Policy rates are at very low levels and a number of central banks have moved towards asset purchases. A range of approaches has been taken to easing monetary policy and improving conditions in credit markets, in part reflecting the structure of financial markets in different countries.

In the United States, asset purchases have covered a range of different types of assets, such as commercial paper and asset-backed securities. These purchases have either been undertaken directly by the Federal Reserve or by providing financing to financial companies to facilitate their purchase of private sector assets. The Federal Reserve has also expanded its purchases of US Treasuries, and begun to purchase debt issued by housing-related government sponsored enterprises. Much of the focus has been on intervening in specific markets to improve their functioning. However, the depth of capital markets in the United States has meant that these operations have resulted in a sizable expansion of the monetary base.

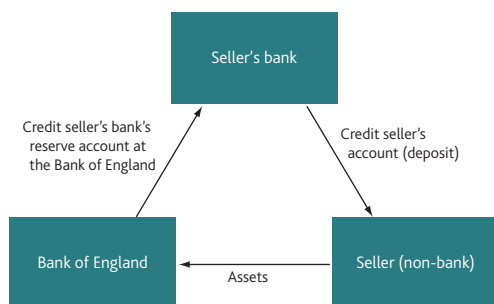
While the European Central Bank's enhanced credit support measures have mainly focused on providing support to banks through its refinancing operations it has also announced that it will begin purchases of covered bonds in the near future.

Since the start of this year, the Bank of Japan has introduced outright purchases of private sector instruments such as commercial paper and corporate bonds.

In March, the Swiss National Bank announced that it would purchase private sector assets and foreign currency to increase liquidity and prevent a further appreciation of the Swiss franc against the euro.

The Bank of Canada published a report in April that set out how it might provide a further monetary stimulus if required with the policy rate at an effective lower bound. This included purchases of both public and private sector assets, although these tools have not been used so far.

Figure 1 Flow of funds for Bank of England asset purchase from a non-bank company



Assets purchased

In order to inject a large quantity of money over a short period, there needs to be a ready supply of assets to purchase. The bulk of the Bank's purchases to date have been in the gilt market, where there is a large amount of assets with similar characteristics, allowing large quantities to be purchased quickly. However, the Bank is also purchasing private sector assets such as commercial paper and corporate bonds, albeit in smaller amounts. The aim of these purchases is to improve conditions in corporate credit markets by being a ready buyer for such instruments. This should make it easier and cheaper for companies to access credit. The focus of these operations is to improve the functioning of these markets, rather than to purchase a specific quantity of assets.

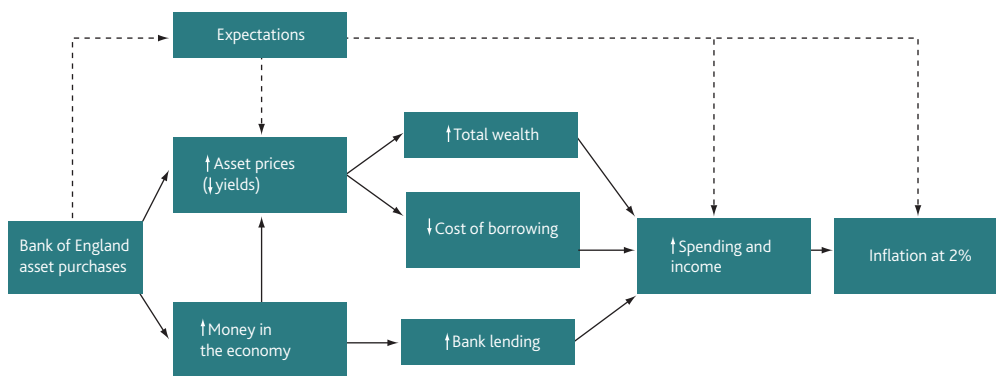
The MPC's choice of a twin-track approach — purchasing both public and private sector assets — is designed to provide a

number of different channels through which it can boost spending. The box on pages 94–95 sets out more details on the operational framework for conducting purchases of these different assets. As the box notes, the Bank had begun to purchase private sector assets before the MPC decided to undertake quantitative easing. This was to improve conditions in corporate debt markets. However, those purchases were funded by the issuance of Treasury bills, rather than central bank money, and so did not increase the money supply. Purchases of commercial paper and corporate bonds do not need to be financed by central bank money to influence conditions in those markets, but since quantitative easing began they have been financed by central bank reserves and so contributed to the injection of money.

Economic channels

Injecting money into the economy, in return for other assets, increases the liquidity of private sector balance sheets. This is the fundamental mechanism through which such a monetary expansion influences spending and hence inflation. Money is highly liquid because it can easily be used to buy goods and services or other assets. The increase in private sector liquidity will depend on the liquidity of the assets that are being exchanged for money. There are a number of channels through which greater liquidity can have an impact. Three key channels are set out below. The transmission mechanism is also summarised in **Figure 2**.

- **Asset prices and portfolio effects.** Purchases of assets financed by central bank money should push up the prices of assets. Higher asset prices mean correspondingly lower

Figure 2 Stylised transmission mechanism for asset purchases

yields, reducing the cost of borrowing for households and companies leading to higher consumption and investment spending. Cheaper and easier access to working capital for companies should also help them to maintain output, improving the prospects for employment and hence consumer spending. Furthermore, higher asset prices increase the wealth of asset holders, which should boost their spending. The Bank's asset purchases influence asset prices in a number of ways.

When a financial company sells an asset to the Bank, its money holdings increase (ie it has additional deposits). If the company does not regard this extra money to be a perfect substitute for the assets it has sold, this would imply that it is now holding excess money balances. In order to rebalance the portfolio back to its desired composition, the company may use the money to purchase other assets. However, that just shifts the excess balances to the seller of those assets so that they look to purchase other assets as well. This process should bid up asset prices, in principle to the point where, in aggregate, the value of the overall asset portfolio has risen sufficiently to bring the share of money relative to all assets to its desired level. This is sometimes known as the portfolio balance effect.

More generally, as prices rise for the assets purchased by the Bank, their yield will fall relative to those on other assets. Households and companies may be encouraged to switch into other types of asset in search of a higher return. That would push up on other asset prices as well. Moreover, by injecting more money into the economy, the Bank is making liquidity cheaper and easier to obtain. That should make households and companies more willing to hold other illiquid assets on their balance sheets.

The Bank's purchases of commercial paper and corporate bonds are aimed at improving conditions in corporate debt markets more directly. In the current stressed financial environment, investors are likely to be concerned that they will not be able to find buyers for these assets if they need to sell quickly unless they accept a substantial discount on the

price. That has made it difficult or costly for some companies to raise finance in the capital markets, as investors demand an additional return (or liquidity premium) to compensate them for that risk. By offering to be a ready buyer for commercial paper and corporate bonds, the Bank should make investors more confident that they can sell such assets if required, and hence lower the yield required to hold the asset back to more normal levels. More investors should also be encouraged to participate in the market, increasing the amount of financing available.

- **Bank lending and quantity effects.** As noted earlier, banks end up with higher reserve balances held at the Bank of England as the result of asset purchases. These injections of reserves may make it easier for banks to finance a higher level of liquid assets. Banks gain both new reserves and a corresponding new customer deposit when assets are purchased from non-banks. A higher level of liquid assets could encourage them to extend more new loans than they would otherwise have done. Banks need to keep a stock of liquid assets in order to be able to meet payment demands arising from customers or financial transactions. As that stock increases, banks should also be more willing to hold a higher stock of illiquid assets in the form of loans as they have the funds to cope with the potentially higher level of payments activity, unless they are constrained by other factors (see below). More bank lending to households and companies should help to support higher consumption and investment. And, even if banks do not choose to expand their lending to households and corporates, the extra reserves may contribute to a decline in the interest rate that banks pay to borrow from each other.⁽¹⁾

⁽¹⁾ Before the start of quantitative easing, the Bank used its open market operations (OMOs) to lend sufficient reserves to banks to meet their aggregate reserves target. However, while the system as a whole will be supplied with sufficient reserves in this way, individual banks may need to borrow from each other (at different terms to the Bank's OMOs) to acquire the reserves they need to meet their reserve targets. Injections of additional reserves through asset purchases may reduce the extent to which banks have to borrow on the market to maintain a given level of reserves.

Implementation of asset purchases

Injections of money are implemented through the Asset Purchase Facility (APF). The facility was announced in January (Table 1) and details were set out in a subsequent exchange of letters between the Governor of the Bank of England and the Chancellor of the Exchequer.⁽¹⁾ The APF initially began purchases of private sector assets funded by the issuance of Treasury bills. Its purpose at that time was focused solely on improving the availability of credit to companies, by improving the liquidity in certain capital markets. However, once the MPC decided that it wished to purchase assets financed by the creation of central bank reserves, the APF was then used for monetary policy purposes, and purchases of gilts were also introduced.

Table 1 Timeline for asset purchases

Date	Event
19 January	Announcement of Asset Purchase Facility (APF) by Chancellor.
29 January	Exchange of letters on details of APF.
13 February	Launch of commercial paper facility.
5 March	MPC decision to use APF for monetary policy purposes.
11 March	First APF purchases of gilts.
19 March	Market notice for corporate bond and Credit Guarantee Scheme facilities.
25 March	First APF purchases of corporate bonds.

The overall level of purchases is decided by the Monetary Policy Committee, with the choice of assets to purchase delegated to the Bank executive. The Bank is currently purchasing three different types of high-quality assets through the APF: investment-grade commercial paper; investment-grade corporate bonds; and UK government bonds (gilts). Other assets, such as paper issued under the Credit Guarantee Scheme, syndicated loans and certain types of asset-backed securities are also included on the list of assets that are eligible for purchase by the APF, and could be considered in due course. Furthermore, the Bank can ask for the Chancellor's approval to add other assets to the eligible list if it deems that appropriate.

Asset purchases are being conducted through a separate wholly-owned subsidiary of the Bank of England, with an indemnity provided by HM Treasury to cover any losses that might be incurred. The MPC is independent of the Government in making its decisions on the level of purchases. Details of the transactions are published through the Bank's statistical publications, operational announcements and a quarterly report on the APF. The mechanisms through which the purchases are currently being made are described below.⁽²⁾

Commercial paper facility. A window is provided each business day in which companies can issue commercial paper to the Bank directly or market participants can sell paper

previously acquired from issuers. A fixed spread to risk-free interest rates is charged, depending on the credit rating of the paper. Market participants selling previously acquired paper must pay an additional fee. To be eligible, commercial paper should be of up to three months maturity, subject to minimum credit ratings (equivalent to investment grade) and issued in sterling by non-bank companies that make a material contribution to economic activity in the United Kingdom.

The aim of this facility is to improve the liquidity in the commercial paper market by being a ready buyer of such assets, making issuers and investors more confident that they can raise funds if necessary. This should encourage a return to more normal market conditions and lower interest rates being charged to hold such paper. The sterling non-bank commercial paper market is relatively small in the United Kingdom, at around £6–£8 billion. As of 21 May, the APF held around £2¼ billion of commercial paper, about a third of the eligible stock.

Corporate bond facility. Reverse auctions are undertaken three times a week to buy a wide range of sterling bonds from financial institutions that act as market makers for such bonds. Participants submit bids for the price (spread) at which they are willing to sell particular bonds, with the cheapest bids being accepted by the Bank up to a maximum amount. The Bank privately sets a minimum spread (equivalent to a maximum price) at which it is prepared to purchase a bond, and so not all bonds will be bought at each auction, even if bids are received for each bond. Each auction is for a relatively small amount of each bond (up to £5 million), but the frequency of the auctions should make participants more confident that they can sell bonds if necessary. That in turn should reduce the interest rate they charge for holding them. The auctions also provide a regular source of information on the pricing of individual bonds, helping to reduce uncertainty over their market value. The focus of these purchases is to facilitate market-making by banks and dealers and so remove obstacles to corporate access to capital markets.

The eligibility criteria for corporate bonds are very similar to those for commercial paper. Bonds must be of investment grade and issued in sterling by non-bank companies that make a material contribution to economic activity in the United Kingdom. The portfolio of corporate bonds held under the APF is likely to grow over time as more auctions are held. As of 21 May, the APF held around £0.6 billion of corporate bonds.

Gilt purchases. Conventional gilts in the maturity range of 5 to 25 years are purchased through twice-weekly reverse auctions. The Bank will accept the cheapest bids (relative to market prices) for the gilts offered to it up to the total amount to be purchased at that auction. Although the bidders in these

auctions are banks and securities dealers, they can submit bids on behalf of their customers. And the auctions also allow non-competitive bids to be made by other financial companies, whereby they agree to sell their gilts at the average successful price in the competitive auction.

The aim of the gilt purchase programme is to allow the MPC to inject large quantities of money into the economy over a relatively short time scale. The nominal value of the stock of gilts in the maturity range covered by the auctions is currently around £270 billion. The purchases are not aimed at particular maturities within that range. As of 21 May, the APF had purchased around £64 billion of gilts.

Changes to the Bank's other operations. Before quantitative easing began, the Bank implemented the MPC's decisions on Bank Rate through a system of voluntary reserves targets. Banks would choose what level of reserves they wished to hold on their accounts at the Bank of England on average each month, and the Bank would supply just enough central bank

money in aggregate to meet those targets. Each bank's reserves were remunerated at Bank Rate provided they were close to their target. The terms on which central bank money was provided helped to ensure that short-term market interest rates were in line with Bank Rate. But once the focus switched to the quantity of money supplied, with the MPC deciding to inject additional money into the economy, those reserves targets became redundant and were suspended. Banks simply earn interest at Bank Rate on any reserves they hold. The Bank's other open market operations that supply and withdraw central bank money have continued, so that the injection of additional reserves is broadly equal to the amount of assets purchased under the APF.

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- (1) These are available on the Bank's website at www.bankofengland.co.uk/monetarypolicy/assetpurchases.htm.
- (2) Full details are set out in the Market Notices issued by the Bank. These are available at www.bankofengland.co.uk/markets/apf/index.htm. A box on pages 70–71 of the 'Markets and operations' article in this *Quarterly Bulletin* also discusses the Bank's purchases of private sector assets. The Credit Guarantee Scheme facility has not been activated, but the Bank stands ready to do so if market conditions deteriorate. A consultation paper was published on 8 June containing proposals for possible extensions to the APF to cover a broader range of instruments that are used to finance working capital.

The additional deposits created by bank lending will be passed on to other households and companies as they are spent.⁽¹⁾ In an analogous way to the portfolio effect discussed earlier, if their money balances are pushed above the desired level, they may respond by buying more goods and services. This will further boost nominal spending and should ultimately bid up the prices of goods and services leading to higher inflation. Higher money balances may also provide working capital for companies, making it easier for them to maintain employment levels.

- **Expectations.** Asset purchases could have an important impact on expectations. By demonstrating that the MPC will do whatever it takes to meet the inflation target, expectations of future inflation should remain anchored to the target when there was a risk that they might otherwise have fallen. Even with nominal interest rates fixed at very low levels, this would imply that real interest rates are kept at a lower level, which should encourage greater spending. Higher inflation expectations could also influence price-setting behaviour by firms, leading to a more direct impact on inflation. More generally, a perceived improvement in the economic outlook is likely to boost confidence and make people more willing to spend. The article on public attitudes to inflation and interest rates in this edition of the *Quarterly Bulletin* provides a discussion of recent developments in household inflation expectations.

What factors are likely to influence the strength of these channels?

To motivate a discussion of the likely strength of the above channels, we first review the past empirical evidence of the

effects of asset purchases. We then discuss a number of key drivers of the strength of the economic channels set out above: first, the response by sellers of assets to the additional money they receive (most relevant to the effect of purchases on asset prices); second, the response of capital markets to purchases of corporate debt; third, the response by banks to the additional reserve balances they hold (relevant to the bank lending and quantity effects); and finally the wider response of households and companies.

Empirical evidence

Increases in money should eventually lead to a rise in prices. There is a well-established long-run empirical relationship between broad money growth and inflation across a variety of countries and monetary regimes (see for example Benati (2005) and King (2002)). However, there is considerable uncertainty about the pace with which injections of money will feed through to prices.

Quantitative easing has been used on few occasions in the past, so there is little empirical evidence on which to draw. One obvious international example is the experience of Japan earlier this decade. Bernanke *et al* (2004) found some evidence of an impact on long-term interest rates from quantitative easing. However, Baba *et al* (2005) concluded that the Bank of Japan's commitment to keep policy rates low was more important for reducing long-term interest rates than its use of quantitative easing. Asset purchases have also been used to influence government bond yields in the

(1) The deposits created directly by the Bank's asset purchases are likely to flow to financial companies, but they could end up with non-financial companies, for example, if the money is used to buy corporate bonds. The money could then flow elsewhere as the company issuing the bonds spends the money.

United States in the past. Bernanke (2002) highlighted that the Federal Reserve was successful in maintaining a ceiling on long-term Treasury bond yields in the 1940s. However, studies suggest that an attempt in the United States in the 1960s to raise short-term interest rates while lowering long-term interest rates, the so-called 'Operation Twist', was less successful (though this may have been due to the small size of the operation).

Recent announcements of asset purchases by central banks provide further evidence that such purchases can influence asset prices. Kohn (2009) highlighted that the Federal Reserve's announcements of purchases of mortgage-backed securities and Treasury bonds reduced mortgage and other long-term rates in the United States appreciably — by some estimates by as much as a percentage point. And the Bank of England's announcement on 5 March that the Bank would be purchasing £75 billion of assets financed by central bank money also appeared to have an impact on UK government bond yields. Gilt yields in the 5 to 25 year maturity range eligible for purchase fell around 40–90 basis points by the end of the day following the announcement.

Evidence on the impact of money injections on output and inflation is sparser. For the Japanese episode, Kimura *et al* (2003) found the effect to be small but highly uncertain. It is difficult to know how important quantitative easing was in the case of Japan without knowing how much worse the recession would have been without it.

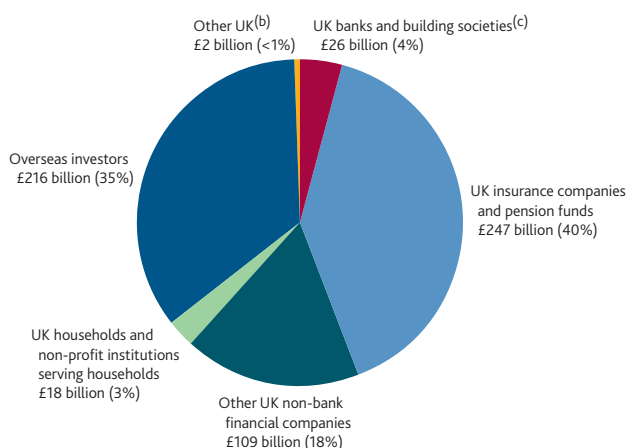
The remainder of this section looks at the factors that will influence the strength of the economic channels set out above.

Response by sellers of assets

In order for the portfolio rebalancing effect to work, sellers of assets need to purchase other assets with the money they receive, thereby bidding up asset prices. As gilts have made up the bulk of purchases, an important consideration is who typically own gilts and what they are likely to do with the money. Looking at the final seller of the gilts purchased by the Bank could be misleading. For example, some financial institutions may have bought gilts in anticipation of selling them to the Bank. In that case, it is the original seller that ends up with extra money as a result of the asset purchase programme. The distribution of gilt holdings before the announcement of the Bank's asset purchases may therefore be more informative. At the end of last year, the bulk of gilt holdings were accounted for by UK insurance companies and pension funds, other UK non-bank financial institutions and overseas investors (Chart 2).

For these UK non-bank financial companies, gilts represent a relatively small proportion of their overall asset portfolios, with these companies holding a range of other types of assets (Table A). That suggests that those companies might be

Chart 2 Distribution of total gilt holdings as at the end of 2008^(a)



(a) Data are not seasonally adjusted.
 (b) Non-financial corporations and local government.
 (c) Includes Bank of England holdings.

Table A End-2008 asset holdings of UK non-bank financial companies^(a)

	Insurance companies and pension funds	Other non-bank financial companies ^(b)
Cash/deposits	7	32
Gilts	12	4
UK bank and building society bonds	4	1
Other UK bonds	7	4
UK and foreign equities	41	28
Other	29	30

(a) Data are not seasonally adjusted. Sum of components may not add up to 100 due to rounding.
 (b) This measure excludes the bank deposits of intermediate other financial corporations (OFCs), which are unlikely to be related to asset prices and spending. For more details, see the box on page 13 of the May 2009 Inflation Report.

prepared to reinvest the money from gilt sales into other types of assets given that they already hold such assets. The speed of any adjustment will depend on how quickly portfolio reallocation decisions are made. Overseas investors might choose to invest the additional money in foreign rather than UK assets. However, in order to do so, they would still need to exchange the sterling they are holding for foreign currency. That would mean that the money is then passed on to someone else, who may decide to use it to buy other sterling assets.

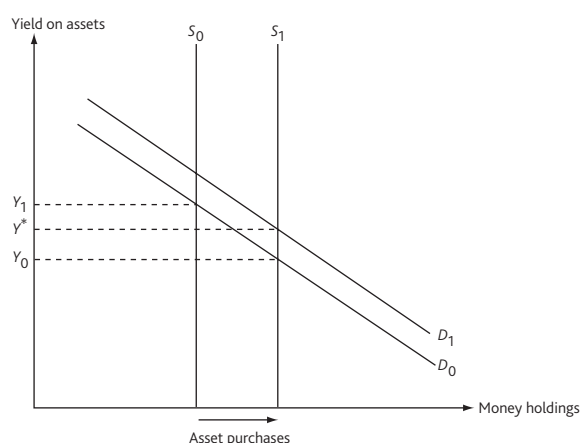
The extent to which the impact of the Bank's asset purchases feeds through to a wider range of asset prices will depend in part on the substitutability of different types of assets. Each has its own characteristics in terms of risk and return, and asset holders may require more of a difference in the relative yield to open up before they attempt to switch into particular higher-yielding assets to increase their overall returns.

If markets are efficient, all asset prices might be expected to adjust quickly to news about the Bank's asset purchases.

However, if financial markets are impaired or if there is uncertainty over how asset sellers will adjust their portfolios following the purchases, some asset prices may only adjust gradually as transactions take place.

The overall impact on asset prices (and market yields) will depend on the sensitivity of the demand for money to changes in asset returns. This is illustrated in **Figure 3**. Money provides benefits in the form of liquidity, but also imposes an opportunity cost because the return on holding money is typically lower than on other assets. So the demand for money should rise as the yields on other assets fall (shown by the downward-sloping demand curve, D_0). An increase in the supply of money (from S_0 to S_1) will only be willingly held if the yield on other assets falls (from Y_1 to Y_0).

Figure 3 Changes in money demand and money supply



Money demand will also be affected by other factors, such as activity in the economy (given the need for money to conduct transactions). As asset prices rise, nominal spending should increase and the demand for money should shift upwards (from D_0 to D_1). That will reduce the change in asset prices and yields required to bring money demand and money supply back into line (from Y_0 to Y^*).

Two key factors affecting the asset price channel, therefore, are the response, or elasticity, of money demand to changes in yields (the slope of the demand curve) and the elasticity with respect to changes in spending (the extent of the shift in the demand curve). One risk is that at low levels of yields the elasticity of money demand to changes in yields may be high, and so sellers are prepared to accept a higher proportion of money holdings and not seek to buy other assets. While this could reduce the impact on asset prices, it seems unlikely that it would negate it altogether.⁽¹⁾ If that is the case, the injection of money should still have a significant effect on asset prices provided it is large enough.

Response of capital markets

The Bank's purchases of high-quality private sector assets should make it easier and cheaper for companies to raise

finance in corporate debt markets. However, their impact will depend in part on what has driven the increase in the spread between yields on corporate and government bonds over the past two years. An illustrative decomposition of the spread on investment grade corporate bonds in the February 2009 *Inflation Report* suggested that the pickup had been driven by both increased compensation for illiquidity and increased compensation for default losses. The Bank's facility is targeted at reducing illiquidity premia, although credit risk premia may be influenced indirectly through the general increase in collateral values and nominal spending that arises through money-financed asset purchases.

The impact on the availability of credit to companies will also depend on the willingness of investors to expand the finance they provide in corporate debt markets. Due to the financial risk involved, the Bank's purchases are focused on high-quality debt, but they could still make it easier for companies with lower-quality debt to raise finance if greater use of the capital markets by investment-grade companies leaves banks with more capacity to lend to non-investment grade companies.

The Bank's commercial paper and corporate bond facilities need not require large quantities of assets to be purchased by the Bank in order to be effective, and so their success should not be measured by the quantity of purchases. The aim is to be a ready buyer if needed, so even if actual purchases are relatively small, the knowledge the Bank stands ready to purchase assets should give confidence to investors to hold such assets.

Response by banks to additional reserves

The impact of the additional reserves on banks' overall liquidity positions will depend on how the other components of banks' balance sheets change. If banks' holdings of gilts fall (as would be the case if gilts are purchased from the banks) then banks' overall holdings of liquid assets will be relatively little changed, but if gilts are bought from non-banks, the stock of liquid assets held by banks should increase relatively more. The extent to which any improvement in the liquidity of banks' balance sheets will encourage them to increase their lending will be driven by a number of considerations, including whether they have sufficient capital to support such an expansion of their balance sheet, whether they have access to funding for the loans, and whether there is demand for the loans in the first place.

Given the financial stresses that banks are currently facing, this channel may be impaired, at least in the near term. However, over the past year a range of measures have been introduced by the authorities to support the banking sector and bolster

⁽¹⁾ An extreme version of this is the so-called 'liquidity trap' where people are indifferent between holding money and other assets, and so the demand for money is infinite, and yields cannot be pushed down any further.

lending. These have included capital injections, guarantees on debt issued by banks to obtain funding, and insurance against losses on some assets held by banks. As the impact of these measures feed through, they should interact with the additional liquidity provided by the Bank of England's asset purchases to make the effect of higher reserves on lending (the bank lending channel) more powerful.

One measure that is sometimes used to analyse the creation of broad money through lending by commercial banks is the 'money multiplier' — the ratio of broad money to central bank money. Given that the level of broad money is many times larger than that of central bank money, this might suggest that a small injection of reserves could have a substantial impact on broad money. However, this is not a direct causal relationship. The level of broad money reflects all the factors discussed above. In current conditions, the marginal impact on broad money of a change in reserves is likely to be much smaller than implied by the current ratio. And indeed, the money multiplier has fallen sharply since the onset of the financial crisis in the middle of 2007.

Even if banks do not increase lending at all, broad money will still rise to the extent that the Bank's asset purchases create deposits by buying from non-banks. The asset purchases should therefore boost broad money regardless of the response of the banks, but the impact could be much larger if banks increase lending as well.

Wider response of households and companies

The overall impact of asset purchases on spending will also depend on how households and companies respond to changes in their money holdings and asset prices. The impact of higher money holdings will depend, for example, on the extent to which households and companies choose to pay down debt or increase spending.

Companies facing a lower cost of borrowing, as yields fall, are likely to spend more on investment projects, for example, but the impact will also depend on the expected demand for their products. The extent to which the policy stimulus contributes to an improvement in confidence is therefore likely to be important.

The impact on household spending of an increase in asset prices will depend in part on whether it is perceived to be persistent. If households expect asset prices to remain higher, the impact on spending is likely to be stronger. Alternatively, additional wealth may be used to provide a precautionary buffer against future income shocks, and so have a more limited impact on current spending. Some wealth will be tied up in pension pots or other funds. Increases in the value of these assets may be less visible, or more difficult to access, so households may be slower to respond. Such examples illustrate the uncertainty surrounding the impact of asset purchases on aggregate spending.

Asset purchases and the monetary policy process

At its March meeting, the MPC decided to purchase £75 billion of assets over the following three months. At its May meeting, the Committee decided to purchase an additional £50 billion of assets. This will leave the level of reserves held by banks at the Bank of England more than four times higher than it was prior to the asset purchases. The injection of central bank money will be equivalent to around 8% of broad money (or 8¾% of annual GDP).⁽¹⁾

As discussed in the minutes of the MPC's March meeting, the full impact of this stimulus is likely to take some time to come through. There is also a considerable lag between Bank Rate changes and their final effect on nominal spending. Ultimately, asset purchases will have been successful if they have helped the Committee return inflation back to target in the medium term. In practice, though, it will be difficult to assess the marginal impact of those purchases given the wide range of other policy measures and economic developments that will be affecting the economy. Nevertheless, a range of indicators are likely to be useful in assessing the effects of the Bank's asset purchases at different stages. Early indicators include developments in financial markets and assets prices. The 'Markets and operations' article in this *Quarterly Bulletin* provides some commentary on recent market developments. Over time, the impact on bank lending and broad money should become clearer, with the effects finally feeding through to nominal spending and inflation. MPC judgements on the impact of asset purchases and the outlook for the economy will continue to be set out in the minutes of its monthly meetings and in quarterly *Inflation Reports*.

Exit strategy

As the economy recovers, the medium-term outlook for inflation will improve. As in normal times, the Committee will be guided by the medium-term outlook for inflation relative to the inflation target. Given that the inflation target is symmetric, if inflation looks set to rise above the 2% target, then the Committee will want to tighten monetary policy to slow spending and reduce inflation.

Monetary policy could be tightened in a number of ways. It could involve some combination of increases in Bank Rate and sales of assets in order to reduce the supply of money in the economy. Alternatively, the supply of reserves could be reduced without asset sales, through the issuance of short-term Bank of England bills. The MPC will decide on the

(1) Broad money is based on a measure of M4 that excludes the holdings of intermediate other financial corporations (OFCs) which are unlikely to be related to asset prices and spending. For more details on this measure, see the box on page 13 of the May 2009 *Inflation Report*.

most appropriate way to withdraw the policy stimulus based on the circumstances prevailing at the time.

Conclusion

The introduction of large-scale asset purchases using central bank money, or 'quantitative easing', shifted the focus towards the quantity of money as well as the price of money. Injecting more money into the economy should boost spending, helping the MPC to bring inflation back to target in the medium term. The stimulus is likely to occur through a number of channels, and the responses of those who receive the additional money balances will be key to its overall effectiveness. The more that

households and companies use the new money to buy goods and services or other assets, the more it will raise spending. If banks use the additional reserves to expand their lending, the impact could be even stronger.

It is too soon to say how powerful the stimulus will ultimately be. There is considerable uncertainty about the strength and timing of the effects. Standard economic models are of limited use in these unusual circumstances, and the empirical evidence is extremely limited. However, the monetary policy framework will ensure that the appropriate measures are taken over time so that the inflation target is met in the medium term.

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Public attitudes to inflation and monetary policy

By Alina Barnett and Ozlem Oomen of the Bank's Monetary Assessment and Strategy Division and Venetia Bell of the Bank's Inflation Report and Bulletin Division.⁽¹⁾

According to the Bank/GfK NOP survey, near-term inflation expectations have fallen markedly over the past year from elevated levels. In part, that may have reflected a reduction in households' perceptions of current inflation. But it is also likely to have reflected weaker demand prospects. Longer-term measures of inflation expectations were a little higher in May than in February. Households' perceptions of the current level of interest rates have fallen, as both borrowing and saving rates have declined. Households report that they expect interest rates to rise over the year ahead. The net balance of respondents satisfied with the performance of the Bank has fallen over the past year. That may reflect concerns about the economic outlook and the financial crisis.

Introduction

The Bank of England is charged with maintaining price stability in the United Kingdom. Stable prices are defined by the Government's inflation target — currently 2%, as measured by the annual change in the consumer prices index (CPI). Subject to delivering price stability, the Bank is also tasked with supporting the Government's economic objectives, including those for growth and employment. To achieve these objectives, the Monetary Policy Committee (MPC) sets the level of both Bank Rate and, since March 2009, asset purchases financed by the issuance of central bank reserves.

Monetary policy is likely to be most effective if its objectives, and the tools available to policymakers to achieve those objectives, are well understood by the general public. To that end, an article on pages 90–100 of this *Quarterly Bulletin* discusses how the programme of asset purchases financed by the issuance of central bank reserves, sometimes referred to as 'quantitative easing', will help ensure that inflation remains close to the target in the medium term.

The general public's inflation expectations provide an important signal about confidence in the inflation-targeting regime. And there are a number of channels through which inflation expectations can themselves influence inflation. First, companies' expectations of overall inflation, and so their expectations for competitors' prices, will influence the prices that they set for their own goods and services. Second, if households expect higher inflation, they may be more likely to bid for higher wages, pushing up on companies' costs. Third, the prices that households and companies expect in the future will affect their spending and investment decisions today.

To provide information about inflation expectations and to gauge public understanding of the policy framework, the Bank has, since 1999, commissioned GfK NOP to conduct a survey of households' attitudes to inflation and interest rates. This article is the latest in an annual series that analyses the survey results, and includes data up until May 2009. The box on page 102 of this article describes the survey in more detail.

Households' perceptions of current inflation have fallen back over the past year, and official estimates of inflation are also lower than a year ago. The first part of this article discusses whether these movements in official measures of inflation, as well as other factors, can explain the fall in households' perceptions of inflation.

Over the past year, the MPC has consistently expected inflation to ease over the following twelve months. Like the MPC, households have also, on average, expected inflation to fall back below their perception of current inflation over the year ahead. The next part of the article discusses what this divergence between perceptions and expectations reveals about how households form their inflation expectations, both for the near term and further ahead.

In response to the deterioration in the economic outlook over the past year, the MPC has cut Bank Rate to 0.5%, the lowest level of official interest rates since the Bank of England was established in 1694. But the average interest rates paid on retail deposits and charged on loans have not fallen by as much. The final part of this article discusses developments in

(1) The authors would like to thank Chia Ling Liu for research assistance, and Theresa Löber for her help in producing this article.

The Bank/GfK NOP survey

In 1999, the Bank commissioned GfK NOP to conduct a regular survey of attitudes to inflation on its behalf. The survey aims to provide information on inflation expectations and to gauge public understanding of the monetary policy framework. GfK NOP conducts the survey each quarter, in February, May, August and November. Each survey covers around 2,000 individuals, with an additional 2,000 taking part in an extended survey each February.

Respondents are asked how they think prices of goods and services have changed over the past twelve months, and how they expect them to change over the year ahead. They are not asked about a specific inflation measure, for example CPI or the retail prices index (RPI). Individuals are also asked a range of questions to assess how well they understand both the Bank's inflation target, and how that target can be achieved.

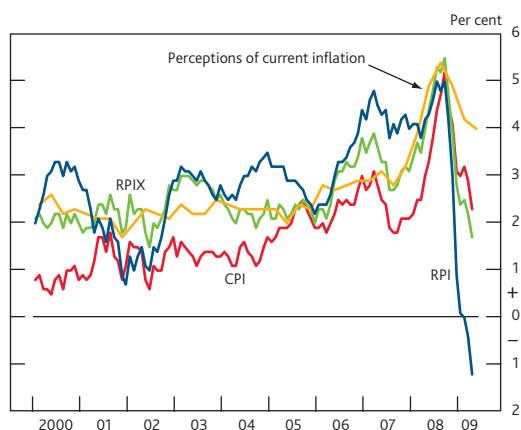
Since February 2009, the survey has included additional questions about households' longer-term inflation expectations. After asking about how respondents expected prices to change in the next twelve months, interviewers

households' interest rate perceptions and expectations, and their awareness of quantitative easing. It also discusses changes in the degree of public satisfaction with the Bank.

Perceptions of inflation

The Bank/GfK NOP survey asks households how they think that prices of goods and services have changed over the past year. After drifting upwards since mid-2005, the median estimate of households' perceptions of current inflation (inflation perceptions) peaked in August 2008, and has since fallen back (Chart 1). Although median inflation perceptions have fallen back over the past year, around a third of respondents thought that inflation was in excess of 5% in the

Chart 1 Median perceptions of current inflation and annual CPI, RPI and RPIX inflation rates



Sources: Bank/GfK NOP survey and ONS.

asked: 'And how about the twelve months after that?' and 'And how about the longer term, say in five years' time? How much would you expect prices in the shops generally to change over a year then?'

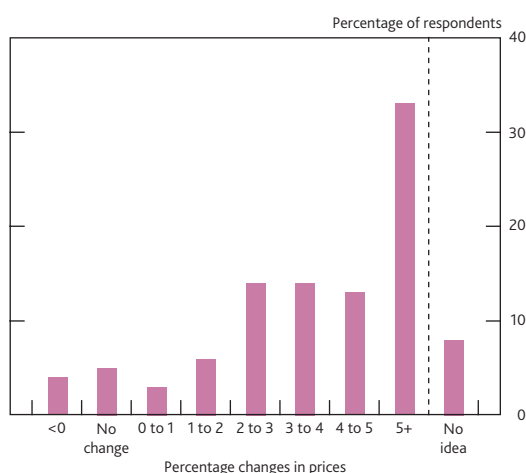
The May 2009 survey included the following additional questions in order to assess public awareness of quantitative easing, and the public's confidence that this policy would help ensure that inflation remains close to the target in the medium term:

'In addition to setting Bank Rate, the MPC of the Bank of England recently announced that it would start to inject money directly into the economy in order to meet the inflation target. How much had you heard about this policy of 'quantitative easing' before today?' and 'Do you think this policy of 'quantitative easing' will help the MPC to meet its inflation target?'

As with all surveys, the Bank/GfK NOP survey is subject to sampling error. The sample is designed and weighted to ensure that it is representative of known population data on age, gender, social class and region.

May survey (Chart 2). By contrast, around a fifth thought that inflation was below 2%. This section discusses potential factors influencing these movements, beginning with how movements in inflation perceptions compare with official estimates of inflation, and continuing with the possible influence of media reports on inflation perceptions.

Chart 2 Distribution of inflation perceptions^(a)



Source: Bank/GfK NOP survey.

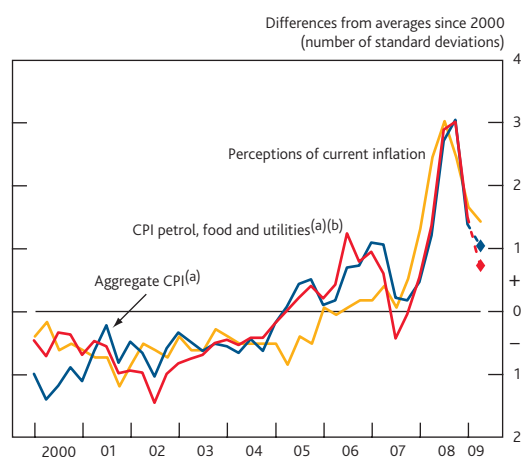
(a) Data are for the May 2009 survey.

Correlation with official inflation rates

Individuals' inflation perceptions are likely to move with official measures of inflation. The reduction in inflation perceptions has coincided with a sharper decrease in official measures of inflation (Chart 1). But on average over the past,

inflation perceptions have been a little less volatile than CPI inflation. Taking that lower average volatility into account, the fall back in perceptions has been only a little less than the reduction in CPI inflation (**Chart 3**). The falls in RPI and RPIX inflation — on a similarly adjusted basis — have, however, been greater than the fall in inflation perceptions, particularly the drop in RPI inflation. That suggests that the large fall in estimated mortgage interest payments — which accounts for the fall in the RPI relative to RPIX — has not made a significant contribution to households' perceptions of current inflation.

Chart 3 Inflation perceptions and official estimates of annual CPI inflation



Sources: Bank/GfK NOP survey and ONS.

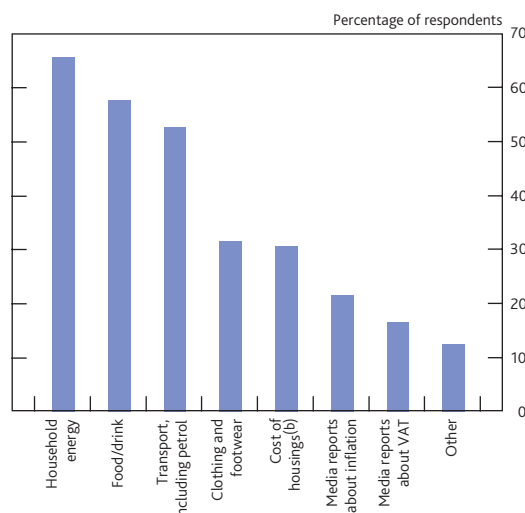
- (a) Averages of monthly inflation rates in the three months up to and including the Bank/GfK NOP survey dates. Inflation rates are calculated as percentage changes compared with a year earlier. The diamonds show data in the three months to April 2009.
(b) CPI inflation rates for petrol and other fuels, food and non-alcoholic beverages, and electricity and gas, weighted together according to their weights in the CPI.

According to the survey responses, households focus on particular types of goods and services when thinking about inflation. In the February 2009 Bank/GfK NOP survey, the last time this question was asked, the prices of household energy, food and drink, and transport-related purchases were reported to be very important influences on inflation perceptions by most people (**Chart 4**). That may be because those items form a large proportion of households' regular purchases, or because the inflation rates of these items have had a particularly significant impact on overall inflation over the past year or so. The relative fall in petrol, food and utilities inflation, however, has been a little larger than the decline in both CPI inflation and inflation perceptions (**Chart 3**).

Impact of media reports

Some households' perceptions of inflation are also affected by media reports about price trends (**Chart 4**). Although media reports might simply corroborate households' own experience of changes in prices, Carroll (2003)⁽¹⁾ shows that people may get additional information about inflation from the media. In part, that is because it helps them to acquire information about the economy at a relatively low cost.

Chart 4 Factors cited as 'very important' in forming households' perceptions of current inflation^(a)

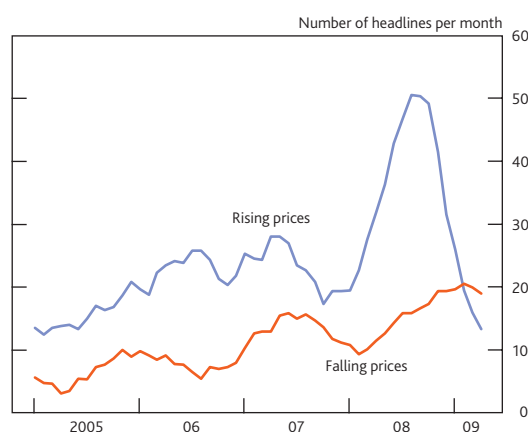


Source: Bank/GfK NOP survey.

- (a) Respondents could select more than one option. This question is asked only in the extended February survey.
(b) For example, mortgage payments or rents.

Media reports may have played a role in the recent decline in inflation perceptions. Over the past year, the number of headlines that mention rising prices has declined sharply, while the number that mention falling prices has picked up (**Chart 5**). But, given inflation of most goods and services has remained positive, stories about falling prices may be more likely to refer to expected falls in prices, rather than realised falls, and so may have affected expectations more than perceptions of inflation.

Chart 5 Media discussions of rising and falling prices^(a)



Source: © 2007 Factiva, Inc. All rights reserved.

- (a) Six-month moving average. Based on searches designed to count the number of headlines referring to inflation, wages, food and energy prices, but where possible excluding headlines referring to non-UK inflation and house prices. Newspapers included in the search are the *Daily Express*, the *Daily Mail*, the *Daily Mirror*, the *Daily Star*, the *Daily Telegraph*, the *Guardian*, the *Independent*, the *Independent on Sunday*, the *Mail on Sunday*, the *News of the World*, the *Observer*, the *People*, the *Sun*, the *Sunday Mirror*, the *Sunday Telegraph*, the *Sunday Times* and the *Times*.

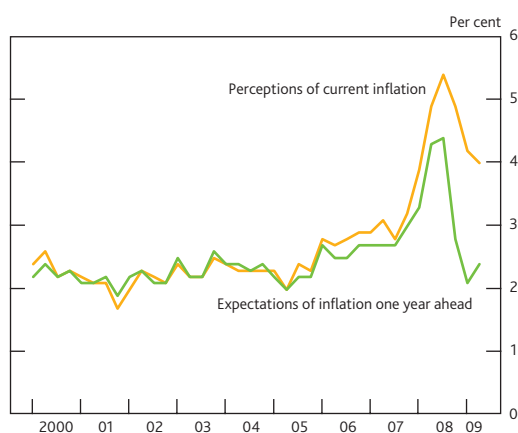
(1) See Carroll, C D (2003), 'Macroeconomic expectations of households and professional forecasters', *The Quarterly Journal of Economics*, Vol. 118, No. 1, pages 269–98.

To conclude, on average, households perceive that inflation has fallen back from a peak in mid-2008. The decline in inflation perceptions was a little less than the drop in CPI inflation. In part, the reduction in median inflation perceptions may reflect fewer media reports about rising prices.

Near-term inflation expectations

Near-term inflation expectations picked up along with perceptions of current inflation between 2005 and mid-2008, reaching their highest recorded level in the Bank/GfK NOP survey in August 2008 (**Chart 6**). But since then, inflation expectations have fallen back more markedly than either inflation perceptions or CPI inflation.

Chart 6 Median inflation perceptions and expectations



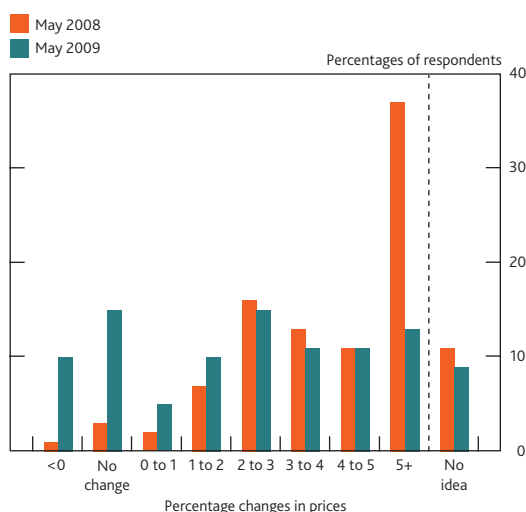
Source: Bank/GfK NOP survey.

The distribution of inflation expectations has widened over the past year. In May 2008, a significant proportion of respondents expected inflation in excess of 5% (**Chart 7**). But in the May 2009 survey, there was no clear modal expectation, and responses were fairly evenly distributed. For example, the proportion of respondents expecting flat or falling prices in the year ahead rose to around a quarter in May 2009 compared with less than 5% a year earlier. And in May 2009, over 10% of respondents expected inflation to be in excess of 5% one year ahead.

The reduction in the median household's inflation expectations over the past year has coincided with a fall in the inflation expectations of other groups. For example, median Consensus forecasts of inflation (which are based on a survey of professional economists) have also fallen back, albeit to a lesser extent. And the MPC has also revised down its projections for near-term inflation over the past year.

The relatively large movements in inflation expectations over the past year provide an opportunity to improve understanding of how households form those expectations. There are a number of ways in which individuals could form their inflation

Chart 7 Distribution of households' inflation expectations one year ahead



Source: Bank/GfK NOP survey.

expectations. Some people may invest time in developing a detailed understanding of how the economy evolves over time, and form their expectations of inflation accordingly. Others may form their expectations with the help of simple rules of thumb. For example: they may assume inflation returns to the inflation target in the next period; they may assume inflation will be the same in the next period as in the previous period; or they may extrapolate recent trends in inflation.

The way in which individuals form their expectations matters for monetary policy. For example, if on seeing high inflation households always expect it to be persistently high, they are more likely to try to negotiate large enough wage increases to offset the expected rise in their cost of living. In turn, companies may be more willing to pay such rises, since they would have greater confidence that they could pass through cost increases to final prices without losing market share. By contrast, if households always expect inflation to return to target, they would be less likely to bid for large wage increases. In the former case, relatively high inflation would be likely to have more persistence, and hence would ultimately require a greater policy response. The remainder of this subsection discusses how movements in inflation expectations over the past year can help explain how people form their expectations, and the relationship between inflation expectations and pay settlements.

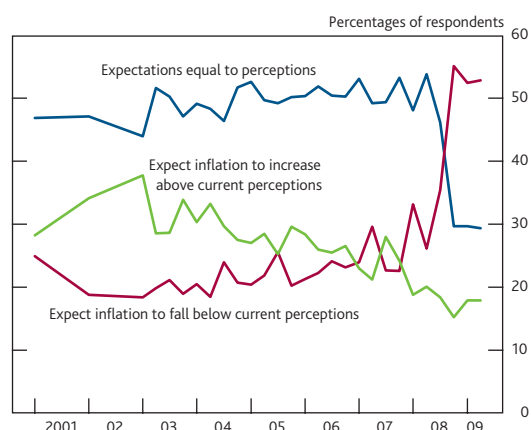
What have we learned about how expectations are formed?

One observation from the behaviour of inflation expectations over the past few years is that individuals do not always expect inflation to be close to target in the year ahead.

In addition, recent trends in inflation are likely to be an important influence on inflation expectations, but perhaps they are less influential than had previously appeared to be the

case. Up until mid-2008, around half of survey respondents expected inflation to be the same as their perception of current inflation. These individuals could have been using a simple rule of thumb based on past inflation, or they could have been taking other factors into account while still expecting future inflation to be similar to current inflation. When the majority of individuals' inflation expectations were similar to their perceptions, it was not possible to distinguish between these hypotheses. But the proportion of respondents in this group fell sharply in November 2008, to around a third (Chart 8). That is consistent with households taking a broader range of factors into account than simply past price trends. When asked what factors influenced their expectations of inflation, however, many households continued to cite recent trends in inflation (Chart 9).

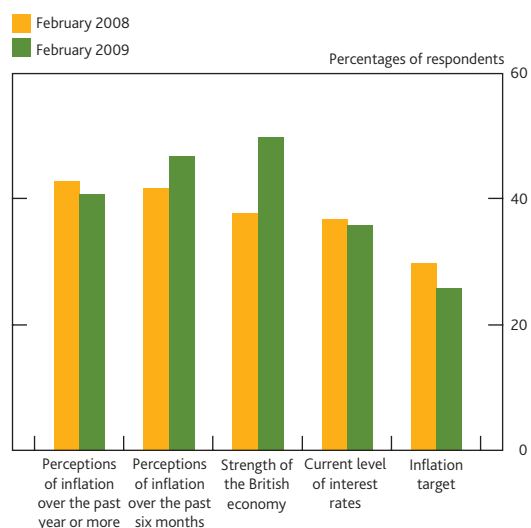
Chart 8 Households' inflation perceptions and expectations^(a)



Sources: Bank/GfK NOP survey and Bank calculations.

(a) Data based on the responses to the Bank/GfK survey in February 2001, 2002 and every quarter since February 2003.

Chart 9 Factors cited as 'very important' in forming households' expectations of inflation^(a)

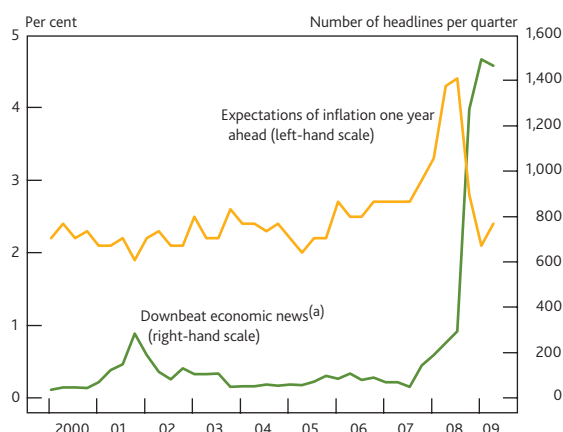


Source: Bank/GfK NOP survey.

(a) Respondents could select more than one option. This question is asked only in the extended February survey.

Given the divergence between inflation perceptions and expectations, it is likely that some households have taken a broader range of economic factors into account in forming their expectations than simply past price trends. One possibility is that households expected inflation to return to target following the temporary increase in oil and commodity price inflation. But it is likely that developments in demand have also been influential in driving expectations below perceptions of inflation. Slowing activity tends to put downward pressure on prices, so the contraction in demand since mid-2008 is likely to have pushed down on households' inflation expectations. Indeed, more people cited the strength of the economy as a very important factor affecting their expectations of inflation in the February 2009 Bank/GfK NOP survey than in the previous year (Chart 9). In part, that may be because of the media coverage generated by the downturn. Chart 10 suggests that the number of downbeat headlines has picked up sharply in recent months. But it is difficult to capture the full range of headlines about demand conditions that might affect inflation expectations.

Chart 10 Inflation expectations and downbeat economic news



Sources: Bank/GfK NOP survey and © 2007 Factiva, Inc. All rights reserved.

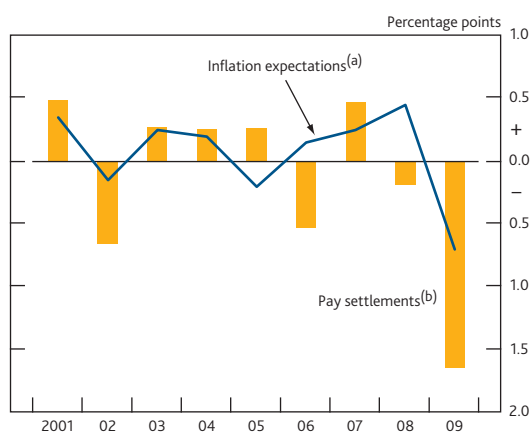
(a) Based on searches designed to count the number of headlines referring to either recession, financial crisis, labour market deterioration, insolvencies or deflation. Newspapers included in the search are as in Chart 5.

To conclude, when inflation perceptions and inflation expectations were close together and broadly stable, it was difficult to assess how households formed their inflation expectations. Movements in inflation expectations over the past year allow us to rule out the hypothesis that most households always expect inflation to return to target in the year ahead. That is not inconsistent with the monetary policy framework, which allows for deviations in inflation from target in the near term, while returning inflation to the target in the medium term. Recent movements in near-term inflation expectations, and, in particular, deviations between perceptions and expectations of inflation, suggest that some households take a wide range of economic factors into account when forming their expectations.

Inflation expectations and pay settlements

One of the channels through which household inflation expectations may affect the economy is via wage bargaining. Inflation expectations are often cited in negotiations over pay settlements. And in the past, pay settlements appear to have moved with the Bank/GfK NOP survey measure of year-ahead inflation expectations (Chart 11). But over the past two years, settlements have appeared to be somewhat weaker than might have been expected given changes in near-term inflation expectations, suggesting that other factors are likely to have depressed pay settlements. In particular, increased labour market slack since early 2008 following the downturn in demand, and heightened concerns over job security, may have outweighed the impact of near-term inflation expectations on wage bargaining. Overall, however, it is difficult to determine the relative importance of these factors in driving wages.

Chart 11 Changes in inflation expectations and in pay settlements



Sources: Bank of England, Bank/GfK NOP survey, Incomes Data Services, Industrial Relations Services, the Labour Research Department and ONS.

- (a) Inflation expectations over the next twelve months. Change on the previous year, based on the average of the November and February surveys.
 (b) Change on the previous year, based on one-month private sector settlements in the first four months of the year.

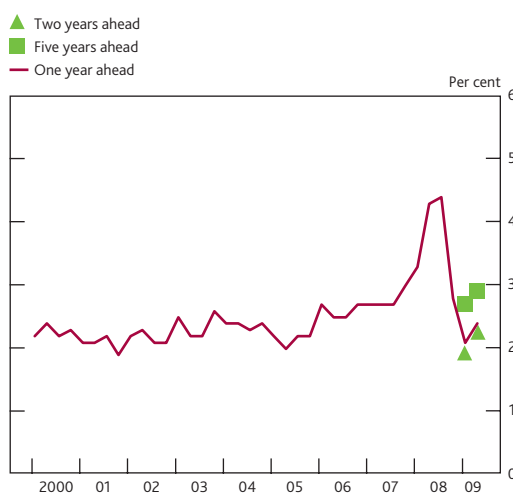
Medium-term inflation expectations

Recent observations of inflation expectations highlight that households, like the MPC, do not always expect inflation to return to target over the year ahead. What is important for monetary policy is that inflation is expected to be around the inflation target in the medium term. So the period over which households expect inflation to return to the target is important in gauging the credibility of the monetary policy framework. It will also influence wage-setting behaviour. Indeed, longer-term measures of inflation expectations may be more important for price and wage-setting than shorter-term measures, as these will be affected by temporary factors, such as increases in commodity prices.

Additional questions have been added to the Bank/GfK NOP survey since February 2009 regarding households'

expectations for inflation in two and five years' time (see the box on page 102). Median expectations were for inflation to be similar in two years' time to that in the year ahead, but to be higher five years ahead (Chart 12). Outturns for both two and five years ahead were a little higher in the May survey than in February.

Chart 12 Median inflation expectations one, two and five years ahead



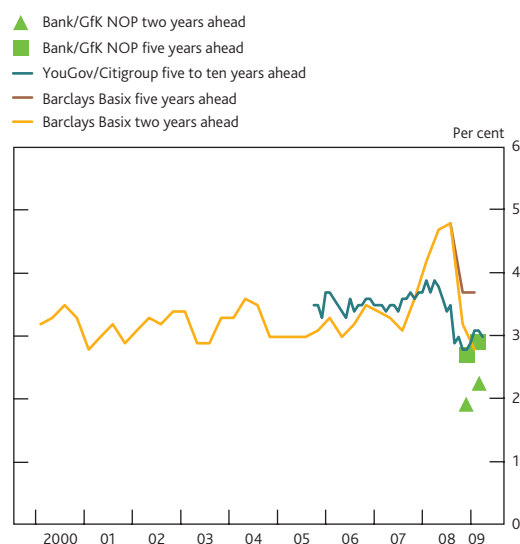
Source: Bank/GfK NOP survey.

Patterns in individuals' inflation expectations across different horizons may help explain how these longer-term inflation expectations are formed. In both the February and May surveys, the majority of respondents reported that they expected inflation to be similar in the year ahead compared with two years ahead. That could suggest that households do not distinguish much between prices one and two years ahead when thinking about inflation. By contrast, there was no clear relationship between individuals' one year ahead and five year ahead expectations. That could suggest that households think that other factors are important at the longer horizon. However, it could also be a product of greater uncertainty at longer horizons. Consistent with the latter explanation, around 35% of respondents answered 'don't know' when asked about their expectations in five years' time in the February and May surveys, compared with around 10% for expectations one year ahead.

Given that the survey has only included questions on longer-term inflation expectations since February 2009, it is not possible to compare these outturns with past observations over a period when inflation was around the target. But other survey measures with longer backruns are available. From mid-2007, the available longer-term measures of households' inflation expectations did pick up a little (Chart 13), albeit to a lesser extent than their corresponding short-term measures. These medium-term measures have subsequently fallen back to below their historical averages. But, as discussed above, there is considerable uncertainty surrounding expectations far

ahead, so it is still difficult to assess the significance of these divergences. Nonetheless, the MPC continue to monitor medium-term inflation expectations data closely.

Chart 13 Longer-term median measures of inflation expectations



Sources: Bank/GfK NOP survey, Bank of England, Barclays Capital, Citigroup and YouGov.

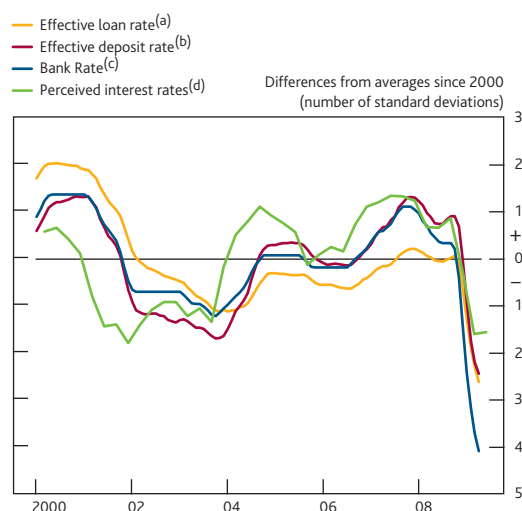
Attitudes to monetary policy and satisfaction with the Bank

The evolution of inflation expectations, particularly for the longer term, should also depend on households' expectations of monetary policy. This subsection discusses two issues regarding expectations of monetary policy. First, how households' perceptions of interest rates have moved relative to changes in Bank Rate. Second, how the low level of Bank Rate, and the MPC's recent programme of asset purchases financed by the issuance of central bank reserves (sometimes referred to as 'quantitative easing'), have affected interest rate expectations and satisfaction with the Bank.

Monetary policy

The MPC has cut Bank Rate significantly over the past year, from 5% in May 2008 to its current rate of 0.5%. But bank deposit and loan rates have not fallen by as much as Bank Rate, in part reflecting banks' funding constraints since the onset of the financial market crisis and also the increased riskiness of lending as a result of the deterioration in the macroeconomic outlook. Responses to the Bank/GfK NOP survey suggest that households perceive that interest rates — on mortgages, bank loans and deposits — have fallen. Those perceptions have fallen more in line with the average rates paid on the stock of outstanding debt and savings than with changes in Bank Rate (**Chart 14**).

Chart 14 Interest rate perceptions and effective household interest rates

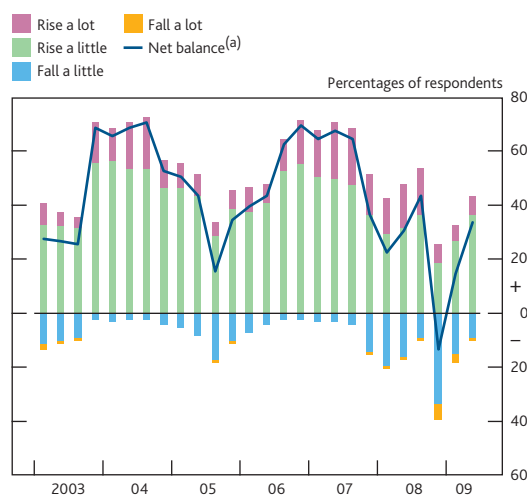


Sources: Bank of England and Bank/GfK NOP survey.

- (a) Three-month average of household secured and unsecured borrowing effective stock rates weighted by the outstanding balances.
- (b) Three-month average of household time and sight deposit effective stock rates weighted by the outstanding balances.
- (c) Three-month average.
- (d) Percentage of respondents who thought that rates had risen over the past year less the percentage who thought that rates had fallen. Data are quarterly observations.

The Bank/GfK NOP survey also asks individuals about their expectations of interest rates over the year ahead. One year ahead interest rate expectations fell sharply in November 2008 (**Chart 15**), with a net balance of respondents expecting interest rates to fall from their level at that time — the first such instance since the survey began in 1999. In both the February and May surveys, respondents, on balance, expected interest rates to rise. But, despite the low level of Bank Rate, some individuals still expected to see further cuts in interest rates, perhaps reflecting an expectation of further pass-through from previous cuts in Bank Rate.

Chart 15 Interest rate expectations over the next twelve months



Source: Bank/GfK NOP survey.

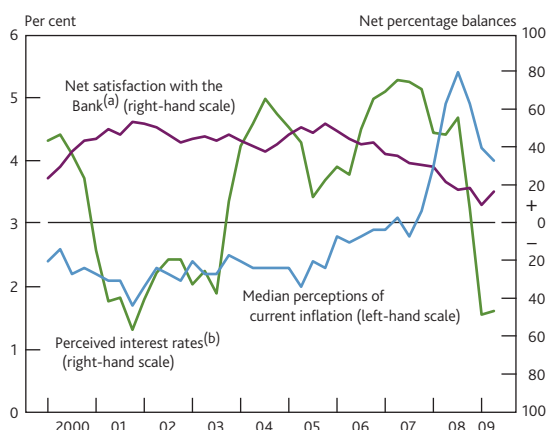
- (a) Percentage of respondents who thought that rates would rise less the percentage who thought that rates would fall.

The May 2009 survey included additional questions that aimed to assess the public's awareness of quantitative easing, and their confidence that this policy will help the MPC to meet the inflation target. Around half of respondents said that they had heard about quantitative easing. That was higher than the proportion of respondents who knew that it was either the Bank or the MPC who sets 'Britain's basic interest rate level', at around 40%. Around a third of respondents who had heard of quantitative easing said that they were confident that it would help the MPC to ensure that inflation is around the target — a little higher than the percentage who thought that it would not help.

Satisfaction with the Bank

The Bank/GfK NOP survey asks respondents whether they are satisfied with the Bank of England. The survey data suggest that, on balance, the public have been satisfied with the performance of the Bank (**Chart 16**), although net satisfaction has fallen over much of the past year. The measure bounced back a little in the May survey.

Chart 16 Satisfaction with the Bank, interest rate perceptions and inflation perceptions



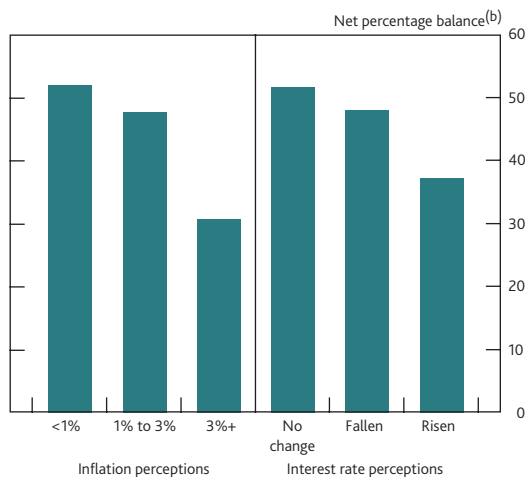
Source: Bank/GfK NOP survey.

- (a) The percentage of respondents who were fairly or very satisfied with the Bank less the percentage who were fairly or very dissatisfied.
 (b) The percentage of respondents who thought that rates had risen over the past year less the percentage who thought that rates had fallen.

Why has satisfaction with the Bank fallen over the past year? In the past, satisfaction with the Bank has tended to be higher among respondents whose inflation perceptions were relatively low and among those who thought that interest rates had not risen (**Chart 17**). Given that households, on average, have perceived a reduction in both interest rates and inflation over the past year (**Chart 16**), these factors are unlikely to account for the fall in satisfaction. Satisfaction was a little higher among respondents who thought that quantitative easing would help the MPC to meet the inflation target (**Chart 18**), so the MPC's programme of asset purchases may have also supported satisfaction in the recent past. But offsetting these factors, it is likely that concerns about the severe dislocation in financial markets and the depth of the

recession have weighed down to some extent on the public's satisfaction with the Bank over the past year.

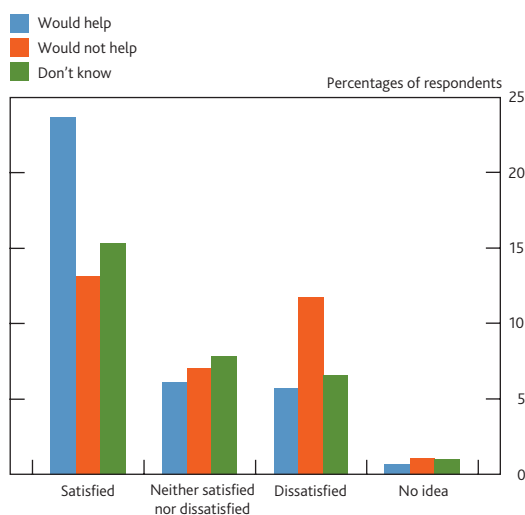
Chart 17 Public satisfaction with the Bank by inflation and interest rate perceptions^(a)



Sources: Bank/GfK NOP survey and Bank calculations.

- (a) Data based on the individual responses to the Bank/GfK NOP survey in February 2001, 2002 and every quarter since February 2003.
 (b) The percentage of respondents who were fairly or very satisfied with the Bank less the percentage who were fairly or very dissatisfied.

Chart 18 Public satisfaction with the Bank and confidence about whether 'quantitative easing' would help^(a)



Source: Bank/GfK NOP survey.

- (a) Percentage of respondents among those who reported that they had heard about 'quantitative easing' by whether they thought that it would help the MPC to meet the inflation target. This question was asked for the first time in the May 2009 survey.

Conclusion

The Bank/GfK NOP survey data suggest that households' perceptions of inflation have fallen back over the past year. Inflation perceptions have, however, fallen by less than CPI inflation.

Near-term inflation expectations have fallen markedly over the past year. In part, that may reflect a reduction in households' perceptions of current inflation. But expectations have fallen more sharply than perceptions. That divergence allows us to put more weight on the hypothesis that some households take a range of economic factors into account when forming their expectations, rather than using more simple rules of thumb. In particular, the marked fall in household expectations for inflation in the year ahead may, in part, reflect the deterioration in the macroeconomic outlook.

Since February 2009, the Bank/GfK NOP survey has included additional questions about households' longer-term inflation expectations. These measures suggested that households, on balance, expected inflation to be similar in two years' time to one year ahead, and to be a little higher in five years' time. Both measures picked up in the May survey compared with the February outturns.

Survey respondents have perceived that interest rates have fallen over the past year. Interest rate perceptions have fallen more in line with average rates paid on the stock of outstanding debt and savings than with the reductions in Bank Rate. In the May survey, on balance, respondents expected interest rates to rise over the next year. Around half of survey respondents said that they had heard about quantitative easing.

Survey respondents were satisfied, on balance, with the performance of the Bank in achieving the inflation target. Although satisfaction picked up in the May 2009 survey, satisfaction levels had fallen over the course of the year. That reduction in satisfaction may reflect concerns about the economic outlook and the financial crisis.

The economics and estimation of negative equity

By Tomas Hellebrandt of the Bank's Monetary Assessment and Strategy Division, Sandhya Kavar of the Bank's Systemic Risk Assessment Division and Matt Waldron of the Bank's Structural Economic Analysis Division.⁽¹⁾

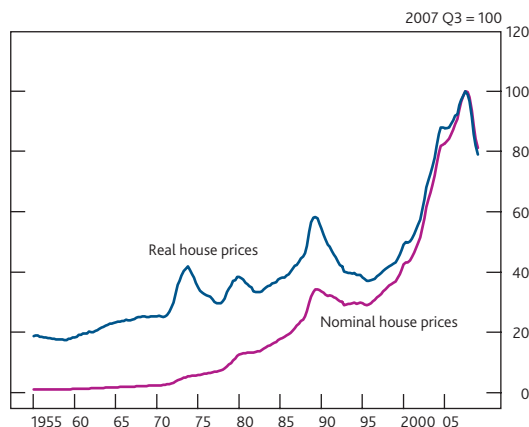
Negative equity occurs when the market value of a house is below the outstanding mortgage secured on it. As house prices fall, the number of households in negative equity tends to rise. Between the Autumn of 2007 and the Spring of 2009, nominal house prices fell by around 20% in the United Kingdom. There are no data which accurately measure the scale of negative equity. Three estimates presented in this article suggest that around 7%–11% of UK owner-occupier mortgagors were in negative equity in the Spring of 2009, although for most of those households, the total value of negative equity was relatively small. The effects of negative equity can be painful for those households concerned. Negative equity can also have implications for both monetary policy and financial stability, which are discussed in this article. These effects are likely to depend on developments elsewhere in the macroeconomy and financial system.

Introduction

Negative equity occurs when the market value of a property is below the outstanding value of the mortgage secured on it. It only ever affects a minority of households — only 40% of UK households are mortgagors and many of those have small mortgages relative to the value of their houses. However, when house prices fall, the number of households in negative equity tends to rise. The housing market weakened significantly during 2008. The price of an average house was around 20% lower in the Spring of 2009 than it had been at the peak of the housing market in Autumn 2007; the largest fall in nominal house prices on record (**Chart 1**).⁽²⁾ This is likely to have resulted in an increased incidence of negative equity.

Negative equity can be a painful experience for the households concerned. It can exacerbate households' financial difficulties in what may already be challenging times for many families. Negative equity can also have important consequences for the wider economy and the financial system, and it is these consequences that are the focus of this article. In particular, negative equity can have implications for monetary policy by affecting the pattern of aggregate demand and supply in the economy. And it can also have implications for financial stability if it leads banks to make writedowns on their mortgage books, or incur losses on securities whose value is related to the housing market, that are sufficiently large to impair the banks' capital ratios. The impairment of banks' balance sheets can also have implications for monetary policy, as evident throughout the financial crisis. These issues are

Chart 1 UK residential property prices^(a)



(a) Calculated as the average of the Nationwide and Halifax quarterly seasonally adjusted indices with the Nationwide long-run house price index prior to 1983. Real house prices calculated as nominal house prices deflated by consumer expenditure prices.

discussed in the first part of the article. An important conclusion is that the consequences of negative equity for the wider economy can vary, and are likely to depend on developments elsewhere in the macroeconomy and financial system. To illustrate this, the box on pages 116–17 compares the estimates and implications of negative equity in the United Kingdom in Spring 2009 with those in the United States and in the United Kingdom in the 1990s.

(1) The authors would like to thank Christopher Hackworth for his help in producing this article.

(2) While nominal house prices matter for negative equity, real house prices affect how much a household chooses to spend on housing relative to other goods and services. The fall in real house prices between the Autumn of 2007 and the Spring of 2009 was comparable to falls seen in previous housing market downturns in the early 1990s and the mid-1970s (**Chart 1**).

The economic consequences of negative equity depend crucially on its extent. But there are no data which accurately measure the number of households who are in negative equity. The second part of this article presents three approaches, used by the Bank and the Financial Services Authority (FSA), to estimate the incidence of negative equity in the Spring of 2009.⁽¹⁾ None of these approaches is perfect, so the section also discusses the merits and shortcomings of each.

The third section discusses which estimate is the most appropriate for addressing specific questions about the economic impact of negative equity. Given varying economic implications of the alternative estimates, and uncertainty around any particular one, the Bank monitors a range of estimates of negative equity.

Why does negative equity matter?

A fall in house prices can affect economic activity regardless of the extent of negative equity. For example, lower house prices can reduce housing investment by reducing the incentive for homebuilders and homeowners to invest in housing (Corder and Roberts (2008)). And, although a fall in house prices does not affect aggregate household sector wealth,⁽²⁾ it can affect the path of aggregate consumer spending in several different ways (Benito *et al* (2006)). But a fall in house prices can have additional economic effects in the event of negative equity becoming widespread, as discussed below.

In practice, the threshold beyond which each of the effects becomes important is not always the point at which the value of the property falls below the outstanding mortgage. Some of the effects described below apply to homeowners who have high loan to value (LTV) ratios, regardless of whether they are in negative equity, while others matter more for homeowners with a large amount of negative equity. In addition, the importance of negative equity for a given household will depend on whether they have other assets, like financial investments, or other debts, like personal loans. It is the overall financial position of the household that matters. However, the extent of negative equity can be a useful summary statistic for the likely importance of rising LTV ratios for the economy.

Implications for monetary policy

A rising incidence of negative equity is often associated with weak aggregate demand, but the direction of causation is not always obvious. Negative equity tends to become more prevalent when house prices fall, which usually reflects weak demand for housing, since housing supply is fixed in the short term. Weak housing demand often coincides with weak consumer demand in general, perhaps due to reduced availability of credit to consumers and potential home buyers. But negative equity can lead to a further contraction in the availability of credit to both households and firms, and it may also reduce household mobility. The effects on aggregate demand and the supply potential of the economy can have

implications for future inflationary pressure and, therefore, for monetary policy. The rest of this section discusses those effects in more detail.

Collateral and credit

A fall in house prices can lead to a reduction in consumer spending, and the effect is likely to be larger the greater the proportion of households with low or negative equity. There are two main ways this can happen. The first stems from the fact that housing equity can be used as collateral to obtain a secured loan on more favourable terms than a loan which is unsecured. Moreover, the more collateral a borrower has available, the better mortgage rate they can obtain. This is illustrated in **Chart 2** which shows average mortgage rates in different LTV buckets in June 2008 and compares them with the average rate on personal loans issued in the same month. Falling house prices reduce the value of collateral that homeowners have at their disposal and the amount of borrowing that can be obtained on more favourable terms. That can discourage households from borrowing and spending.⁽³⁾ As well as affecting the cost of additional borrowing, falling collateral values may also affect the cost of servicing existing mortgages if borrowers have to refinance at higher interest rates when their existing deals expire (eg fixed-rate deals). That would reduce their income available for consumption, which may further reduce demand. **Chart 2** highlights that the effect of falling collateral values on the price of credit is much more pronounced at high LTV ratios. That means that falling house prices are likely to have a larger effect on aggregate borrowing and spending when a higher proportion of households have low or negative housing equity.

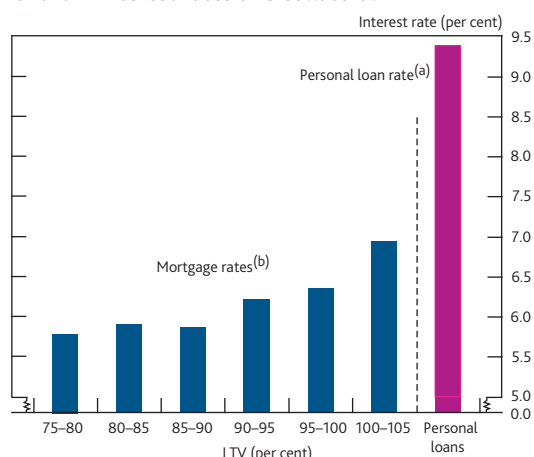
Second, falling values of housing equity also reduce the resources that homeowners have available to draw on to sustain their spending in the event of an unexpected loss of income (eg due to redundancy). By reducing the value of housing equity, falling house prices may lead some homeowners to seek to rebuild their balances of precautionary saving at the expense of consumer spending. While households with high amounts of housing equity may not respond much to falling house prices, because their demand for precautionary savings balances may already be satisfied, those with low or negative equity have a stronger incentive to

(1) The Bank wishes to thank the FSA for sharing their data and estimates. The FSA bears no responsibility for the analysis presented here.

(2) Changes in house prices affect the distribution of household sector wealth rather than overall household sector wealth. For example, a fall in house prices benefits those who are entering the housing market or 'trading up', but at the expense of those who are leaving the housing market or 'trading down'.

(3) That suggests a link between housing equity withdrawal (HEW) and consumer spending. HEW occurs whenever households, in aggregate, increase secured borrowing without spending the proceeds on improving or enlarging the housing stock. A fall in house prices is likely to reduce HEW for two reasons. First, it discourages homeowners from withdrawing equity from their homes for consumption by remortgaging (or taking out a second mortgage) — the collateral channel. Second, as well as such active equity withdrawal by people staying in their current home, equity is often passively released as people exit the housing market or trade down to a cheaper property. And, as house prices fall, the amount of equity withdrawn via this route will also decline. At first, that withdrawn equity is likely to be used to purchase financial assets, rather than for consumer spending. So this decline in equity withdrawal need not have any implications for current consumer spending.

Chart 2 Interest rates and collateral



Note: June 2008 is used as an example because the availability of mortgage products at high LTV ratios was much reduced after Summer 2008.

(a) June 2008 effective personal loan rate on new business, Bank of England data.

(b) Weighted average of mortgage rates in the FSA regulated mortgage transactions data from June 2008.

increase their balances of precautionary savings, particularly during a recession when job security falls.

There is empirical support for these effects. Benito and Mumtaz (2006) find that negative equity significantly raises the probability of a household being credit constrained — they would like to borrow more to finance expenditure, but are unable to do so either because the price of credit is too high or because lenders simply refuse to provide it. Similarly, Disney *et al* (2003) find that a household's spending rises by more in response to rising house prices if that household is in negative equity. Negative equity appears to induce precautionary saving which is eased as rising house prices lift households out of that position. A situation of *falling* house prices pushing people into negative equity, would then imply greater saving and lower spending.

As well as affecting the supply of credit to borrowers with low or negative equity, rising negative equity can also result in a reduced supply of credit to the economy as a whole. That is because, as will be discussed later, negative equity can raise the loss that lenders would incur in the event of default (loss given default). That can make banks less willing or able to supply credit to households and firms. Basel II regulations, which require banks to hold more capital against existing loans when their anticipated loss given default rises, can reinforce that (Benford and Nier (2007)). If credit is more costly or difficult to obtain, households and firms are likely to borrow less, leading to lower demand through lower consumer spending and investment. A reduction in credit availability may also have some effect on the supply capacity of the economy by reducing working capital for smaller businesses and the capital available for small business start-ups (Blanchflower and Oswald (1998)).

Household mobility

Negative equity can affect household mobility by discouraging or restricting households from moving house. For example, households may be reluctant to move because they would not wish to realise a loss on their house (Tversky and Kahneman (1991)). And a household in negative equity would be unable to move if they were unable to repay their existing mortgage and meet any downpayment requirements for a new mortgage on a different house. Of relevance to that is the existence of specific schemes to help borrowers with negative equity to move, which were developed by lenders during the 1990s' housing market downturn (Tatch (2009)).⁽¹⁾ Such schemes could help to limit the extent to which negative equity restricts mobility. Nevertheless, the effect of negative equity on mobility was quantitatively significant during the early 1990s. Henley (1998) estimate that of those in negative equity in the early 1990s, twice as many would have moved had they not been in negative equity.

Reduced household mobility can have a range of macroeconomic effects. For example, Henley (1998) argues that reduced household mobility leads to a reduction in the supply capacity of the economy by increasing structural unemployment and reducing productivity. A temporary reduction in the number of households moving home may also have implications for tax receipts, spending on housing market services and certain types of durable goods (Benito and Wood (2005)). For example, stamp duty revenue, estate agents' fees and solicitors' fees are all linked to the level of housing transactions, which tends to fall when negative equity rises.

Implications for financial stability

Domestic mortgage lending by the major UK banks represents over five times their core Tier 1 capital.⁽²⁾ In addition, around 40% of all outstanding mortgage debt in the United Kingdom has been used to back securities. Large losses on mortgage loans and associated securities can erode banks' capital positions, affecting both lenders' willingness and ability to lend and, in extreme cases, their solvency. Both effects can have implications for aggregate demand and the supply capacity of the economy, highlighting the interdependency of financial stability and monetary policy. What matters for these losses, and their associated economic effects, is the value of debt at risk (loss given default) and the coincidence of that with defaults (probability of default). The remainder of this section discusses the relationship between negative equity, the probability of default and loss given default.

(1) For example, lenders can allow households to transfer their mortgage from one house to another.

(2) Core Tier 1 capital is defined as ordinary share capital, eligible reserves and minority interests. It excludes perpetual non-cumulative preference shares and innovative Tier 1.

Probability of default

Negative equity impacts on the probability of default in a number of ways. In principle at least, and ignoring the transaction costs associated with selling a house, negative equity is a necessary condition for default to occur. That is because any borrower with positive equity who finds themselves unable to meet their repayments can sell their house and use part of the proceeds to pay off their mortgage. It is not in the interest of such a borrower to default because that would involve surrendering the full value of the house to the lender. The perceptions that households have about the value of their housing equity are, therefore, likely to affect whether or not they default.

However, negative equity is by no means a sufficient condition for default to occur. Default is likely to be a painful experience and one that most households try to avoid. When it does happen it usually reflects severe financial difficulties and problems keeping up with mortgage payments. By itself, negative equity does not cause mortgage payment problems. Indeed, May and Tudela (2005) find no evidence that negative equity increased the likelihood of a household experiencing mortgage payments problems in a sample of UK households between 1994 and 2002. And, even during the early 1990s' episode, only a very small fraction of households in negative equity were repossessed (see **Chart B** in the box on pages 116–17).

But if a household is experiencing difficulties meeting their mortgage payments, negative equity can increase the probability of default by reducing the household's *ability* to make payments. Ordinarily, if a household were to experience a loss of income that was believed to be temporary, they could withdraw equity from their home (or take out an additional loan) to help them meet their mortgage payments until their income recovered. That is consistent with evidence in Benito (2007), who finds that households are more likely to withdraw equity from their homes if they have experienced a financial shock. But low or negative equity can affect a household's ability to do that because of credit constraints, as discussed in the previous section.

Negative equity can also increase the probability of default by affecting the household's *willingness* to make mortgage payments. Defaulting on a mortgage has severe costs for the household, including loss of residence (and potentially other assets), reduced access to credit in the future and social stigma. However, defaulting can also have the benefit of reducing or limiting the debt burden of the household.⁽¹⁾ When a household has a lot of negative equity, the debt burden is large relative to the value of the home. For some households in this position, defaulting on the loan may be preferable to continuing to struggle with payments.

Negative equity may affect the probability of default of buy-to-let (BTL) mortgagors (those who have mortgages on properties which they let out to tenants) differently to that of owner-occupier mortgagors. In particular, the initial costs of defaulting on a BTL mortgage may be lower because defaulting does not lead directly to loss of residence, as it does for an owner-occupier. On the other hand, BTL mortgagors are more likely to have alternative financial resources, which lenders could lay claim to in the event of default.⁽²⁾ So, overall, it is hard to determine whether negative equity is more likely to lead to BTL mortgagors defaulting than owner-occupiers.

Evidence on the extent to which negative equity leads to default in the United Kingdom is restricted to surveys and aggregate data. The survey data only provide qualitative evidence and aggregate data are not likely to be particularly informative about the effect of negative equity on default. That is because default is an event that only ever affects a minority of households and is unlikely to be captured well in aggregate data, which better describe the average household. Nevertheless, the available evidence does suggest that negative equity plays a role in mortgage defaults. For example, Coles (1992) presents evidence from a 1991 survey of lenders in which a high LTV ratio was frequently noted as an important characteristic of borrowers falling behind in meeting their mortgage payments. And Brookes, Dicks and Pradhan (1994) and Whitley, Windram and Cox (2004) find that a reduction in the aggregate amount of housing equity owned by UK households was associated with an increase in the overall number of households that fell into arrears.

But other factors that affect payment ability (like interest rates and unemployment, for example) play important roles as well. That suggests that the level of household defaults, and therefore the impact of negative equity on financial stability, is likely to depend on conditions in the broader macroeconomic environment.

Loss given default

Faced with a borrower who is considering default, the lender normally has a number of options depending on the details of the particular case. Often the lender may try to agree with the borrower a change in the terms of the loan which will allow the borrower to eventually repay the loan in full. For example, if the borrower was recently made redundant, the lender may accept lower payments for a certain period until the borrower finds a new job. It is often in the interest of the lender to show forbearance because it can reduce (or eliminate) the loss on the loan.

(1) Because lending in the United Kingdom is done on a recourse basis and borrowers can be pursued for twelve years (five in Scotland) for any shortfalls in their debt obligations, defaulting will not necessarily permanently remove a household's debt burden. It is likely to limit it though, by reducing the total value of arrears added to their debt payments.

(2) For example, most BTL borrowers have equity in their primary residence. See Hellebrandt, Young and Waldron (2008) for survey evidence.

In some cases, however, default by the borrower is unavoidable. If the loan was held on the lender's mortgage book, the loss that the lender would realise depends on how much of the loan can be recovered by selling the house on which the mortgage was secured. Negative equity implies that the proceeds of the sale would not be enough to cover the outstanding loan. The total loss made by the lender would also depend on any costs incurred in selling repossessed property (such as estate agents' and solicitors' fees) and on how much money the lender can later recover from the borrower. It is the total value of negative equity (net of costs and recoveries) that is relevant in assessing lenders' potential losses, not the number of households in negative equity.

Mortgage losses may not be confined to the mortgage book of the lender. Investors (including banks themselves) who own securities that are backed by pools of mortgages (mortgage-backed securities (MBS)) would also be likely to suffer: increasing defaults on underlying mortgages would tend to reduce the current and future stream of mortgage repayments from that portfolio. This is likely to lead to a fall in the price of the security. The price of an MBS can also be affected by a general shift in investor sentiment, regardless of the actual performance of any given portfolio of loans.⁽¹⁾

Estimating negative equity

In order to calculate the number of mortgagors in negative equity exactly, it would be necessary to know the current house value and outstanding mortgage of every mortgaged property in the United Kingdom. Those data are mostly unobserved: individual houses are valued infrequently, normally only when the mortgage is refinanced or when the property is sold, and data on the outstanding value of individual mortgages are held by individual lenders who do not generally make this information publicly available. For this reason, negative equity can only be estimated, and the estimates are necessarily uncertain.

This section describes three alternative approaches to estimating the incidence of negative equity that the Bank has been using to monitor developments. The first approach uses mortgagors' own subjective valuations of their houses and of outstanding mortgages, as reported in household surveys. The second approach uses information on the LTV ratio of individual mortgage transactions at the time of house purchase. The third approach uses published information from a sample of lenders on the LTV ratios of households to whom they have lent in the past. The approaches are used to generate a range of estimates of the incidence of negative equity in 2009 Q1. It should be noted that each approach requires a number of assumptions to generate an estimate. That means there is a considerable range of uncertainty around all three estimates. Each approach has its drawbacks, so none of the estimates are perfect.

Estimates based on all three of these approaches have been published previously. The Bank of England (2008) published estimates based on the NMG Research survey of household finances in its October 2008 *Financial Stability Report* and in the 2008 Q4 *Quarterly Bulletin* (Hellebrandt, Young and Waldron (2008)). The Council of Mortgage Lenders (CML) published estimates in April 2009 based on individual mortgage transactions (Tatch (2009)). And the FSA (2009) published estimates using data from mortgage lenders in its 2009 *Financial Risk Outlook*.

Estimates using household surveys

The most straightforward way to estimate the proportion of mortgagors in negative equity is to survey a sample of households and ask them to estimate the current value of their house and outstanding mortgage. Those who report that the value of their mortgage is larger than the value of their house are estimated to be in negative equity. One such survey is the NMG Research survey commissioned by the Bank. The latest survey was carried out in late September and early October 2008. Just over 1,000 of the households surveyed were mortgagors.⁽²⁾ The responses were used to calculate an estimate of the LTV ratio of each mortgagor in the survey sample.⁽³⁾

Approximately 4% of mortgagors in the survey reported that they were in negative equity in September 2008, compared with around 1% in September 2007 (**Chart 3**). Between 2008 Q3 and 2009 Q1, house prices declined by a further 8% (according to the average of the Nationwide and Halifax indices as in **Chart 1**). By mechanically lowering the reported house values in the 2008 survey by 8% (and assuming that the value of the mortgages remained unchanged) it is possible to calculate an updated estimate of negative equity from the survey for 2009 Q1. That estimate suggests that 7% of UK owner-occupier mortgagors were in negative equity by the end of 2009 Q1, equivalent to around 700,000 households. But **Chart 3** also highlights that the majority of mortgagors had substantial equity in their homes. Over 75% of UK owner-occupier mortgagors were estimated to have an LTV ratio of less than 75%.⁽⁴⁾

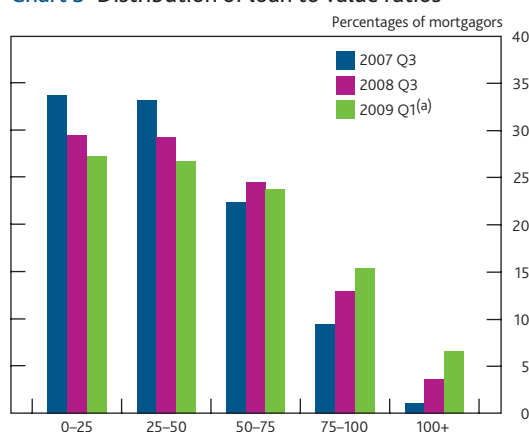
The main advantage of a survey-based approach is that households should potentially have better information about the value of their house and mortgage than almost anyone else. For example, they should take into account local housing market conditions, and also any unscheduled mortgage

(1) See 'Losses on financial assets' Box 1, *Financial Stability Report* (October 2008), available at www.bankofengland.co.uk/publications/fsr/2008/fsrfull0810.pdf.

(2) See Hellebrandt, Young and Waldron (2008) for a discussion of the results. Among other things, the survey asked: 'About how much would you expect to get from your main home if you sold it today?' and 'Roughly how much is left to pay on your current mortgage and secured loan(s) on your home?'.

(3) See the box in Hellebrandt, Young and Waldron (2008) for more details of the methodology.

(4) The method used to calculate LTV ratios is in line with the method used in Hellebrandt, Young and Waldron (2008). It is, however, slightly revised from the approach used in the October 2008 *Financial Stability Report* and so the estimates above are slightly higher than those presented in that publication.

Chart 3 Distribution of loan to value ratios

Source: NMG Research survey.

(a) Updated by mechanically lowering the reported house values in the 2008 survey by 8%; the fall in house prices between 2008 Q3, approximately when the 2008 survey was conducted, and 2009 Q1 according to the average of the Nationwide and Halifax quarterly indices (Chart 1). It was assumed that the value of households' mortgages was unchanged.

repayments or home improvements which affected the value of their housing equity.

However, research suggests that, collectively, respondents to surveys of this sort overstate the value of their house and understate their mortgage debt (Redwood and Tudela (2004)). The mean house value reported by mortgagors in the 2008 NMG Research survey was £213,000, compared to £172,000 and £209,000 in September, according to Halifax and the Department for Communities and Local Government respectively. The mean reported value of mortgages in the survey was £87,000 compared to £101,000 based on aggregate ONS data. This suggests that household surveys are likely to underestimate the incidence of negative equity.⁽¹⁾ In addition to that potential bias, there is also some uncertainty around the aggregation of survey samples. Given the 2008 NMG Research survey sample size of around 1,000 mortgagors, and an estimated proportion in negative equity of 7%, standard statistical methods would suggest with 95% confidence that the true proportion of mortgagors in negative equity in 2009 Q1 is somewhere between 5.6% and 8.7%.

Estimates using data on the flow of mortgage lending

The second approach uses a large data set of individual mortgage transactions collected by the FSA as part of its regulatory responsibilities.⁽²⁾ Among other things, this data set contains precise information on the size of the loan and the value of the house at the point when the loan was made. This makes it possible to calculate precisely the original value of housing equity of each mortgagor in the data set. In order to determine whether a given mortgagor was in negative equity in 2009 Q1, it is necessary to make two key adjustments to his or her original housing equity. First, the house value needs to be updated for subsequent house price growth. If house prices are falling, incumbent mortgagors' housing equity will tend to fall over time. Second, the outstanding mortgage needs to be updated for principal repayments. The majority of mortgagors gradually repay the mortgage principal over the life of the

mortgage, which reduces the size of the outstanding mortgage and increases the amount of equity they own in their houses over time.⁽³⁾

The FSA data set captures mortgage transactions between 2005 Q2 and 2009 Q1. Despite this short back run, it captures around 65% of the total stock of owner-occupied mortgages outstanding in the United Kingdom. That is because UK mortgages tend to be refinanced quite frequently. Moreover, the mortgages that are not captured in this data set, those households who took out or refinanced a mortgage prior to 2005 Q2, are unlikely to have been at risk of negative equity in 2009 Q1. That reflects both house price developments and mortgage repayments. Nominal house prices in 2009 Q1 were only slightly below their 2005 Q2 level (Chart 1) and had increased rapidly in the years preceding that, so few households who took out their mortgage prior to 2005 Q2 would have been pushed into negative equity by falling house prices alone. In addition, most of those households would likely have made sufficient repayments of principal between 2005 Q2 and 2009 Q1 to avoid negative equity.

Estimates using this methodology suggest that roughly 10% of owner-occupier mortgagors were in negative equity at the end of 2009 Q1, or around 1 million households. The CML, who have access to this data set and who use a very similar methodology, estimate that 900,000 households were in negative equity at the end of 2008 (Tatch (2009)).

Relative to the survey based approach, the main advantage of the flow data approach is that it allows housing equity at origination to be calculated for the population of recently issued regulated mortgages. And it does so without relying on the subjective responses of households.

The main problem with this approach is that it is not possible to adjust precisely for principal repayments and house price changes since each loan was originated. The adjustment is not able to capture unscheduled repayments of the mortgage principal by those with capital repayment mortgages or lump-sum repayments by those with interest-only mortgages, and equally it cannot capture arrears on repayments or repayment holidays.⁽⁴⁾ House price adjustments are sensitive to the house price index used and do not take into account local factors or home improvements made since origination of

(1) It is possible that the degree of bias in the responses varies according to the LTV ratio of the respondent. Mortgagors with high LTVs are likely to be those who bought their homes and took out their mortgages more recently. Those households are likely to be better informed about the value of their house and mortgage, so they may provide more accurate responses. In that case, estimates of negative equity would not be as biased as estimates of the average LTV ratio.

(2) The FSA data set covers only regulated mortgage transactions (including regulated adverse credit and self-certified loans). BTL and second charge mortgages are not included because they are not regulated. The data set is not publicly available.

(3) The data set includes postcode information, which allows regional house price indices (average of the Nationwide and Halifax) to be used for the house price growth adjustment. And it distinguishes between interest-only mortgages and 'repayment' mortgages so adjustments for the latter can be made more accurately.

(4) Some mortgage equity withdrawal is captured if that withdrawal requires the borrower to remortgage and the new mortgage appears in the transactions data.

A comparison with different episodes

The scale and economic effects of negative equity are likely to depend on the wider backdrop of the macroeconomy and financial system. This box compares the current episode with two other episodes: the housing downturn in the United Kingdom in the 1990s and the downturn in the United States that began in 2006.

The 1990s

Cutler (1995) estimates that 1.1 million households were in negative equity in 1995 Q2, equivalent to 11% of all mortgagors. That is broadly similar to the estimate for 2009 Q1 presented earlier that is most methodologically similar — the method based on mortgage transactions data.⁽¹⁾

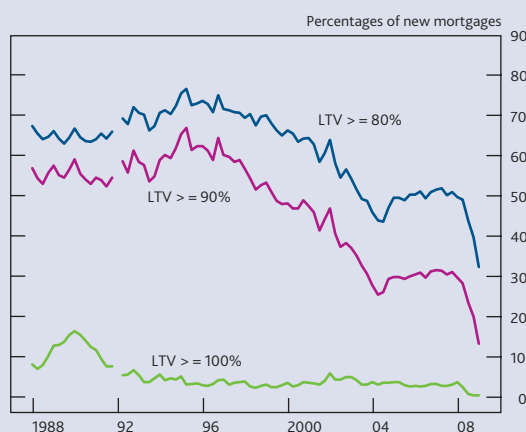
There are a number of factors that would, *a priori*, suggest that the extent of negative equity might have been higher in 2009 Q1 than in the 1990s. First, the fall in house prices was both larger and quicker in the more recent episode than in the early 1990s, giving households less time to make repayments to avoid falling into negative equity. House prices fell by 19% in just a year and a half between 2007 Q3 and 2009 Q1. By contrast, it took almost six years for house prices to fall by 15% between 1989 Q3 and 1995 Q2.⁽²⁾

Second, the emergence of interest-only (IO) mortgages since the mid-1990s is likely to have reduced the rate of mortgage principal repayment. While IO mortgages were non-existent in the run up to the housing downturn in the early 1990s, they accounted for up to 22% in 2006 of new loans and 24% in 2007.⁽³⁾

Third, a loosening of credit conditions in the early part of 2000 led to the emergence of specialist lenders focusing on lending to adverse credit borrowers (those who have previously been in significant arrears on mortgage or unsecured debts, and/or who have had County Court Judgements, Bankruptcy Orders or Individual Voluntary Arrangements). This sector grew to around 3%–4% of the mortgage stock by the end of 2007. Adverse credit borrowers tend to have borrowed at higher LTV ratios.

But other factors which strengthened the housing equity position of households in the run up to the more recent crisis help to explain why estimates of the scale of negative equity in these two episodes are similar. First, despite the emergence of the adverse credit sector in the early 2000s, the proportion of mortgages issued at high LTV ratios was actually lower than in the late 1980s and early 1990s (**Chart A**). Moreover, the volume of housing market transactions at the peak of that housing cycle was much larger, which further increased the number of new high LTV mortgages in the stock at the time.

Chart A Mortgagors' LTV ratios



Sources: FSA and Survey of Mortgage Lenders.

Second, Mortgage Interest Relief at Source (MIRAS), which provided mortgagors with tax relief on their mortgage interest payments, was withdrawn in 2000. So mortgagors would have had lower incentives to repay their outstanding balances and lower their LTV ratios before the 1990s' episode than they would have done in the run up to the more recent crisis.

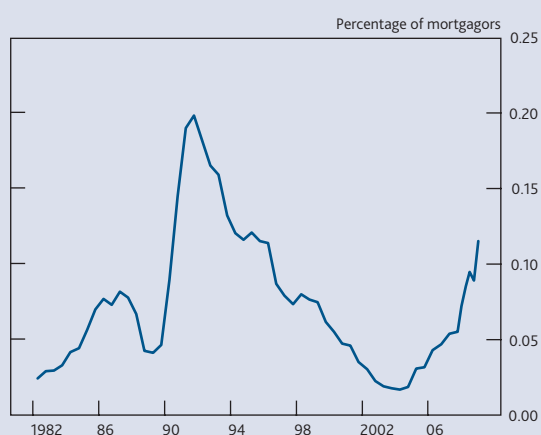
Despite similar estimates in the two periods, the implications of negative equity may be somewhat different in 2009 than in the 1990s. A particularly important difference is that rising negative equity in 2008 and 2009 has been accompanied by a severe financial crisis characterised by losses suffered on structured credit investments and concerns over banks' funding. That weakness in the banking system and associated lack of confidence suggests that rising negative equity is likely to have had a larger impact on credit availability and aggregate demand than it did in the 1990s. This also illustrates how financial stability concerns can have implications for monetary policy.

The growth in structured credit products (such as MBS) that has occurred since the early 2000s has important implications for how losses are distributed. In particular, the range of institutions that are exposed to losses on mortgage loans is greater in 2009 than in the 1990s. Moreover, uncertainty about the exposure of different investors to defaults is likely to have exacerbated the severity of the financial crisis, and so, via this channel at least, increased the impact of negative equity on the economy relative to the 1990s.

The implications of negative equity for losses on mortgage loans depend to an important degree on the extent of mortgage payment problems. As of 2009 Q1, arrears and repossessions remained well below their peaks in the early 1990s (**Chart B**). A number of factors are likely to influence payment problems, including the level of interest rates and

unemployment. In 2009 Q1, both of these were below their respective peaks during the 1990s' slowdown. Market commentators expect unemployment to rise further, but interest rates to remain low. The extent to which payment problems rise going forward depends on how any changes interact with other influences on households' finances.

Chart B Quarterly repossession rate^(a)



Source: Council of Mortgage Lenders.

(a) Following the exclusion of 'legacy loans' from 2009 Q1, the latest figure is not directly comparable to earlier data. See 2009 Q1 arrears and repossessions release for more details.

The United States

There are no official estimates of the extent of negative equity in the United States. However, a private sector estimate suggests that nearly one in six mortgagors was in negative equity around the end of 2008.⁽⁴⁾ By that time house prices had fallen by around 30% from their June 2006 peak according to the Case-Shiller 10-City house price index — a larger fall than experienced in the United Kingdom up to 2009 Q1.

Certain characteristics of the mortgage market in the United States also make households particularly prone to falling into negative equity. First, the United States experienced a higher take-up of IO mortgages than in the United Kingdom, and in addition there has been significant growth in negative amortisation (NegAm) products which do not exist in the United Kingdom.⁽⁵⁾ IO and NegAm together accounted for about 26% of all mortgages originated in 2006 (Edmiston and Zalneraitis (2007)).

Second, US tax laws allow interest on mortgages for owner-occupied homes to be deductible against income tax. This means that households do not have as strong an incentive to reduce their outstanding mortgage balances. Therefore, their LTV ratios are likely to remain high for longer after origination than perhaps would have been the case otherwise (Ellis (2008)).

Differences in regimes may also make the impact of negative equity larger in the United States than in the United Kingdom. Lending in the United Kingdom is done on a recourse basis, and following default, a borrower can be pursued for outstanding mortgage obligations. But in the United States, the prevalence of 'no-recourse lending' reduces the cost of default to the household, and therefore increases the probability of default for a given level of negative equity (Crosby (2008)).

- (1) Cutler's estimate is based on a sample of new mortgage lending from the Council of Mortgage Lender's Survey of Mortgage Lenders. The survey, which was discontinued in 2005 Q2, contained similar information to that in the FSA's data set. However, the sample was smaller and contained less detailed information on the characteristics of new mortgage lending, making it more difficult to adjust for mortgage repayments.
- (2) Calculated using the average of the Halifax and Nationwide seasonally adjusted quarterly indices as shown in Chart 1.
- (3) Source: FSA mortgage transactions data. Some IO mortgages have a repayment vehicle whereby the mortgagor makes payments to the vehicle rather than to the mortgage provider. Unfortunately, the data do not identify 'pure' IO mortgages, with no vehicle. The figures presented here are for mortgages where the vehicle was not identified and so represent an upper bound for the proportion of pure IO mortgages.
- (4) See Hagerty and Simon (2008).
- (5) Negative amortisation mortgages allow the borrower, for a period of time, to pay less than the interest accruals, generally up to a certain percentage of the original loan amount.

the loan. On the one hand, failure to account for unscheduled or lump-sum repayments and home improvements implies an overestimate of negative equity. On the other hand, failure to account for variation in house prices at the individual level, arrears and repayment holidays may imply an underestimate of negative equity.⁽¹⁾ Overall, the net impact of those considerations is uncertain.

Estimates based on lenders' mortgage book data

The third approach to estimating negative equity has been developed by the FSA and is based on lenders' own estimates of the housing equity held by mortgagors to whom they have lent in the past. In their 2009 *Financial Risk Outlook*, the FSA presented negative equity estimates based on 2007 published data (from annual or interim results, investor presentations and securitisation reports) from a sample of UK lenders covering 80% of the market by value (including 45% of the BTL market).⁽²⁾ Each lender estimated the proportion of their mortgage book (including BTL) in different LTV ratio buckets (eg 75%–80%, 80%–85% etc).⁽³⁾ To do this the lenders would have used up-to-date internal information about the outstanding value of mortgages on their own mortgage books, together with an adjustment for house prices since origination of each loan. The FSA weighted these estimates using the lenders' respective market shares and combined them to generate an estimate of the proportion of all mortgagors in each of the LTV ratio buckets at the end of 2007. That distribution formed the basis of an estimate of the incidence of negative equity at the end of 2007, but also for the effects of further potential house price falls since then. For example, if house prices fell by 20% after the end of 2007, as they almost did between the end of 2007 and 2009 Q1, then all those who had an LTV ratio of more than 80% at the end of 2007 would have been in negative equity (under the assumption that was made that there were no repayments of principal since the end of 2007).

Because individual lenders tend to publish information based on different sets of LTV buckets, the aggregate LTV buckets generated by the FSA had to be large enough to be consistent with all the lenders.⁽⁴⁾ Those limitations meant that the FSA only calculated estimates of negative equity under particular house price scenarios — namely 10%, 20% and 30% house price falls from the end of 2007.⁽⁵⁾

Based on a house price fall of 20%, the FSA estimates suggest that around 11% of UK owner-occupier mortgages were in negative equity at the end of 2009 Q1, equivalent to 1.1 million households. That is very close to estimates generated using the second approach outlined above. The FSA estimates also suggest that around 200,000 BTL mortgages were in negative equity in 2009 Q1. Some of these BTL mortgages may be held by households that were in negative equity on their own houses and some landlords may hold multiple BTL mortgages that were in negative equity. For this reason the

total number of households with mortgages that were in negative equity is likely to be less than the sum of these two estimates.

The advantage of this approach is that the number of adjustments that the lenders need to make to estimate the housing equity of mortgagors to whom they have lent is smaller than in the approach described above which uses transactions data. They have accurate information on the outstanding mortgage because they know the repayments made by their customers and so need only make adjustments for changes in house prices. Although that adjustment is subject to the problems already discussed above, the precise knowledge of households' outstanding mortgages should make estimates of the incidence of negative equity based on lenders' mortgage books more accurate.

The problems with this approach stem from the fact that it is based on a published snapshot of the lenders' mortgage book at a given time (in this case end-2007). This means that estimates can only be updated fully when lenders publish the necessary information (usually once a year). Adjusting the estimates for developments since then is problematic because adjustments for repayments cannot be made to the combined LTV distribution as they can when using individual mortgage transaction data, and the estimates generated do not capture mortgages issued since the latest snapshot. In addition, the data are based on a sample of lenders, albeit a large one. But the sample is not random and may not be representative of the population.⁽⁶⁾

Summary

The three estimates presented above suggest that around 7% to 11% of UK owner-occupier mortgagors were in negative equity at the end of 2009 Q1. The estimate based on household survey results is the lowest of the three, but given the tendency of survey respondents to overstate the value of their housing equity, that is perhaps not surprising. The other two approaches generate very similar estimates of the

(1) Failure to take into account individual-level variation in house prices is likely to lead to an underestimate of negative equity because the distribution of LTV ratios is such that there are more mortgagors who are close to but below the negative equity threshold than are those who are close to but above it (eg Chart 3).

(2) The sample excludes the majority of second charge loans. A second charge loan is an additional secured loan taken out by a household with an existing mortgage. It is called a 'second charge' loan because if the household gets into financial difficulties and the home is repossessed, the lender of the original mortgage has the first right to recover as much money as they can, with the lender of the second loan having rights over the remainder.

(3) Lenders present data on the proportion of the value of mortgages in different LTV buckets. These data have to be adjusted to generate an estimate of the number of mortgages in different LTV buckets, which is necessary to obtain an estimate of the number of households in negative equity. The FSA made that adjustment using data from a sample of securitisation and covered bond reports, which contain information on both numbers and values.

(4) For example, if one lender reported 80%–85% and 85%–90% and another lender reported only 80%–90%, the FSA had to generate an overall bucket of 80%–90%.

(5) Other house price scenarios could be considered, but the lack of granularity in the data would mean these estimates would be less accurate.

(6) Although all the major BTL lenders are included in the sample, many specialist lenders, who tended to focus on adverse credit lending, are not. By itself, that implies that the FSA calculations would tend to underestimate the incidence of negative equity.

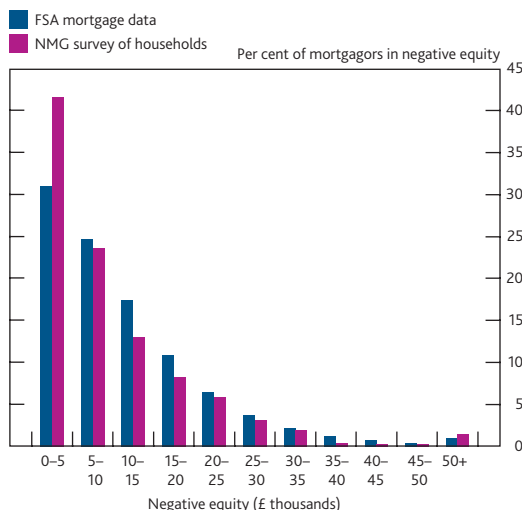
Table A Summary of negative equity estimates

Description	Advantages	Disadvantages	Estimate for 2009 Q1 Number of households (Percentage of mortgagors)
Household survey NMG Research survey carried out in late September and early October 2008	i) Households should have more information about the value of their home and outstanding debts — they can account for home improvements and unscheduled mortgage payments. ii) Gauges households' own perceptions, which should affect their financial decisions.	i) Households tend to overestimate the value of their housing equity. ii) Surveys are subject to sampling variation.	700,000 (7%)
Flow of mortgage lending FSA data on all regulated mortgage transactions between 2005 Q2 and 2009 Q1	i) Captures the population of recent regulated mortgage transactions and so avoids problems with samples. ii) Precise LTV ratio at origination available for each mortgage transaction. iii) An objective estimate, which is likely to be informative about lenders' potential losses and credit supply.	i) Unable to adjust precisely for principal repayments. ii) Unable to adjust precisely for changes in individual property prices.	1 million (10%)
Lenders' mortgage books Published LTV distributions from a large sample of lenders estimated at end-2007	i) Lenders are able to update precisely the value of their customers' outstanding mortgages over time. ii) Allows for estimates of negative equity on BTL mortgages. iii) An objective estimate, which is likely to be informative about lenders' potential losses and credit supply.	i) Does not capture mortgages issued since end-2007, or any principal repayments since then. ii) Data published in aggregate LTV buckets. iii) Unable to adjust precisely for changes in individual property prices. iv) Although sample is large, it is not necessarily representative of the total mortgage population.	1.1 million (11%) 200,000 BTL

incidence of negative equity. They avoid the problem of subjectivity of survey responses. But various adjustments that need to be made to the data create problems and biases of their own. These estimates will tend to overstate negative equity to the extent that repayments of mortgage principal are not fully adjusted for. However, using regional as opposed to individual-level data to adjust for house price changes since the origination of each mortgage may lead to a bias the other way (see footnote 1 on page 118). The three approaches and their relative advantages and disadvantages are summarised in **Table A**.

The FSA data on mortgage transactions and the NMG survey can also be used to estimate the distribution of negative equity values (**Chart 4**). That suggests that the majority of those households who were in negative equity in 2009 Q1 had relatively small amounts of negative equity. According to the FSA data 73% of households had less than £15,000, and 56% had less than £10,000, of negative equity. The NMG survey suggests 78% had less than £15,000 and 65% had less than £10,000.

Overall then, although negative equity had become more widespread, the majority of households continued to hold significant buffers of housing equity. Estimates from the NMG survey suggest that over 75% of mortgagors had an LTV ratio of below 75% in 2009 Q1. The survey and FSA mortgage data indicate that the majority of those that had fallen into negative equity by 2009 Q1 had relatively small values of negative equity. This suggests that relatively few households are likely to be in a position where negative equity may

Chart 4 Estimated distribution of negative equity values in 2009 Q1

influence their willingness to continue servicing their mortgage payments.

When thinking about the macroeconomic implications of these estimates, as discussed previously, it is important to bear in mind that it is the overall balance sheet position of households that matters. Negative equity is less of a concern for households with additional assets, such as deposits or equities. On the other hand, unsecured debt adds to households' total debt and tends to exacerbate the problems of low or negative housing equity. It is not clear from the available evidence which of those is likely to be more important. For example, mortgagors who reported having LTV

ratios in excess of 80% in the 2005 British Household Panel Survey reported holding an average of around £6,000 of financial assets; while mortgagors who reported having LTV ratios in excess of 80% in the 2008 NMG Research survey also reported holding around £6,000 of unsecured debt.⁽¹⁾

Which estimate is the most appropriate?

As discussed in the first section, negative equity can have several consequences for the economy and the financial system. The relative attractiveness of subjective survey-based estimates and more objective measures, depends on which of these consequences are of interest.

Responses to household surveys (like the NMG Research survey) provide a measure of household *perceptions* and these are important to the extent that they influence households' decisions, regardless of their accuracy. For example, as already discussed, the perception of low or negative housing equity may lead households to increase their precautionary saving. It may also affect their perceptions of credit availability, making them less likely to apply for loans. Both of those effects would serve to reduce consumer spending and aggregate demand. The perception of negative equity may also influence households who are struggling with their debts, by affecting their ability and willingness to meet mortgage payments. This is important for considering probability of default.

But for other purposes, alternative measures that do not rely on households' subjective perceptions may be more useful. Lenders' decisions about credit supply are in part determined by their own estimates of the LTV distributions on their mortgage books and by losses they expect to make on those loans. And for households who do apply for credit, their ability to withdraw housing equity to finance consumption depends on an objective valuation of their house by the lender and the outstanding mortgage. Moreover, for the purposes of evaluating financial stability and monetary policy, it is important to have objective measures of potential losses on mortgage lending. So in thinking about bank losses and credit supply, objective measures of negative equity, such as those based on disaggregated mortgage data or lenders' mortgage books, are useful.

Conclusion

The housing market weakened significantly during 2008 and the price of an average house was around 20% lower in the Spring of 2009 than it had been at the peak in the housing market in Autumn 2007. As house prices fall, the number of households in negative equity tends to rise.

There are no data which accurately measure the scale of negative equity, but it can be estimated in several ways. This article has presented three different approaches. Estimates

using these approaches suggest that between 700,000 and 1.1 million households in the United Kingdom (or around 7%–11% of UK owner-occupier mortgagors) were in negative equity in 2009 Q1, similar to the number estimated to be in negative equity in the mid 1990s. But the majority of mortgagors continued to hold significant buffers of housing equity with an estimate based on a household survey suggesting that over 75% of mortgagors had an LTV ratio of less than 75%. Estimates also indicate that the majority of those that had fallen into negative equity by 2009 Q1 had relatively small values of negative equity; though that would increase in the future if house prices fell further.

It should always be borne in mind that there is a great deal of uncertainty around any estimate of negative equity, reflecting the assumptions required to generate the estimate. In addition, negative equity is an arbitrary threshold, particularly once all of households' assets and debts are taken into account. Nevertheless, rising LTV ratios during 2008, as indicated by higher estimates of the number of households in negative equity, are likely to have had economic consequences.

Negative equity can have an impact on both aggregate demand and supply in the economy with implications for future inflationary pressure and, therefore, for monetary policy. It can also affect banks' resilience by raising the probability of default and loss given default on banks' mortgage exposures and lead to losses on investments in securities related to the housing market. The financial crisis that began in 2007 led to a contraction in the supply of credit to households and firms in the United Kingdom. One consequence of that has been a fall in consumer demand for goods and services, including demand for housing. In turn, that has resulted in falling house prices and a rising incidence of negative equity. By increasing expected bank losses, negative equity may have amplified the slowdown by further constraining the supply of credit to households and firms — thereby reducing aggregate demand and supply. That impact of negative equity on credit conditions may have been somewhat stronger than in the 1990s' recession because of elevated concerns over banks' capital positions at the start of the slowdown. But as of 2009 Q1, arrears and repossessions remained well below their peaks in the early 1990s. In addition, the minority of UK households in negative equity in 2009 Q1 for the most part had relatively small levels of negative equity. Looking ahead, monetary policy and financial stability implications of negative equity will depend on the outlook for house prices and for factors that affect households' ability to service debt, including interest rates and unemployment.

(1) The 2008 NMG Research survey did not ask about households' assets, and the British Household Panel Survey only does so every five years.

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Dynamics of the term structure of UK interest rates

Summary of Working Paper no. 363 Francesco Bianchi, Haroon Mumtaz and Paolo Surico

A number of recent papers have analysed the evolving dynamics of output and inflation using systems of equations known as vector autoregressions (VARs): a set of equations where the explanatory variables in each equation are the complete set of lagged variables in the system. GDP growth, inflation and the nominal interest rate are the typical variables included in VARs that describe the transmission mechanism of monetary policy. These empirical models are subject to the criticism that they include a limited amount of information. If, in reality, the central bank examines a wider set of variables when setting policy, estimates of the monetary policy shock derived from these small empirical models may be biased — ie not completely disentangled from non-policy shocks. As a consequence an accurate assessment of structural shifts may be hampered.

The aim of this paper is to investigate the evolution of UK macroeconomic dynamics using a VAR model that is less susceptible to this criticism. In particular, we augment the standard three-variable VAR with variables that describe the level, slope and curvature of the yield curve, which shows the pattern of interest rates at different maturities. These yield curve variables contain information about private sector expectations. This additional information may alleviate the biases referred to above by ensuring that the forward-looking aspect of monetary policy is accounted for in our empirical model. In addition, we allow the relationship between the yield curve and the macroeconomy (embodied in our VAR) to change over time. We use this model to investigate how the

dynamics of UK macroeconomic variables have changed over time and how these changes are related to changing properties of the yield curve.

The main results can be summarised as follows. First, the level, slope and curvature factors display substantial time variation, with the level factor moving closely with measures of inflation expectations. Second, our estimates indicate a large decline in the volatility of both yield curve and macroeconomic variables around 1992, when the United Kingdom adopted inflation targeting. Third, and more important, during the inflation-targeting regime, monetary policy shocks have been more muted and inflation expectations have been lower than in the pre-1992 era. Fourth, the link between the macroeconomy and the yield curve has also changed over time, with fluctuations in the level factor becoming less important for inflation after Bank of England independence in 1997. In particular, policy rates appear to have responded more systematically to inflation and unemployment in the current regime. Finally, we use our time-varying macro-finance model to revisit the evidence on the expectations hypothesis (ie the hypothesis that in any given period the yield on a long-maturity bond is equal to the discounted sum of the expected yields on short-maturity bonds over the lifetime of the long-maturity bond). Our results suggest that time-varying dynamics in both the yield curve and the structure of the economy may explain part of the deviations from the expectation hypothesis found in fixed-coefficient models.

What lies beneath: what can disaggregated data tell us about the behaviour of prices?

Summary of Working Paper no. 364 Haroon Mumtaz, Pawel Zabczyk and Colin Ellis

How do prices respond to changes in interest rates? Most previous work has tried to answer this question by looking at aggregate price measures, such as the consumer prices index (CPI) or the National Accounts consumption deflator. This paper takes a different approach. Following recent work on US data, we examine the behaviour of both aggregate and disaggregated prices in the United Kingdom using a large volume of data covering prices, volumes, money and asset prices.

In this paper, we summarise these data by using 'principal components', or 'factors'. Factor analysis uses linear transformations of data series to identify common components that underlie those series. The 'factors' are calculated by creating combinations of the underlying data series to make new series that in turn capture the largest possible amount of variation in the data set as a whole, while remaining statistically independent of each other. We then use these factors to estimate a simple model (known as a vector autoregression, or VAR), which in this case relates these factors to their previous values and the interest rate. The resulting model is known as a 'factor-augmented vector autoregression', or FAVAR for short.

The advantages of a FAVAR are that it encompasses a large number of data series but, at the same time, is relatively simple to estimate. By estimating a FAVAR on disaggregated data, we are able to examine how individual disaggregated prices respond to monetary policy and other macroeconomic shocks. The model also tells us how important these macroeconomic factors are, compared to sector-specific factors that affect the individual disaggregated series.

Our benchmark results match those of previous studies and suggest that aggregate demand falls before aggregate inflation when interest rates rise. However, our disaggregated results offer a number of insights that are not captured by aggregate models.

- First, while macroeconomic factors are very important for aggregate data such as CPI inflation, they are much less important for disaggregated inflation measures. Sector-specific factors are at least as important for disaggregated prices.
- Second, we find evidence of significant aggregation bias — aggregate inflation is far more closely related to its previous values than disaggregated inflation measures. This suggests that aggregate inflation measures do not offer a good guide to the behaviour of underlying prices. In other words, trying to infer the statistical properties of individual prices from those of aggregate price indices is likely to be misleading.
- Third, different disaggregated prices respond differently to changes in interest rates, suggesting that monetary policy can affect relative prices in the economy.
- Fourth, there is some evidence that competition within industries plays a role in determining how companies set prices — in particular, companies in less competitive industries may be more able to pass on changes in prices to customers.

Foreign exchange rate risk in a small open economy

Summary of Working Paper no. 365 Bianca De Paoli and Jens Søndergaard

Investors require compensation (or a 'premium') to hold risky financial asset. So if some currencies are perceived to be riskier than others, investors may demand a foreign exchange (FX) premium to invest in those currencies. This paper presents a small open economy model that can explain why FX premia arise in currency markets. We use this model to examine how well it resolves the so-called uncovered interest rate parity (UIP) puzzle. UIP is simply a condition that follows from financial market arbitrage. It ensures that the interest rate return on a domestic currency asset should equal the interest rate on each foreign currency assets, less the expected appreciation of the domestic currency. The puzzle stems from the empirical observation that high interest rate currencies tend to appreciate — contrary to what UIP would predict.

A key feature of our model is that households are assumed to have consumption habits, ie households get used to a 'habit' level of consumption, and only attain higher utility if actual consumption rises relative to that level.

We demonstrate that our model will only resolve the UIP puzzle if it produces significant precautionary savings effects, where savings rise in response to increased uncertainty. And these savings effects will only occur if we assume quite persistent productivity shocks combined with very slow-moving consumption habits.

In our model, changes in precautionary savings are a result of changes in households' attitude towards risk, and changes in economic prospects. In the face of bad shocks, for example, households increase their precautionary savings if they expect consumption to be low relative to their habits level. Thus, the slower is the adjustment of habits to the shock, the larger will be the revisions in precautionary savings. These revisions are also larger when the shocks are more persistent.

To understand the combined role of slow-moving consumption habits and persistent shocks in resolving the UIP puzzle, consider how a temporary fall in productivity in the rest of the world works its way through our model. The drop in

foreign productivity causes an *ex ante* excess demand for foreign goods which is eliminated by a rise in the relative price of foreign goods, ie a domestic currency depreciation. But since this is ultimately a temporary shock, the domestic currency is expected to appreciate back towards its initial steady state.

However, the same negative foreign shock also triggers a large increase in foreign precautionary savings, putting downward pressure on foreign interest rates and hence causing domestic interest rates to exceed foreign rates at the same time as the domestic currency is expected to appreciate, thus potentially resolving the puzzle. But at the same time the increase in foreign households' borrowing to smooth their consumption (known as 'intertemporal substitution') will tend to put upward pressure on foreign interest rates and hence cause domestic rates to lie below foreign rates at the same time as the domestic currency is expected to appreciate (ie in line with the predictions of UIP). So we can only account for the tendency for high interest rate currencies to appreciate if the precautionary savings effects outweigh the intertemporal substitution effects. This would be the case if the shock is very persistent and consumption habits are very slow-moving.

We initially show our result at work in a model with fixed labour supply. We then examine how our result changes when we allow domestic households in our small open economy to vary their hours worked. In our model, this extension makes domestic consumption less synchronised with foreign consumption. To ensure that risk is efficiently shared across countries, the real exchange rate would have to fluctuate more. We find that a more volatile real exchange rate combined with a stronger precautionary savings effect actually improves the model's ability to address the UIP puzzle. But when we allow both domestic and foreign households to vary their hours worked, consumption is both smooth and synchronised across countries. This dampens the FX premium volatility and impedes the model's ability to resolve the UIP puzzle.

Common determinants of currency crises: role of external balance sheet variables

Summary of Working Paper no. 366 Mirko Licchetta

This paper investigates the role of external balance sheet variables as determinants of episodes of currency crises in both advanced and emerging market economies (EMEs). There is a relatively well-established literature on the determinants of currency crises but only recently has some attention been made to the role of a country's external capital structure as a potential source of vulnerability. Since the Asian crisis, many economists have focused on the destabilising role of short-term debt flows, suggesting that their liberalisation between the late 1980s and the early 1990s was a major cause of episodes of crises in EMEs. More recently, the development of the balance sheet approach to financial crises has emphasised the role of external assets and liabilities in affecting a country's financial strength, and some empirical studies have provided support to the idea that debt flows are particularly prone to sudden stops in times of stress.

This paper uses a model to investigate the role of external balance sheet variables as determinants of currency crises in emerging and advanced economies over the January 1980 to December 2004 period. Using a new database on external assets and liabilities, this paper investigates the role of the size and the composition of the stock of gross external liabilities as possible determinants of a country's degree of vulnerability to crises. Our central finding is that the probability of a crisis is found to increase with the size of total liabilities (relative to GDP) and, particularly in EMEs, to decrease with the share of foreign direct investment (FDI) in total liabilities.

There are reasons in support of the idea that a country's vulnerability to crises increases with the stock of external debt. A large stock of external debt implies a large dependence on foreign sources of finance. Therefore, the larger the stock of external liabilities, the larger is the amount of capital that can potentially be withdrawn in a sudden stop. Then, from an empirical perspective, there is evidence to suggest that international capital flows are determined by external factors as well as domestic ones. Therefore, the larger the inflow, the more sensitive a country's external financing is likely to become to external conditions. However, it is still debated within the empirical literature whether a high level of debt necessarily increases the likelihood of a currency crisis.

As for the role of the composition of external liabilities on the determination of currency crises, there are reasons to suggest that a higher (lower) share of external debt (FDI) liabilities increases (decreases) the susceptibility of a crisis. First, a lot of external debt is short term, whereas FDI is less fungible and, thus, more

difficult to withdraw in a crisis. Second, contractual obligations for debt financing — unlike for equity — are unrelated to the performance of the economy, so an adverse shock may cause EMEs debt repayment difficulties and forward-looking investors may withdraw in anticipation of these problems. The empirical evidence supports the view that a high FDI (debt) share is likely to reduce (increase) the vulnerability of an economy to crises. Short-term debt flows are usually found more sensitive to shocks to other capital flows and more volatile than FDI. Moreover, both bank loan and bonds debt flows are largely reversed during periods of stress whereas portfolio equities are found to be less sensitive and FDI stable.

Our results also suggest that the composition of external liabilities has a more important impact on the degree of vulnerability of emerging rather than advanced economies. This might be due to the shorter maturity of debt that EMEs traditionally experience. In the presence of mismatches between short-term liabilities and long-term assets, a country is likely to be particularly vulnerable to crises. Another explanation may be related to the so-called 'debt intolerance' of emerging market economies, which suggests that in most emerging markets external debt to GNP ratio needs to be lower than 35% (and even lower if a country has a long history of crises or defaults) to be regarded as 'safe'. This is because emerging market economies tend to have a weaker fiscal structure, less-developed financial systems and a worse record of macroeconomic management and inflation than more advanced economies. Therefore, they are felt as less able to tolerate higher levels of indebtedness.

Countries with a fixed exchange rate regime are found to be more sensitive to external balance sheet variables than economies with more flexible regime. Under a flexible exchange rate, banks and firms may be more likely to be sensitive to currency risks. Indeed, they have a stronger incentive to match foreign currency liabilities with dollar assets than in the presence of a fixed exchange rate. On the other hand, for a given external liability structure, fixed exchange rate regimes are more likely to lead to currency mismatches because economic agents believe the government commitment to the peg will immunise them from exchange rate fluctuations.

This paper also provides further support to standard leading indicators of currency crises and it reinforces the view that crises during the 1990s were likely to be less 'fundamentally' driven than those in the 1980s.

Labour market flows: facts from the United Kingdom

Summary of Working Paper no. 367 Pedro Gomes

Macroeconomic policy makers need to have a good understanding of the state of the supply side of the economy in order to set monetary policy appropriately, and an important part of supply is in the labour market. Close attention is paid to the stocks of employed, inactive (ie, those not working or looking for work) and unemployed people, as well as to the balance between demand and supply often referred to as 'tightness'.

But the labour market stocks and aggregate indicators are fundamentally driven by the behaviour of flows between employment, unemployment and inactivity. These flows are very large. On average, between 1996 and 2007 nearly a million people moved into new jobs every three months, with a slightly smaller number leaving. A smaller but comparably large number of people shifted jobs each quarter as well. So these gross flows are massive. For example, at 60,000 per quarter, the average increase in employment over this period (the net flow) was less than a tenth the size of either of those two gross employment flows. It is clear therefore that an understanding of all the relevant flows is essential to our understanding of labour market dynamics and business cycle fluctuations. Moreover, from an academic point of view, they lie at the heart of many recent theories of unemployment.

Thus the simple objective of this paper is to describe the main developments in, and establish a number of key facts about, the recent history of these important UK labour market flows. For policy makers, knowledge of those facts can help improve the monitoring of business cycles, the detection of inflection (turning) points and the assessment of labour market tightness. For macroeconomists, they provide a summary of the empirical features that theoretical models should ideally have.

It is possible to draw out some broad features of the data from the analysis of the Labour Force Survey over the period 1996 to 2007. On average, in each quarter 7% of the working-age population change status between inactivity, employment and

unemployment and 2% of the working-age population change their employer. In expansions, although jobs become easier to find, as the labour market becomes tighter there are fewer movements between the three pools. The cyclical behaviour of flows between inactivity and employment seem to have changed in recent years. They were not related to the business cycle until 2001, but became positively related (procyclical) thereafter.

Every quarter 7% of all employees search for a different job, and they are seven times more likely to change jobs than those who are not searching. In booms, there are less people searching for a different job, but they are more likely to change employer. In booms, more people resign their jobs, but there are less people being fired. Involuntary separations dominate the employment-to-unemployment flows, while 70% of all employment-to-inactivity flows occur because of personal reasons. Inactive people who want a job are twice as likely to move into the labour force, and four times more likely to move into unemployment, than those inactive people who do not want a job.

Some of the structural changes in the UK labour market seem to be due to changes in the education level of the working-age population, particularly due to the increasing share of the highly educated. There are substantial differences in the employment, unemployment and inactivity rates of different education categories, as well as in the transition probabilities (the chances of moving between different labour market states). The less-educated individuals face unemployment and inactivity rates that are three times greater than those with higher education, as well as double the separation and half the job-finding rate.

Job-finding and job-separation rates are equally important determinants of unemployment fluctuations. The job-finding rate has been more important over the past ten years, but further analysis of claimant count data has revealed that the job-separation rate was particularly relevant in the period between 1989 and 1996.

The real exchange rate in sticky-price models: does investment matter?

Summary of Working Paper no. 368 Enrique Martínez-García and Jens Søndergaard

Explaining exchange rate movements remains a challenging area of research for academics and policymakers alike. This is so partly because exchange rates are volatile; the standard deviations are roughly five times larger than GDP. It can also take three to five years for exchange rates to return halfway to their long-run values. So previous researchers have therefore attempted to build macro models where exchange rates are both excessively volatile and very slow to revert. In one strand, it is argued that high exchange rate volatility is due to the combination of sticky prices and nominal (eg monetary) shocks. But nominal shocks tend not to produce sufficiently persistent exchange rates. A more recent strand has argued that real shocks can potentially account for both the volatility and persistence of real exchange rates. However, the literature has so far not paid attention to the link between real exchange rate dynamics and what the model assumes about physical capital. Given how volatile investment flows are relative to output over the business cycle, we think this omission is not inconsequential.

Dynamic stochastic general equilibrium (DSGE) models take into account the evolution over time of interrelationships between agents in the economy, where there are random ('stochastic') shocks hitting the economy. We build a two-country open economy model that features optimising households and firms, as well as sticky output and import prices. It is symmetric with two equally sized economies (ie the United States and the euro area). As is common in the academic literature, we compare how the model matches the main features of US/euro-area data including the \$/€ real exchange rate (the exchange rate accounting for price differences). We are particularly interested in whether our results hinge on what the model assumes about capital.

A key assumption is that households and firms have access to complete international financial markets (ie they can buy a set of securities that ensure risk is effectively shared across countries). We find that assuming this imposes a tight link between real exchange rate and consumption volatility. Real exchange rate volatility is approximately determined by how correlated consumption is across countries as well as how volatile consumption is. So whether the model produces volatile real exchange rates or not depends on how well households can smooth consumption over time ('intertemporally') in response to country-specific shocks. Capital formation (investment) represents an additional intertemporal smoothing channel, and so tends to lead to smoother consumption and, hence, less

volatile exchange rates. But this ability to smooth consumption hinges on how costly it is for households to adjust their capital stock. Capital adjustment costs regulate the volatility of investment and indirectly control the degree of consumption smoothing in the model. So ultimately real exchange rate volatility depends on the degree of capital adjustment costs imposed in the model.

We show that our sticky-price DSGE model with capital adjustment costs can produce volatile exchange rates as they are in the data when business cycles are exclusively driven by nominal (monetary) shocks. But adding variable capital utilisation reduces the volatility of real exchange rates. Capital utilisation offers a way around the investment constraints imposed by capital adjustment costs and hence facilitates consumption smoothing in the model with monetary shocks. This, in turn, reduces real exchange rate volatility in our model by 50%. We then focus on the role of real shocks, and show that these shocks produce too little real exchange rate volatility, especially when we allow for capital accumulation. For instance, our model with no capital accumulation and real shocks generates 60% of the observed real exchange rate volatility. But when we allow households to alter their capital stock — subject to investment adjustment costs — that proportion falls to 30%.

Our model's ability to generate real exchange rate persistence depends on the type of shock driving business cycles. Monetary shocks alone cannot generate real exchange rates that are as persistent as in the data. The key to high real exchange rate persistence depends on whether the particular shock causes long-lived real interest rate differentials. But this is partly determined by how monetary policy responds to the particular shock. For instance, an expansionary monetary shock increases inflation and output which requires the central bank to subsequently raise nominal interest rates sharply. Since this endogenous policy response quickly brings inflation and output back to target, the initial monetary shock dissipates very quickly and produces little real exchange rate persistence. In contrast, real shocks do produce more persistence. Positive real shocks increase output but push down on inflation. Monetary policy responds by lowering interest rates, further supporting demand but also increasing inflation. This allows the shock to propagate for a longer time leading to longer-lasting real interest rate differentials and greater real exchange rate persistence. Including or excluding capital in the model turns out to be inconsequential in most instances for persistence.

Multivariate methods for monitoring structural change

Summary of Working Paper no. 369 Jan J J Groen, George Kapetanios and Simon Price

Monetary policy makers need to know what is happening now in the economy, and also to have some idea what will happen in the future. To do the latter, they need to forecast. But a major practical problem is that one of the main causes of forecast failure is structural change. Often, as David Hendry and Mike Clements have emphasised, this manifests itself as a 'mean shift'; for example, a step change in a growth rate. In some cases, policymakers might have a good idea when such changes take place. For example, the shift to inflation targeting in the United Kingdom in 1992 and the move to Bank independence in 1997 were clear structural changes, with likely consequences for inflation. But in other cases, such as the period after a large rise in energy prices, the case may not be so obvious. It would be helpful to have statistical techniques that help us look for evidence of such changes in the data.

However, such a continuous 'monitoring' of series for structural changes, period after period, raises well-known econometric issues. Statistical tests are designed so that accepting a false hypothesis happens only a small proportion of times, often set at 5%. The idea is that if we do such a test only once, then there is only one chance in 20 of making this type of mistake. In this way we can be quite confident that results are unlikely to have been generated by chance; it is a cautious approach. But it is easy to see that if such a test is repeated many times then eventually it will accept a false hypothesis (in this case, that a break has happened) purely by chance. This has led to the development of techniques looking at single time series accounting for this problem. But in practice such tests are not very successful in detecting breaks, as they must be inherently conservative.

The simple insight explored in this paper is that if several time series of data have a structural break at roughly the same time ('co-break'), as may often be plausible, then it is possible that simultaneous examination of a set of such variables helps identify changes with higher probability or more rapidly than when each is examined on a case-by-case basis. Naturally, this need not necessarily imply that there is a break in some aggregate series of interest, although it may do so. Some statistical theory is developed for such a method, which cumulates forecast errors from many series and picks the maximum at each point to construct a 'CUSUM' (cumulated

sum) detection test, or 'detector'. Breaks leading to forecast failure often manifest themselves by mean shifts, even if the shock to the variable is temporary. We therefore focus on this type. Monte Carlo experiments (simulating data generating processes thousands of times) suggest that there is an improvement in detection relative to a single variable test over a wide range of experimental parameters, given a sufficiently large number of co-breaking series. It should be clear, however, that this method only has the potential to detect the existence of a general break; it is not informative about the precise nature of that object.

One very natural application is UK retail prices index (RPI) inflation in the period after 2001. This is partly because many subcomponent series are published (about 80 on a consistent basis over the relevant period). But there are also several reasons to suppose that at least some of these may have experienced breaks. Although inflation is determined by monetary policy in the long run, in the short run large fluctuations in important prices may lead to the breakdown of the type that we consider in empirical relationships. From 1992 to 2001 there was a high degree of stability in aggregate RPI inflation. But thereafter house price inflation fluctuated fairly widely (peaking at over 25% per year) and energy prices rose dramatically after 2004. As policymakers, we are mainly interested in the aggregate, and not all of the subcomponents need to have co-broken for there to be an impact on total RPI, so this method could be useful. On the other hand, we should recognise that breaks may be offsetting, so that there may be no effect on the aggregate series.

It turns out that univariate methods would not have detected any breaks in the aggregate series, but the multivariate method would have indicated a potential break in 2005, which would then suggest further examination using other methods. And it appears from an examination of the data over the whole period, and therefore with the benefit of hindsight, that such a break may have occurred in the aggregate RPI series. It should be noted, however, that the evidence is not overwhelming, and there is no sign of a break in the inflation series that was targeted for much of this period (RPI excluding mortgage interest payments). Nevertheless, this new method may be a useful addition to the toolkits of policymakers and other forecasters.

Banks' intraday liquidity management during operational outages: theory and evidence from the UK payment system

Summary of Working Paper no. 370 Ouarda Merrouche and Jochen Schanz

We investigate how banks that are direct members of the United Kingdom's large-value payment system, CHAPS, react to operational problems that prevent their counterparties from making payments in CHAPS. It handles nearly all large-value same-day sterling payments between banks, other than those relating specifically to the settlement of securities transactions. Every day, about £270 billion worth of payments are settled using the system. In such real-time gross settlement systems, these direct members — also referred to as settlement banks — rely to some extent on incoming payments to fund their own payments: in 2006, five settlement banks settled £5–£10 worth of payments for each pound of liquidity they had available at the start of the day, and five other banks settled even more than £10. (There were fifteen direct members at that time: the Bank of England and CLS were excluded in these calculations, and the Royal Bank of Scotland and NatWest treated as one entity.)

Occasionally, a settlement bank experiences operational problems which prevent it from sending payment instructions to CHAPS (an 'outage'). Frequently, such a bank — we refer to it as a 'stricken bank' — remains able to receive payments on its account with the Bank of England. If its counterparties continue to make payments, a stricken bank involuntarily absorbs liquidity: it becomes a 'liquidity sink'. To the extent that healthy banks relied on incoming payments to fund their own payments, they find themselves short of liquidity. Thus, if banks do not sufficiently monitor their outgoing payments, operational risk at one bank can be a source of liquidity risk to the payments systems as a whole.

In this paper, we investigate by how much, and when, banks on average reduce their outgoing payments to a stricken bank that is able to receive but unable to send payments.

We first present a game-theoretic model to understand under which circumstances we would expect banks to withhold payments to a stricken bank. The distinctive feature of such models is that the 'players' take into account the likely response of each other; in other words, they play 'strategically'. The model covers payments behaviour on a single day. Two banks decide at the start of the day how much liquidity to borrow from the central bank. In the subsequent periods, they decide whether to delay the execution of their payment instruction(s). Whether delay is attractive depends

on how much liquidity each bank has available, the other bank's strategy, and whether operational shocks have hit one or both banks.

We show that, under reasonable conditions, banks ensure they retain sufficient liquidity to be able to execute unexpected urgent payment instructions immediately — if necessary by temporarily withholding payments to a stricken counterparty. Because these urgent payments are more likely early in the day, a healthy bank is more likely to withhold payments temporarily if a shock occurs in the morning rather than in the afternoon.

These results are supported by our empirical estimates. We focus on the activity of the five major CHAPS settlement banks. (They execute 80% of all payments in value terms.) Our data set includes eight days at various points in 2007 when at least one of these banks was unable to send any payment during a certain time interval. We find that during the outage, healthy banks on average reduce their payment outflows to the stricken bank by 40%. The trough is reached at 50% about 40 minutes into the outage; afterwards, payment flows pick up. As our model predicts, the reduction is substantially stronger (by a factor of between two and four) when the outage starts in the morning rather than in the afternoon.

Importantly, by selectively reducing their liquidity outflows to the stricken bank, healthy banks successfully prevented any significant spillover from the outage; the average decrease in payment flows between healthy banks is not statistically different from zero.

We execute a number of robustness checks for our empirical results. Our outages differ in several aspects: the bank that experiences the outage, the time of day at which they occur and the date (some occur during the liquidity shortage in the second half of 2007), and, finally, their length. With just eight outages, we cannot independently identify each of these influences. We therefore group the outages into smaller groups which are more homogeneous: for example, in one group, we exclude outages that occurred during the crisis; in another, we exclude the two longest and the two shortest outages. Our results prove robust to these variations.

Payment systems, inside money and financial intermediation

Summary of Working Paper no. 371 Ouarda Merrouche and Erlend Nier

Reforms to improve the efficiency of interbank payment systems have the potential to improve welfare by increasing the demand for inside money (demand deposits created 'inside' the banking system) and reducing the need for outside money (currency and reserves, created by the central bank and therefore 'outside' the banking system). This is because inside money can be put to productive use: banks use deposits to finance lending to the corporate sector. An economy which increases its reliance on inside money relative to outside money may therefore be able to support a higher level of capital and increased growth as that capital is accumulated.

In this paper, we study the effects of payment systems reform, using as a laboratory the transition from paper-based to modern, automated payment systems in Eastern European countries during the period 1995 to 2005. After 1989, these countries undertook major reforms of their financial and banking systems. As part of that effort they introduced modern, secure, automated interbank payment systems. These reforms were introduced to improve the reliability and security and to increase the efficiency of accounts-based payments. At the same time there have been sizable shifts in the amount of funds intermediated by the banking system. Indeed, many commentators have referred to a credit boom in a number of our sample countries. This paper investigates whether payment system reform and credit creation are causally linked. We also study the channels that might effect such a link.

Two channels are investigated. First, innovations in payments technology enhance the speed and security of inside money as a payment medium for customers and therefore affect the split between holdings of cash (outside money) and holdings of deposits (inside money). Second, innovations in payment systems help establish well-functioning interbank markets for end-of-day funds. This reduces the need for banks to hold excess reserves (outside money) to self-insure against end-of-day outflows and thus helps credit creation.

We find that upon the introduction of efficient payment systems there is a marked increase in the trend growth of financial intermediation. This finding exploits differences in the timing of reform across our sample countries, and it is robust to the inclusion of control variables that take account of macroeconomic determinants of credit growth, such as general economic development and the extent of foreign capital inflows, as well as other dimensions of structural change in our sample, such as variation in government ownership of banking assets.

Further investigation suggests that the trend increase in credit supplied to the private sector is associated with a trend decrease in the use of currency, relative to demand deposits. By contrast, the evidence in favour of a reduction in banks' holding of excess reserves is less strong.

To establish whether any of these two channels might have caused the observed increase in the trend growth of credit around payment reform, we investigate whether there is more generally a positive response of credit to either a shock to the demand for deposit (relative to currency) or the ratio of reserves to deposits. Here we find a corroborating, more general relationship between credit and deposits, but not between credit and reserves. This suggests that while a shift away from cash and towards demand deposits around the reform dates can be argued plausibly to have caused an increase in credit, a shift away from reserves cannot.

Last, while our main results rely on a reform variable that is 'zero-one' we also employ alternative measures of payments systems development, such as the number of credit transfers effected across the payment system. These alternatives provide a continuous and more direct measure of the system's use. Our empirical tests using these alternatives confirm that payment system development is an important contributing factor in accounting for the observed increases in credit creation in some of our sample countries.

Report



A review of the work of the London Foreign Exchange Joint Standing Committee in 2008

This article reviews the work undertaken by the London Foreign Exchange Joint Standing Committee during 2008.

Introduction

The Foreign Exchange Joint Standing Committee (FXJSC — ‘the Committee’) was established in 1973, under the auspices of the Bank of England, as a forum for banks and brokers to discuss broad market issues. The Committee comprises senior staff from many of the major banks operating in the wholesale foreign exchange market in London, representatives from brokers, the Wholesale Market Brokers’ Association (WMBA), the Association of Corporate Treasurers (ACT) — representing corporate users of the foreign exchange market, the British Bankers’ Association (BBA) and the Financial Services Authority (FSA). A list of the members of the Committee as at end-2008, as well as a high-level organogram, can be found at the end of this article.

The Committee held six regular meetings during 2008, as well as a number of *ad hoc* liaison teleconferences. A key feature at the FXJSC meetings during 2008, was the ongoing discussion of market conditions especially those relating to the deterioration in liquidity in FX and swap markets. There was also increased focus by market participants on counterparty risk. There were presentations to the group about the new facilities and operations offered by the Bank of England and their potential impact on the market. The work programme of the main Committee and its subgroups included: reviewing the Non-Investment Products Code (NIPs Code); considering issues in FX settlement risk and possible measures for risk reduction; and the publication of the semi-annual turnover survey of the UK foreign exchange market in April and October 2008. Much of this work was progressed by subgroups, in particular those representing operations managers, legal representatives and other *ad hoc* specialist working groups. The November meeting included a guest speaker who opened the main topic of discussion on lessons from recent market developments and the future challenges facing foreign exchange wholesale markets.

Members of the Committee also met with asset managers and members of the hedge fund community during 2008 to discuss market developments.

Non-Investment Products Code

The NIPs Code is a voluntary code of good market practice drawn up by market practitioners covering the foreign exchange market in the United Kingdom as well as the markets for wholesale bullion and wholesale deposits. The Code is published by the FXJSC, with contributions from the FXJSC operations and legal subgroups, the Sterling Money Markets Liaison Group and the Management Committee of the London Bullion Market Association (LBMA) for the relevant sections.

A new version of the code was published in April 2009,⁽¹⁾ primarily to update references to the FSA Handbook. The Code also included a new paragraph encouraging market participants to utilise settlement services that reduce their exposures to settlement risk.

Work of the FXJSC operations subgroup

The operations subgroup was established in 2002 and its membership consists of operational managers from many major banks active in the London wholesale foreign exchange market as well as representatives from service providers and banking associations.

During 2008, the operations subgroup and its working groups, in conjunction with the legal subgroup, worked on reviewing and providing updates to sections of the NIPs code. A working group of the operations subgroup was set up to establish best practice standards for FX option confirmations and considered issues such as FX settlement risk, claims processing and the standardisation of Standard Settlement Instructions. The operations subgroup has also strengthened its co-operation with other international committees by regular liaison conference calls to discuss the workstreams of the individual groups. It also held a joint meeting with the members of the New York Operational Managers Working Group (OMWG) to discuss common areas of interest, such as option

(1) See www.bankofengland.co.uk/markets/forex/fxjsc/nipscode.pdf.

confirmations, settlement risk and novations. The operations subgroup also reviewed training and education initiatives for operations managers available in the market place.

Work of the FXJSC contingency subgroup

The contingency subgroup, which was established in 2005, continued to highlight business continuity issues relevant to the foreign exchange market, including settlement deadlines and reviewing processes in times of high volumes. The operations subgroup conducted a business continuity test during the year which was successful.

Work of the FXJSC legal subgroup

The legal subgroup was established in 2004 and comprises 17 members offering in-house counsel for many of the major institutions involved in the wholesale foreign exchange markets in London. The group met three times in 2008. It continued to make an invaluable contribution through its provision of legal support to the work of the FXJSC main Committee and operations subgroup; in particular through advising on and drafting the sections to update the NIPs Code. During 2008, the legal subgroup welcomed guest speakers from EMTA, CLS, Allen and Overy, and the FSA.

In addition, the legal subgroup participated in the FXJSC operations sub working group on FX Options Confirmations which continued to work on standardising the master documentation on non-deliverable forward (NDF)⁽¹⁾ confirmation. The group also considered the treatment of FX forwards in the Markets in Financial Instruments Directive ('MiFID') and reviewed and updated references in the NIPs code which had been superseded by the introduction of MiFID. The legal subgroup continued to liaise with a range of other domestic and foreign legal committees to keep abreast of topical issues relating to foreign exchange markets.

FXJSC Chief Dealers' subgroup

The Chief Dealers' subgroup was established in July 2005. Its membership in 2008 comprised twelve chief dealers active in the London foreign exchange market.

The subgroup met three times during 2008 to discuss conjunctural and structural developments in the foreign exchange market, focusing on volatile market conditions and their impact on trading. The group also discussed developments in e-commerce with a particular focus on the provision of liquidity and exchange rate fixings.⁽²⁾

International co-operation

Liaison between the eight foreign exchange committees based in different international financial centres (London, Frankfurt

for the euro area, Hong Kong, New York, Singapore, Sydney, Tokyo and Toronto) continued during the year. In April 2008 the London Committee hosted the second global meeting of the FX committees. Topics discussed included current market developments and foreign exchange activity in volatile market conditions, algorithmic trading, the growth of retail activity — with a particular focus on the impact on liquidity and the FX turnover surveys produced by some of the committees.

International survey results overview

Thirty two banks, drawn from committee members and the most active participants in the London foreign exchange market, contributed to the eighth and ninth semi-annual surveys of foreign exchange turnover in London conducted by the FXJSC. In April 2008 a revised and more comprehensive survey was introduced. The new survey includes additional currency information, counterparty types (eg retail activity), maturities, modes of execution eg electronic trades transacted, and product (eg derivatives). In April 2008 the survey continued to show strong growth in London foreign exchange turnover, however given further deterioration in the global economic environment turnover in October declined by 8%. Average daily turnover⁽³⁾ recorded in the October 2008 survey was \$1,679 billion, 8% lower than the April survey, but still some 21% higher than in October 2007 (**Chart 1**). By comparison, turnover growth recorded by the New York Foreign Exchange Committee was 9% on the year to October 2008, while Singapore and Canada rose 9% and 1% respectively. Turnover growth recorded in Australia was down 7% on the year to October 2008.

The decrease in London turnover in October compared to April was more than accounted for by a 23% fall in foreign exchange swaps turnover (**Chart 2**). This reflected ongoing strains in international money markets. Spot and outright forward products continued to grow.

Turnover in most major currencies fell, with the exception of the Japanese yen and euro (**Chart 3**). Turnover in sterling decreased 7%, while turnover in the US dollar dropped 11% in October from April. Turnover concentration in the top five banks rose markedly to 53% from 45% in April 2008, while the number of banks accounting for 95% of turnover remained broadly consistent at 21 for October 2008.

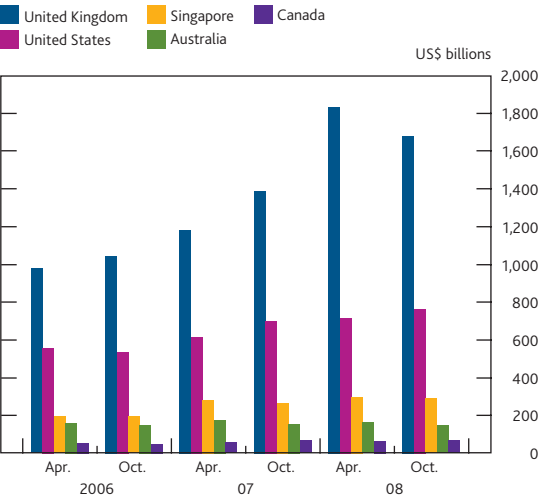
The forthcoming FXJSC survey results for April 2009 will be published in Summer 2009.

(1) NDFs are forward contracts in foreign exchange where one currency is not easily traded. The contract is priced by reference to a particular source for the bilateral exchange rate but is settled entirely in the more freely available currency, usually dollars.

(2) The fixing rate of a particular currency pair is a reference rate at a specific point in time and is used, for example, in the settlement of forward foreign exchange contracts.

(3) Based on spot, outright forwards, FX swaps and other OTC foreign exchange instruments.

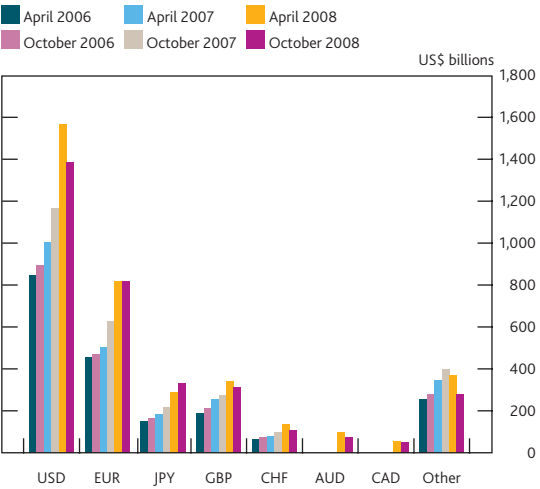
Chart 1 Global FX^(a) daily average turnover



Sources: Canadian Foreign Exchange Committee, London Foreign Exchange Joint Standing Committee, New York Foreign Exchange Committee and Singapore Foreign Exchange Committee.

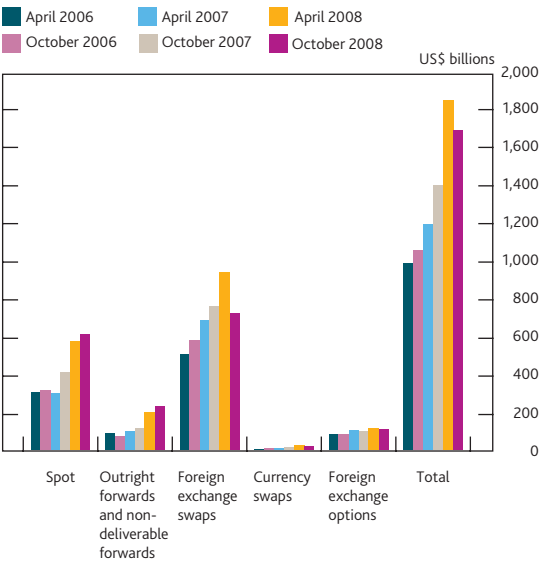
(a) This includes spot, outright forwards, FX swaps, currency swaps and FX options.

Chart 3 UK daily average turnover by currency



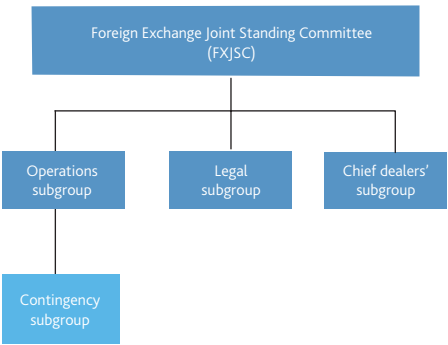
Source: London Foreign Exchange Joint Standing Committee.

Chart 2 UK daily average turnover by product



Source: London Foreign Exchange Joint Standing Committee.

Figure 1 Foreign Exchange Joint Standing Committee: structure



Members of the London Foreign Exchange Joint Standing Committee as at December 2008

Name	Firm/Organisation
Brian Welch	Association of Corporate Treasurers
Vincent Delorenzo	Bank of America
Rob Loewy	Bank of China
Richard Gill	The Bank of New York Mellon
Sean Comer	Barclays
Cassandra Kenny	British Bankers' Association
Vincent Leclercq	Calyon
James Bindler	Citigroup
Rob Close	CLS
Zar Amrolia	Deutsche Bank
Heather Pilley	Financial Services Authority
Phil Weisberg	FXAll
Nick Burgin	Goldman Sachs
Andrew Brown	HSBC
Christopher Wilcox	JPMorgan Chase
Sara Edgington	Morgan Stanley
Marcus Nysten	SEB
James Potter	Tullet Prebon
Darren Coote	UBS
Ben Welsh	Unicredit
Stewart Lloyd-Jones	Wholesale Market Brokers' Association
Susan Balogh	Chair, operations subgroup
Susan Revell	Chair, legal subgroup
Paul Fisher (Chair)	Bank of England
Grigoria Christodoulou/Sumita Ghosh (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee operations subgroup as at December 2008

Name	Firm/Organisation
Dennis Sweeney	Association of Foreign Banks
Michael Douglas	Bank of America
Richard Gray	Bank of England
Duncan Lord	Barclays Capital
Cassandra Kenny	British Bankers' Association
Leigh Meyer	Citigroup
Phil Kenworthy	CLS Services
Andreas Gaus	Credit Suisse
Tony Beels	Deutsche Bank
Mike Neale	HSBC
Colin Perry	ICAP
Graeme Munro	JPMorgan Chase
Derrick Pearson	Lloyds
Kim Surendran	Mellon Bank
Andrew Harvey	Morgan Stanley
John Moorhouse	Reuters
Jeremy Hill	Royal Bank of Scotland
Ian Cowell	State Street
Alan Spalding	SWIFT
William Boss	UBS
Susan Balogh (Chair)	Goldman Sachs
Grigoria Christodoulou/Sumita Ghosh (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee Chief Dealers' subgroup as at December 2008

Name	Firm/Organisation
Ichei Kuki	Bank of Tokyo-Mitsubishi UFJ
Danny Wise	Barclays Capital
Robert de Groot	Citigroup
Bernie Kipping	Commonwealth Bank of Australia
Angus Grieg	Deutsche Bank
Gary Nettleingham	HSBC
Geoff Thorpe	JPMorgan Chase
Chris Nicoll	Morgan Stanley
Mark Iles	Royal Bank of Canada
Roger Hawes	Royal Bank of Scotland
Chris Freeman	State Street
Nial O'Riordan	UBS
Martin Mallett (Chair)	Bank of England
James O'Connor	Bank of England

Members of the London Foreign Exchange Joint Standing Committee legal subgroup as at December 2008

Name	Firm/Organisation
Gaynor Wood	Bank of America
Chris Allen	Barclays Capital
Richard Haynes	Citigroup
Julia Elliot	Citigroup
Leonie Miller	Credit Suisse
Carl Husselmann	Deutsche Bank
Anne Moore-Williams	FSA
Dan Parker	Goldman Sachs
Felicity White	HSBC
Patrick Palmer	JPMorgan Chase
Stephen Potts	Lloyds TSB
Ed Bracken	Morgan Stanley
Martin Oakley	Reuters
Alex Bouchier	Royal Bank of Scotland
Alistair Clevely	Standard Chartered
Kate Binions	Standard Chartered
Kurt Crommelin	UBS
Susan Revell (Chair)	Morgan Stanley
Jacqueline Joyston-Bechal (Secretary)	Bank of England

Speeches



Bank of England speeches

A short summary of speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

[The repertoire of official sector interventions in the financial system: last resort lending, market-making, and capital](#)

Paul Tucker, Deputy Governor, May 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech390.pdf

In this speech Paul Tucker discussed the role the authorities can play in providing crisis support to the financial system. The current crisis has underlined how problems of funding liquidity, asset-market liquidity and solvency are intertwined. And those dimensions of a systemic crisis map into the authorities' capability, in principle, to be a lender of last resort; a market maker of last resort (MMLR); and a provider of capital of last resort. In relation to central bank liquidity insurance to banks, he explains the thinking behind the Bank of England's new permanent facilities: the discount window facility and wider-collateral long-term repos. Their design reflects the Bank's objective in this area: to reduce the cost of disruptions to the liquidity and payments services supplied by commercial banks by balancing the provision of liquidity insurance against the costs of creating incentives for banks to take greater risks, and subject to the need to avoid taking risk onto its balance sheet. The authorities also need to set the right regulatory framework for banks' management of their liquidity. He argued that regulators should define the 'liquidity buffer' to comprise high-quality securities that can reliably be traded or exchanged in liquid markets, including in stressed circumstances. In practice, that would mean focusing on government bonds in many economies.

In relation to the debate about MMLR operations, he outlined for debate six possible principles, stressing the need for a central bank to perform a catalytic role, helping ideally to kick-start markets rather than replace them. He argued that there was also a need for principles and policies for what might be called 'capital of last resort' given the recurrence through history of episodes when governments have ended up bailing out banks. In that connection, he also suggested for debate that one possible approach would in future be to build on the example of deposit insurance schemes by putting more of the cost of banking system failures on shareholders in the banking system generally rather than the general taxpayer.

[Deputy Governor's speech given at Cutlers' Feast, Cutlers' Hall, Sheffield](#)

Charles Bean, Deputy Governor, May 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech389.pdf

In this speech, Charles Bean described how a crisis that had begun in the financial sector triggered a much wider global recession. A collapse in confidence and a sharp contraction in the availability of credit following the failure of Lehman Brothers bank caused a global downturn in demand which was then propagated through the stock cycle. He noted that the nature of this recession was different from previous ones because it was not the result of the need to reduce inflation due to excess demand growth for goods and services, but arose out of excess demand for financial and real assets. The banking system was at the heart of the problem and was therefore where a number of policy initiatives had been focused. He explained the Monetary Policy Committee's decision to cut Bank Rate to 0.5% and the programme of asset purchases intended to increase the growth of nominal spending. He noted that there were some encouraging signs on the economy and that growth should resume towards the end of the year although the pickup is likely to take place relatively slowly. He emphasised that the MPC's remit is to target CPI inflation and set out the tools the Bank would use to withdraw its monetary stimulus if inflation risks increased. He explained that it would not be necessary to unwind the asset purchases before raising Bank Rate. And if the Bank needed to drain reserves quickly it could issue Bank of England bills in order to be able to stagger the sales of gilts.

[Containing system-wide liquidity risks: some issues and challenges](#)

Nigel Jenkinson, Adviser to the Governor, May 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech388.pdf

In his speech, Nigel Jenkinson set out a number of high-level objectives that should help guide future research and analysis on the development and design of a framework to strengthen the regulation of system-wide liquidity risks. He reviewed the origins of the present financial crisis, noting that defences against a rise in system-wide liquidity pressure were clearly inadequate and that attempts by banks to use defences designed to address idiosyncratic liquidity problems severely compounded system-wide stress. He noted that reducing the likelihood and impact of future episodes of system-wide liquidity risk was high on the policy agenda. He welcomed the

initiatives being taken by the Basel Committee and Committee of European Banking Supervisors to strengthen the management and supervision of liquidity risk by individual firms, but believes future financial regulation needs to take stronger account of system-wide implications. He gave a preliminary assessment of some of the issues and challenges in meeting five high-level objectives that should influence the future design of a new framework. He thought good progress has already been made in some of the areas but in others, research is only just beginning. He concluded that any new framework must balance the containment of system-wide liquidity risks against the benefits the financial system provides through maturity transformation and the taking of liquidity risk.

Rethinking the financial network

Andrew Haldane, Executive Director for Financial Stability, April 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech386.pdf

In this speech, Andrew Haldane applied lessons from other disciplines, including ecology, epidemiology and engineering, to consider the financial system as a complex adaptive network. Using network theory, he outlined how the emergence of complexity and homogeneity in the financial network over the past decade had resulted in sharp discontinuities in the financial system. He then went on to suggest three broad areas for improvement in the robustness of the financial network. First, improvements in data are needed, in terms of better data collection, better analysis of the data, and better communication of the results to the public. Second, regulation of the network is needed to ensure appropriate control of the damaging network consequences of the failure of large, interconnected institutions — systemic regulation. Finally, the financial network should be structured so as to reduce the chances of future systemic collapse. Central counterparties, netting-off gross claims within the financial system, and public authority intervention against undesirable structural developments, are possible solutions.

Monetary policy in turbulent times

Andrew Sentance, Monetary Policy Committee member, April 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech385.pdf

In this speech, Andrew Sentance explained how the pattern of recession which has unfolded over the past six to nine months, reflected the compound effect of three major global shocks from commodity prices, the 'credit crunch', and the confidence shock following the collapse of Lehman Brothers. The worst-affected economies have not been those which have

seen the biggest rises in credit or house prices, but those which are major exporters of manufactured goods. This illustrates how, in an integrated global economy, a country's vulnerability to recession depends on whether its economy is a large producer of the products where global expenditure is falling. Other features of a more highly integrated global economy might be more volatile commodity prices, more synchronised international business cycles and an increased risk of financial cycles. The solution to these potential volatilities should not be to hold back the process of globalisation but to build a regulatory and policy framework capable of attenuating them.

Remarks by Paul Tucker

Paul Tucker, Deputy Governor, March 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech384.pdf

In this speech, Paul Tucker summarised views on a range of policy issues for making the global and domestic financial system more resilient in future. He defined 'financial stability' to a large degree as being about maintaining the value of private sector money (deposits with banks) in terms of central bank money. Alongside low and stable inflation, that is essential for broader monetary stability. He reviewed a few key issues in microprudential regulation: having supervisors prepared to face down bank management where necessary, but act with restraint; avoiding overly large exposures of any kind; and avoiding business structures that are too complex to supervise, a lesson from BCCI. He emphasised that all banks should hold a core liquidity buffer of high-quality government bonds; and that regular capital should essentially comprise equity, as only it can absorb losses. On the debate about macroprudential supervision, he identified five big issues that need to be resolved: whether the objective should be to dampen the credit cycle; whether it is enough to focus on banks; what the instruments should be; whether the policy should be based on rules or discretionary judgements; whether individual national authorities would need to co-operate or co-ordinate in any way. Finally, he stressed that policy to make the banking system and capital market more resilient in the event of a future bubble bursting, were just as important as taming the cycle.

Tough times, unconventional measures

Spencer Dale, Executive Director and Chief Economist, March 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech383.pdf

In this speech, Spencer Dale described the tough times that the UK economy was experiencing. The pace, breadth and spread of the global downturn suggested that tighter credit conditions were not the only force at work — a widespread

collapse in confidence had also played a major role. Nevertheless, there was a substantial stimulus in the pipeline — larger than at comparable stages of previous recessions. The degree of stimulus was not the only difference. The causes of the current downturn were unique and the structure of the UK economy had evolved. These changes highlighted a danger of viewing the current recession through the prism of previous ones. He went on to describe the unconventional measures being employed by the MPC. There were encouraging signs that asset purchases might be having the desired effect. He concluded by noting that the Committee's decisions remained focused on the symmetric inflation target. This target was therefore a natural guide to the exit strategy.

The future of monetary policy

David Blanchflower, Monetary Policy Committee member, March 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech382.pdf

In this speech, David Blanchflower considered the future for monetary policy. He explained that the 'one tool one target' approach of using Bank Rate to target CPI inflation had been inadequate. This approach failed to prevent the build-up of imbalances that presaged the crisis and was insufficient in dealing with failing banks and financial market stress as the crisis developed. There was a consensus that new tools were required to regulate the financial sector and prevent such crises in the future. However, the current problem facing policymakers was that banks were risk-averse. As the costs and benefits of tighter regulation were likely to be least favourable in the aftermath of a financial crisis, it would be prudent to take time in deciding on new regulatory structures. In the near term, monetary policy was likely to remain accommodative given the disinflationary pressure evident in the economy.

Finance: a return from risk

Mervyn King, Governor, March 2009

www.bankofengland.co.uk/publications/speeches/2009/speech381.pdf

In this speech, the Governor discussed the nature of risk in the financial system to draw lessons about the policy responses that are required to ensure greater monetary and financial stability in the future. He considered the design of future banking regulation and the more urgent need to recover from the present crisis.

The Governor stated that at the heart of the crisis was an inability to perceive the true nature of the risks involved, which has been a persistent feature of crises over time. He stressed that regulation should be 'simple and robust'. He argued that, 'To correct these types of market failure will require a system of regulation that effectively marries the 'top down' assessment of the risks to the system as a whole to the 'bottom up' supervision of individual institutions.'

He went on to discuss why these measures should not involve monetary policy being diverted from its role of controlling inflation. Instead, he supported the introduction of additional tools. 'What is needed is an additional instrument... to provide the authorities with the ability to control the growth of the financial sector and its interactions with the wider economy.'

He also spelt out the need to address the weaknesses in the international monetary system that allowed global imbalances — one of the underlying causes of the crisis — to grow unchecked.

Stability, instability and monetary policy

Kate Barker, Monetary Policy Committee member, March 2009.

www.bankofengland.co.uk/publications/speeches/2009/speech380.pdf

In this speech, Kate Barker looked back at the history of UK interest rates, compared with other developed countries, over the period from the start of inflation targeting in 1992 to the financial crisis in 2007. It was concluded that the United Kingdom's real short-term interest rate had been a little higher than the average, and suggested that this might be attributed to the United Kingdom's relative economic stability which had tended to reduce domestic precautionary savings. Looking to the present, she also considered the adverse impact of low Bank Rate on savers and on some financial institutions. Although cuts in Bank Rate at low levels might have less positive effect on the economy, the recent reduction to 0.5% and associated announcement of a programme of quantitative easing, were necessary steps to reduce the risks of an even sharper UK recession and potential deflation.

Appendices



Contents of recent Quarterly Bulletins

The articles and speeches that have been published recently in the *Quarterly Bulletin* are listed below. Articles from November 1998 onwards are available on the Bank's website at:

www.bankofengland/publications/quarterlybulletin/index.htm.

Articles and speeches

Speeches are indicated by (S)

Summer 2006

- House prices and consumer spending
- Investing in inventories
- Cost-benefit analysis of monetary and financial statistics
- Public attitudes to inflation
- The Centre for Central Banking Studies
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2005
- Uncertainty, the implementation of monetary policy, and the management of risk (S)
- Reflections on operating inflation targeting (S)
- Cost pressures and the UK inflation outlook (S)
- The UK current account deficit and all that (S)
- A shift in the balance of risks (S)
- What do we now know about currency unions? (S)

2006 Q3

- The UK international investment position
- Costs of sovereign default
- UK export performance by industry
- The Governor's speech in Edinburgh, Scotland (S)
- The Governor's speech at the Mansion House (S)
- Stability and change (S)
- Financial system risks in the United Kingdom (S)

2006 Q4

- The economic characteristics of immigrants and their impact on supply
- Recent developments in sterling inflation-linked markets
- The state of British household finances: results from the 2006 NMG Research survey
- Measuring market sector activity in the United Kingdom
- The Governor's speech at the Great Hall, Winchester (S)
- Trusting in money: from Kirkcaldy to the MPC (S)
- The Governor's speech to the Black Country business awards dinner (S)
- International monetary stability — can the IMF make a difference? (S)
- The puzzle of UK business investment (S)
- Hedge funds and financial stability (S)

- Practical issues in preparing for cross-border financial crises (S)
- Reflections on my first four votes on the MPC (S)
- Prudential regulation, risk management and systemic stability (S)
- Globalisation and inflation (S)

2007 Q1

- The Monetary Policy Committee of the Bank of England: ten years on
- The macroeconomic impact of globalisation: theory and evidence
- The macroeconomic impact of international migration
- Potential employment in the UK economy
- The role of household debt and balance sheets in the monetary transmission mechanism
- Gauging capacity pressures within businesses
- Through the looking glass: reform of the international institutions (S)
- The Governor's speech to the Birmingham Chamber of Commerce Annual Banquet (S)
- Perspectives on current monetary policy (S)
- The MPC comes of age (S)
- Pricing for perfection (S)
- Risks to the commercial property market and financial stability (S)
- Macro, asset price, and financial system uncertainties (S)
- The impact of the recent migration from Eastern Europe on the UK economy (S)
- Inflation and the supply side of the UK economy (S)
- Inflation and the service sector (S)
- Recent developments in the UK labour market (S)

2007 Q2

- Public attitudes to inflation and interest rates
- National saving
- Understanding investment better: insights from recent research
- Financial globalisation, external balance sheets and economic adjustment
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2006
- The MPC ten years on (S)
- The City's growth: the crest of a wave or swimming with the stream? (S)
- The changing pattern of savings: implications for growth and inflation (S)
- Interest rate changes — too many or too few? (S)
- A perspective on recent monetary and financial system developments (S)

- Recent developments in the UK economy: the economics of walking about (S)

2007 Q3

- Extracting a better signal from uncertain data
- Interpreting movements in broad money
- The Bank of England Credit Conditions Survey
- Proposals to modify the measurement of broad money in the United Kingdom: a user consultation
- The Governor's speech to CBI Wales/CBI Cymru, Cardiff (S)
- The Governor's speech at the Mansion House (S)
- London, money and the UK economy (S)
- Uncertainty, policy and financial markets (S)
- Central banking and political economy: the example of the United Kingdom's Monetary Policy Committee (S)
- Promoting financial system resilience in modern global capital markets: some issues (S)
- UK monetary policy: good for business? (S)
- Consumption and interest rates (S)

2007 Q4

- Household debt and spending: results from the 2007 NMG Research survey
- The macroeconomic impact of higher energy prices on the UK economy
- Decomposing corporate bond spreads
- The foreign exchange and over-the-counter derivatives markets in the United Kingdom
- The Governor's speech in Northern Ireland (S)
- Current monetary policy issues (S)
- The global economy and UK inflation (S)
- Trends in European labour markets and preferences over unemployment and inflation (S)
- Fear, unemployment and migration (S)
- Risk, uncertainty and monetary policy (S)
- New markets and new demands: challenges for central banks in the wholesale market infrastructure (S)
- A tale of two shocks: global challenges for UK monetary policy (S)

2008 Q1

- Capital inflows into EMEs since the millennium: risks and the potential impact of a reversal
- Recent developments in portfolio insurance
- The Agents' scores: a review
- The impact of low-cost economies on UK import prices
- The Society of Business Economists' survey on MPC communications
- The Governor's speech in Bristol (S)
- The impact of the financial market disruption on the UK economy (S)
- The return of the credit cycle: old lessons in new markets (S)
- Money and credit: banking and the macroeconomy (S)
- Financial markets and household consumption (S)

2008 Q2

- Public attitudes to inflation and interest rates
- Recent advances in extracting policy-relevant information from market interest rates
- How do mark-ups vary with demand?
- On the sources of macroeconomic stability
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2007
- Sovereign wealth funds and global imbalances (S)
- Monetary policy and the financial system (S)
- Inflation and the global economy (S)
- Does sterling still matter for monetary policy? (S)
- Strengthening regimes for controlling liquidity risk: some lessons from the recent turmoil (S)
- Inflation, expectations and monetary policy (S)

2008 Q3

- Market expectations of future Bank Rate
- Globalisation, import prices and inflation: how reliable are the 'tailwinds'?
- How has globalisation affected inflation dynamics in the United Kingdom?
- The economics of global output gap measures
- Banking and the Bank of England (S)
- The Governor's speech at the Mansion House (S)
- A tale of two cycles (S)
- The financial cycle and the UK economy (S)
- The credit crisis: lessons from a protracted 'peacetime' (S)
- Financial innovation: what have we learnt? (S)
- Global inflation: how big a threat? (S)
- Remarks on 'Making monetary policy by committee' (S)

2008 Q4

- The financial position of British households: evidence from the 2008 NMG Research survey
- Understanding dwellings investment
- Price-setting behaviour in the United Kingdom
- Monetary Policy Roundtable

2009 Q1

- Price-setting behaviour in the United Kingdom: a microdata approach
- Deflation

2009 Q2

- Quantitative easing
- Public attitudes to inflation and monetary policy
- The economics and estimation of negative equity
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2008

Bank of England publications

The Bank of England publishes information on all aspects of its work in many formats. Listed below are some of the main Bank of England publications. For a full list, please refer to our website:

www.bankofengland.co.uk/publications/index.htm.

Working papers

An up-to-date list of working papers is maintained on the Bank of England's website at:

www.bankofengland.co.uk/publications/workingpapers/index.htm

where abstracts of all papers may be found. Papers published since January 1997 are available in full, in portable document format (PDF).

No. 357 A no-arbitrage structural vector autoregressive model of the UK yield curve (December 2008)
Iryna Kaminska

No. 358 Understanding the real rate conundrum: an application of no-arbitrage finance models to the UK real yield curve (December 2008)
Michael Joyce, Iryna Kaminska and Peter Lildholdt

No. 359 Globalisation, import prices and inflation dynamics (December 2008)
Chris Peacock and Ursel Baumann

No. 360 Extracting inflation expectations and inflation risk premia from the term structure: a joint model of the UK nominal and real yield curves (February 2009)
Michael Joyce, Peter Lildholdt and Steffen Sorensen

No. 361 Why do risk premia vary over time? A theoretical investigation under habit formation (February 2009)
Bianca De Paoli and Pawel Zabczyk

No. 362 Output costs of sovereign crises: some empirical estimates (February 2009)
Bianca De Paoli, Glenn Hoggarth and Victoria Saporta

No. 363 Dynamics of the term structure of UK interest rates (March 2009)
Francesco Bianchi, Haroon Mumtaz and Paolo Surico

No. 364 What lies beneath: what can disaggregated data tell us about the behaviour of prices? (March 2009)
Haroon Mumtaz, Pawel Zabczyk and Colin Ellis

No. 365 Foreign exchange rate risk in a small open economy (March 2009)
Bianca De Paoli and Jens Søndergaard

No. 366 Common determinants of currency crises: role of external balance sheet variables (April 2009)
Mirko Licchetta

No. 367 Labour market flows: facts from the United Kingdom (April 2009)
Pedro Gomes

No. 368 The real exchange rate in sticky-price models: does investment matter? (April 2009)
Enrique Martínez-García and Jens Søndergaard

No. 369 Multivariate methods for monitoring structural change (June 2009)
Jan J J Groen, George Kapetanios and Simon Price

No. 370 Banks' intraday liquidity management during operational outages: theory and evidence from the UK payment system (June 2009)
Ouarda Merrouche and Jochen Schanz

No. 371 Payment systems, inside money and financial intermediation (June 2009)
Ouarda Merrouche and Erlend Nier

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's website at:

www.bankofengland.co.uk/publications/externalmpcpapers/index.htm.

The following papers have been published recently:

No. 24 The causal relationship between inflation and inflation expectations in the United Kingdom (July 2008)
Roger Kelly

No. 25 Household external finance and consumption (October 2008)
Timothy Besley, Neil Meads and Paolo Surico

No. 26 Monetary policies and low-frequency manifestations of the quantity theory (December 2008)
Thomas J Sargent and Paolo Surico

Monetary and Financial Statistics

Monetary and Financial Statistics (Bankstats) contains detailed information on money and lending, monetary and financial institutions' balance sheets, banks' income and expenditure, analyses of bank deposits and lending, external business of banks, public sector debt, money markets, issues of securities, financial derivatives, interest and exchange rates, explanatory notes to tables and occasional related articles.

Bankstats is published on a monthly basis, free of charge, on the Bank's website at:

www.bankofengland.co.uk/statistics/ms/current/index.htm.

Further details are available from: Leslie Lambert, Monetary and Financial Statistics Division, Bank of England; telephone 020 7601 4544; fax 020 7601 3208; email leslie.lambert@bankofengland.co.uk.

Articles that have been published in recent issues of *Monetary and Financial Statistics* can also be found on the Bank's website at:

www.bankofengland.co.uk/statistics/ms/articles.htm.

Financial Stability Report

The *Financial Stability Report* is published twice a year. Its purpose is to encourage informed debate on financial stability; survey potential risks to financial stability; and analyse ways to promote and maintain a stable financial system. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policymakers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available at a charge, from Publications Group, Bank of England, Threadneedle Street, London, EC2R 8AH and on the Bank's website at:

www.bankofengland.co.uk/publications/fsr/index.htm.

Payment Systems Oversight Report

The *Payment Systems Oversight Report* provides an account of how the Bank is discharging its responsibility for oversight of UK payment systems. Published annually, the *Oversight Report* sets out the Bank's assessment of key systems against the benchmark standards for payment system risk management provided by the internationally adopted

Core Principles for Systemically Important Payment Systems, as well as current issues and priorities in reducing systemic risk in payment systems. Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/psor/index.htm.

Handbooks in central banking

The series of *Handbooks in central banking* provide concise, balanced and accessible overviews of key central banking topics. The *Handbooks* have been developed from study materials, research and training carried out by the Bank's Centre for Central Banking Studies (CCBS). The *Handbooks* are therefore targeted primarily at central bankers, but are likely to be of interest to all those interested in the various technical and analytical aspects of central banking. The series also includes lecture and research publications, which are aimed at the more specialist reader. All the *Handbooks* are available via the Bank's website at:

www.bankofengland.co.uk/education/ccbs/handbooks/index.htm.

The framework for the Bank of England's operations in the sterling money markets (the 'Red Book')

The 'Red Book' describes the Bank of England's framework for its operations in the sterling money markets, which is designed to implement the interest rate decisions of the Monetary Policy Committee while meeting the liquidity needs, and so contributing to the stability of, the banking system as a whole. It also sets out the Bank's specific objectives for the framework, and how it delivers those objectives. The framework was introduced in May 2006. The 'Red Book' is available at:

www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.

The Bank of England Quarterly Model

The *Bank of England Quarterly Model*, published in January 2005, contains details of the new macroeconomic model developed for use in preparing the Monetary Policy Committee's quarterly economic projections, together with a commentary on the motivation for the new model and the economic modelling approaches underlying it.

www.bankofengland.co.uk/publications/other/beqm/index.htm.

Cost-benefit analysis of monetary and financial statistics

The handbook describes a cost-benefit analysis (CBA) framework that has been developed within the Bank to ensure a fair balance between the benefits derived from good-quality statistics and the costs that are borne by reporting banks. Although CBA is a well-established approach in other contexts, it has not often been applied to statistical provision, so techniques have had to be adapted for application to the Bank's monetary and financial statistics. The handbook also discusses how the application of CBA has enabled cuts in both the amount and the complexity of information that is required from reporting banks.

www.bankofengland.co.uk/statistics/about/cba.htm.

Credit Conditions Survey

As part of its mission to maintain monetary stability and financial stability, the Bank needs to understand trends and developments in credit conditions. This survey for bank and non-bank lenders is an input to this work. Lenders are asked about the past three months and the coming three months. The survey covers secured and unsecured lending to households and small businesses; and lending to non-financial corporations, and to non-bank financial firms.

www.bankofengland.co.uk/publications/other/monetary/creditconditions.htm.

Trends in Lending

This monthly publication presents the Bank of England's assessment of the latest trends in lending to the UK economy. The report draws mainly on long-established official data sources, such as the existing monetary and financial statistics collected by the Bank of England. But these data are supplemented by the results of a new collection, established by the Bank of England in late 2008, to provide more timely data covering aspects of lending to the UK corporate and household sectors. The Bank collects these data on behalf of the Lending Panel, which was established by the Chancellor in November 2008 to monitor lending to the UK economy, and to promote best practice across the industry in dealing with borrowers facing financial difficulties.

The Lending Panel comprises Government, lenders, consumer, debt advice and trade bodies, regulators and the Bank of England. See www.hm-treasury.gov.uk/press_126_08.htm.

Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/other/monetary/trendsinlending.htm.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

www.bankofengland.co.uk/publications/quarterlybulletin/index.htm.

Inflation Report

The Bank's quarterly *Inflation Report* sets out the detailed economic analysis and inflation projections on which the Bank's Monetary Policy Committee bases its interest rate decisions, and presents an assessment of the prospects for UK inflation over the following two years. The *Inflation Report* is available at:

www.bankofengland.co.uk/publications/inflationreport/index.htm.

The *Report* starts with an overview of economic developments; this is followed by five sections:

- analysis of money and asset prices;
- analysis of demand;
- analysis of output and supply;
- analysis of costs and prices; and
- assessment of the medium-term inflation prospects and risks.

Publication dates

Copies of the *Quarterly Bulletin*, *Inflation Report* and *Financial Stability Report* can be bought separately, or as combined packages for a discounted rate. Current prices are shown overleaf. Publication dates for 2009 are as follows:

Quarterly Bulletin

Q1 16 March
Q2 12 June
Q3 21 September
Q4 14 December

Inflation Report

February 11 February
May 13 May
August 12 August
November 11 November

Financial Stability Report

June
December

Quarterly Bulletin, Inflation Report and Financial Stability Report subscription details

Copies of the *Quarterly Bulletin (QB)*, *Inflation Report (IR)* and *Financial Stability Report (FSR)* can be bought separately, or as combined packages for a discounted rate. Subscriptions for a full year are also available at a discount. The prices are set out below:

Destination	2009					
	<i>QB, IR and FSR package</i>	<i>QB and IR package</i>	<i>IR and FSR package</i>	<i>QB only</i>	<i>IR only</i>	<i>FSR only</i>
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Outside Europe						
Surface mail	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50
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The **concessionary** rates for the *Quarterly Bulletin*, *Inflation Report* and *Financial Stability Report* are noted above in *italics*. Academics at UK institutions of further and higher education are entitled to a concessionary rate. They should apply on their institution's notepaper, giving details of their current post. **Students and secondary schools** in the United Kingdom are also entitled to a concessionary rate. Requests for concessionary copies should be accompanied by an explanatory letter; students should provide details of their course and the institution at which they are studying.

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