Quarterly Bulletin

2012 Q2 | Volume 52 No. 2





Quarterly Bulletin

2012 Q2 | Volume 52 No. 2

Executive summary

Recent economic and financial developments (pages 99–112)

Markets and operations. The Markets and operations article reviews developments in financial markets covering the period between the previous *Bulletin* and 31 May 2012. Financial market sentiment worsened markedly over this period amid a renewed focus in financial markets on the challenges facing the euro area. These concerns led to flight into government bonds of those countries considered to be relatively safe and falls in the prices of assets considered most risky. Against this backdrop, the euro depreciated, accounting for most of sterling's appreciation over the review period. Debt issuance by banks slowed, while gross issuance by non-financial corporates remained stronger than in recent years. The article also describes recent changes to intraday liquidity provision by the Bank of England in the CREST system and development of a Standardised Credit Support Annex to be used in over-the-counter derivatives transactions.

Research and analysis (pages 113–58)

How has the risk to inflation from inflation expectations evolved? (by Rashmi Harimohan). For much of the past four years, CPI inflation has been persistently above the 2% target set by the Government. Between 2010 and 2011 H1, the Monetary Policy Committee (MPC) became increasingly concerned that a continued period of above-target inflation might lead to inflation expectations becoming less well anchored by monetary policy. If inflation expectations were to become less well anchored, changes in price-setting or wage-setting behaviour, or both, may lead inflation itself to become more persistent. But since reaching a peak of 5.2% in September 2011, inflation fell to 3% in April 2012 and this has been accompanied by declines in some measures of inflation expectations. This article looks at a range of indicators to assess how the risk to inflation from inflation expectations has evolved, by applying the framework previously set out in the 2011 Q2 Quarterly Bulletin. The article concludes that the upside risk from inflation expectations may have receded a little relative to Autumn 2011. The evidence suggests that the upside risk from longer-term expectations has not crystallised while the upside risk from shorter-term expectations has receded a little. There are also few signs that past elevated inflation expectations have pushed up wages. But while companies' inflation expectations have fallen over the past few months, it is hard to say for sure whether or not past inflation expectations have pushed up inflation through changes in price-setting behaviour.

Public attitudes to monetary policy and satisfaction with the Bank (by Rashmi Harimohan and Rosey Jeffery). The Bank of England's success in achieving its monetary policy objectives will depend, in part, on the public's awareness and understanding of monetary policy. In order to gauge the extent of this understanding, the Bank conducts a regular survey of households' attitudes to monetary policy and satisfaction with the Bank. This article presents the results from the latest surveys. The results suggest that the public's awareness and understanding of the setting of interest rates has changed little since the survey began in 1999. But the February 2012 survey indicates that the MPC's asset purchase programme, commonly referred to as quantitative easing (QE), is less well understood. Since the onset of the financial crisis, satisfaction with the way in which the Bank has

set interest rates to control inflation has fallen. A number of factors may have affected satisfaction, including concerns about the economic outlook. Public satisfaction with the Bank remains positive, although it has been more volatile over the past few quarters than previously observed.

Using changes in auction maturity sectors to help identify the impact of QE on gilt yields (by Ryan Banerjee, Sebastiano Daros, David Latto and Nick McLaren). Between March 2009 and May 2012, the Bank of England's large-scale asset purchases — also referred to as quantitative easing (QE) — have totalled £325 billion. There are a number of channels through which these asset purchases feed through to spending and inflation in the economy, but the first leg of many of those channels is the impact of asset purchases on gilt yields. Identifying the impact of QE on gilt yields has, however, become increasingly difficult as MPC announcements about the amount of assets the Bank intends to purchase are now widely anticipated by financial markets, based on economic news and data releases. The article in this edition tries to overcome this identification problem by using three 'natural experiments' associated with operational changes that contained news about the distribution of future gilt purchases (that is, those in March 2009, August 2009 and February 2012). This approach can be used to identify one of the channels through which QE affects gilt yields known as the local supply channel. The results in this article show that the local supply channel is significant and is estimated to account for around a half of the reduction in gilt yields due to QE. And the strength of this channel has remained broadly constant since QE was introduced in 2009.

UK labour productivity since the onset of the crisis — an international and historical perspective (by Abigail Hughes and Jumana Saleheen). Measured labour productivity in the United Kingdom has been persistently weak since the 2008/09 recession. Understanding whether this has arisen because of a demand shortfall or whether it has been accompanied by a fall in underlying productivity (and hence the supply potential of the economy), is a central issue for policymakers. This article compares the United Kingdom's productivity experience following this recession to that of other advanced economies, and to historic episodes of financial crisis. It finds that persistently weak labour productivity is not a feature of previous financial crises, but has been a feature of the recent crisis for a number of economies including the United Kingdom. An examination of productivity performance by industrial sector reveals that the weakness in the United Kingdom is concentrated in the energy and service sectors.

Considering the continuity of payments for customers in a bank's recovery or resolution (by Emma Carter). Payment systems (such as Bacs and Cheque and Credit Clearing) play a crucial role in the economy. They are the systems that allow payments to be made between different parties via their banks. When a bank is operating under normal conditions, these payments generally flow seamlessly between banks' customers. But when a bank gets into financial difficulty or even fails, maintaining the ability for customers to make and receive payments is critical for the financial stability of the economy. During past bank resolutions the impact on continuity of payments for customers has been minimised. To ensure that this continues to be the case in the future, the Bank of England has been working with the payment schemes and the banks to consider challenges that payment systems may face during future bank recovery or resolution processes. This article highlights some areas where changes could be made so that payments schemes and banks, in conjunction with the authorities, are best prepared for future recovery and resolution scenarios.

Report (pages 159–63)

A review of the work of the London Foreign Exchange Joint Standing Committee in 2011. This edition also includes a review of the work of the London Foreign Exchange Joint Standing Committee during 2011. 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.

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.

Contents

Recent economic and financial developments

Markets and operations Box Asset purchases Box Operations within the Sterling Monetary Framework and other market operations	100 102 106
Research and analysis	
How has the risk to inflation from inflation expectations evolved?	114
Public attitudes to monetary policy and satisfaction with the Bank Box How to find out more about quantitative easing	124 127
Using changes in auction maturity sectors to help identify the impact of QE on gilt yields Box The rationale behind the changes in gilt auction maturity sectors Box Estimating the local supply surprise for February 2012	129 132 134
UK labour productivity since the onset of the crisis — an international and historical perspective Box Is the productivity puzzle evident elsewhere?	138 144
Considering the continuity of payments for customers in a bank's recovery or resolution Box The Bank of England's role in payments Box The Special Resolution Regime objectives and tools	147 149 151
 Summaries of recent Bank of England working papers Non-rational expectations and the transmission mechanism Misperceptions, heterogeneous expectations and macroeconomic dynamics Forecasting UK GDP growth, inflation and interest rates under structural change: a comparison of models with time-varying parameters 	154 154 155 156
 Neutral technology shocks and employment dynamics: results based on an RBC identification scheme Fixed interest rates over finite horizons 	157 158

Report

A review of the work of the London Foreign Exchange Joint Standing Committee in 2011	
Speeches	
Bank of England speeches	166
Appendices	
Contents of recent Quarterly Bulletins	174
Bank of England publications	176

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

Author of articles can be contacted at forename.surname@bankofengland.co.uk

The speeches contained in the *Bulletin* can be found at www.bankofengland.co.uk/publications/Pages/speeches/default.aspx

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.

PROMISE

Recent economic and financial developments

Markets and operations

This article reviews developments in sterling financial markets, including the Bank's official operations, between the 2012 Q1 *Quarterly Bulletin* and 31 May 2012.⁽¹⁾ The article also summarises market intelligence on selected topical issues relating to market functioning.

Sterling financial markets

Overview

Financial market sentiment deteriorated markedly over the review period amid renewed concerns about the vulnerabilities associated with the indebtedness and competitiveness of several euro-area economies. Concerns had intensified after inconclusive Greek elections on 6 May reignited fears of a disorderly resolution of euro-area tensions and as a result of increased investor worries about the resilience of certain euro-area banking systems.

The deterioration in financial market sentiment led to falls in the prices of assets considered most risky, and flows into government bonds of countries considered to be relatively safe. Yields on bonds issued by Germany, the United States and the United Kingdom fell to historically low levels. By contrast the yields on sovereign bonds of euro-area economies perceived by markets to be particularly vulnerable rose considerably. Against this backdrop, the euro depreciated. This accounted for most of sterling's appreciation over the review period.

Debt issuance by banks slowed as measures of longer-term funding costs increased. In contrast, gross issuance by non-financial corporates remained stronger than in recent years.

After the end of the review period, the Bank announced that it would activate the Extended Collateral Term Repo Facility launched in December 2011 as a contingency liquidity facility designed to respond to actual or prospective market-wide stress of an exceptional nature.⁽²⁾ And the Governor of the Bank of England announced that the Bank and the Treasury are working together on a 'funding for lending' scheme that would provide funding to banks for an extended period of several years, at rates below current market rates and linked to the performance of banks in sustaining or expanding their lending to the UK non-financial sector during the present period of heightened uncertainty.⁽³⁾

Monetary policy and short-term interest rates

The Bank of England's Monetary Policy Committee (MPC) maintained Bank Rate at 0.5% throughout the review period. In early May, the Bank completed the extra asset purchases announced by the MPC in February 2012, taking the stock of purchased assets to £325 billion. The MPC voted to maintain the size of its asset purchase programme at this level at each of its meetings during the review period. The asset purchase programme is described in the box on pages 102–03.

According to contacts, market participants pushed back their expectations for the timing of an increase in Bank Rate and placed some weight on the possibility that Bank Rate might be cut below 0.5%. Consistent with this, sterling short-term overnight index swap (OIS) rates fell over the review period (Chart 1). Contacts attributed the moves largely to a combination of weaker UK economic data and the implications for the UK economy of growing concerns about the outlook in the euro area.





(a) Instantaneous forward rates derived from the Bank's OIS curves

(1) The data cut-off for the previous Bulletin was 9 March 2012.

²⁾ Further details are available at

www.bankofengland.co.uk/markets/Documents/marketnotice120615.pdf. (3) See the speech by Sir Mervyn King at the Lord Mayor's Banquet for Bankers and

Merchants of the City of London at the Mansion House on 14 June 2012 available at www.bankofengland.co.uk/publications/Documents/speeches/2012/speech587.pdf.

A Reuters poll released at the end of the review period showed that a majority of the economists surveyed did not expect the MPC to expand the stock of asset purchases beyond £325 billion. The same poll continued to indicate that the median expectation was for no increase in Bank Rate over the period covered by the survey, which ended in 2013 Q4.

Overnight sterling interest rates, most notably secured rates, lay slightly below Bank Rate for most of the review period (Chart 2). Contacts continued to attribute the downward pressure on secured interest rates to elevated demand for high-quality collateral, as well as an ongoing structural shift towards secured lending. The Bank's operations within the Sterling Monetary Framework and other market operations are described in the box on pages 106–07.

Chart 2 Spread to Bank Rate of weighted average sterling overnight interest rates



Sources: Bloomberg and Bank calculations

Elsewhere, the Governing Council of the European Central Bank (ECB) kept its main policy rate at 1% throughout the review period. The reintensification of concerns about the vulnerabilities associated with the indebtedness and competitiveness of several euro-area economies, however, led to market participants lowering their expectations for future policy rates. Consistent with that, forward euro OIS rates fell at all maturities (**Chart 1**).

In the United States, the Federal Open Market Committee (FOMC) continued to indicate that economic conditions were likely to warrant exceptionally low levels for the federal funds rate at least until late 2014. At their April meeting, FOMC participants lowered their projections for economic growth in 2013 and 2014. Consistent with that changed outlook, and continuing strains in global financial markets, forward US dollar OIS rates fell at longer horizons. The Federal Reserve continued to extend the average maturity of its holdings of securities and to reinvest principal payments from its holdings of both agency mortgage-backed securities and agency debt into agency mortgage-backed securities.

Long-term interest rates

Concerns about euro-area developments also affected longer-term interest rates. Sovereign bond spreads over German government bond yields rose in Spain and Italy (Chart 3). Contacts attributed this in part to the effects of a further deterioration in growth prospects on fiscal positions, and concerns about the Spanish banking sector. Greek sovereign bond spreads fell sharply at the start of the review period following agreement on private sector involvement in debt restructuring, but rose subsequently reflecting political uncertainty after inconclusive elections in May.





(a) Yields to maturity on ten-year benchmark government bonds.(b) Yield to maturity on the nine-year benchmark government bond

During the review period international authorities acted to increase the resources available for financial assistance. At the end of March, euro-area Finance Ministers (the Eurogroup) agreed to raise the combined lending ceiling of the temporary European Financial Stability Facility (EFSF) and the permanent European Stability Mechanism (ESM) from €500 billion to €700 billion. And on 20 April, the IMF and the G20 made a joint statement announcing that there were firm commitments to increase the resources available to the IMF by more than US\$430 billion. These resources would be available for the whole membership of the IMF, and were not earmarked for any particular region. Contacts noted a muted reaction to these announcements in financial markets.

Against the backdrop of increased uncertainty about euro-area developments, demand for sovereign bonds that were perceived as more liquid or carrying less credit risk — including those of the United Kingdom, United States and Germany — increased. This contributed to significant declines in the yields of those bonds, which reached historically low levels (Chart 4).

Asset purchases(1)

During the review period, the Bank completed the purchases of gilts mandated by the Monetary Policy Committee (MPC) in February 2012 to increase the size of the programme from £275 billion to £325 billion.⁽²⁾ The MPC voted to maintain the size of the asset purchase programme, financed by the issuance of central bank reserves, at £325 billion at each of its meetings during the review period.

Purchases of high-quality private sector assets financed by the issuance of Treasury bills and the Debt Management Office's (DMO's) cash management operations continued, in line with the arrangements announced on 29 January 2009.⁽³⁾

Table 1 summarises asset purchases by type of asset.

Gilts

Prior to the current review period, on 9 February 2012, the MPC had decided to increase the scale of the programme of asset purchases from £275 billion to £325 billion. On 12 April 2012, the Bank announced that, in light of ongoing sales of assets from the Asset Purchase Facility's corporate bond portfolio, originally financed by the issuance of central bank reserves, the size of the gilt purchase operations during April and early May would be adjusted to ensure that the MPC's target for asset purchases of £325 billion was met by its May meeting. Consequently, total gilt purchases since the February MPC meeting were £51.5 billion, rather than £50.0 billion. The Bank completed these purchases on 2 May 2012.

Table 1 Asset Purchase Facility transactions by type (£ millions)

There were 22 gilt auctions between 9 March 2012 and 2 May 2012. Cover in these auctions varied, and averaged 2.5 in the 3–7 year maturity auctions, 2.5 in the 7–15 year maturity auctions and 2.2 in the auctions for gilts with a maturity greater than 15 years.⁽⁴⁾

In line with previous APF gilt purchases, the Bank continued to exclude gilts in which the Bank held a large proportion (more than 70%) of the free float.⁽⁵⁾

The total amount of gilts purchased since the start of the asset purchase programme in March 2009 in terms of the amount paid to sellers was £325 billion, of which £85.6 billion of purchases were in the 3–7 year residual maturity range, £106.8 billion in the 7–15 year residual maturity range and £132.4 billion with a residual maturity greater than 15 years (Chart A).

Gilt lending facility(6)

The Bank continued to offer to lend some of its gilt holdings via the DMO in return for other UK government collateral. In the three months to 30 March 2012, a daily average of £497 million of gilts was lent as part of the gilt lending facility. This was below the average of £1,640 million in the previous quarter.

Corporate bonds

The Bank continued to offer to purchase and sell corporate bonds via the Corporate Bond Secondary Market Scheme, with

	5 51 (•				.(1)
Week ending ^(a) Secu	red commercial	Gilts	Cor	porate bond		Total ^(D)
	paper		Purchases		Sales	
8 March 2012 ^{(c)(d)}	0	291,270		400		291,670
15 March 2012	0	4,500	0		30	4,470
22 March 2012	0	3,000	0		11	2,989
29 March 2012	0	4,500	0		10	4,490
5 April 2012	0	4,500	0		0	4,500
12 April 2012	0	3,000	0		0	3,000
19 April 2012	0	4,500	0		3	4,497
26 April 2012	0	4,800	0		12	4,788
3 May 2012	0	4,685	0		18	4,667
10 May 2012	0	0	0		22	-22
17 May 2012	0	0	0		16	-16
24 May 2012	0	0	0		2	-2
31 May 2012	0	0	0		0	0
Total financed by a deposit from the DMO ^{(d)(e}	.)	-		67		67
Total financed by central bank reserves ^{(d)(e)}	-	324,753		194		324,947
Total asset purchases ^{(d)(e)}	-	324,753		261		325,014

(a) Week-ended amounts are for purchases in terms of the proceeds paid to counterparties, and for sales in terms of the value at which the Bank initially purchased the securities. All amounts are 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) Measured as amount outstanding as at 8 March 2012.
 (d) In terms of proceeds paid to counterparties less redemptions at initial purchase price on a settled basis.
 (e) Data may not sum due to assets maturing over the period and/or due to rounding.



Chart A Cumulative gilt purchases^(a) by maturity^(b)

(a) Proceeds paid to counterparties on a settled basis (b) Residual maturity as at the date of purchase

purchases financed by the issue of Treasury bills and the DMO's cash management operations. The Scheme continued to serve a backstop role, particularly during periods of market uncertainty.

Net sales of corporate bonds increased during the review period. As of 31 May 2012, the Bank's portfolio totalled £261 million, in terms of amount paid to sellers, compared to £400 million at the end of the previous review period. The

Chart 4 International nominal government bond yields(a)(b)



Source: Global Financial Data

(a) Month-end observations (b) Yields to maturity on ten-year benchmark government bonds.

In the United Kingdom, where nominal gilt yields fell across all maturities, contacts also attributed part of this fall to both the Bank's gilt purchases and a deterioration in the economic outlook. For most of the review period changes in nominal yields were largely accounted for by changes in real yields. But towards the end of the review period measures of

increase in net sales reflected market conditions: the Bank's market contacts reported that continued end-investor demand for corporate bonds and a low level of inventories held by dealers had resulted in demand to purchase bonds from the Corporate Bond Scheme.

Secured commercial paper facility

The Bank continued to offer to purchase secured commercial paper (SCP) backed by underlying assets that are short term and provide credit to companies or consumers that support economic activity in the United Kingdom.⁽⁷⁾ The facility remained open during the review period but no purchases were made.

- (2) For further information, see the 9 February Market Notice, available at
- www.bankofengland.co.uk/markets/Documents/marketnotice120209.pdf. (3) The APF was initially authorised to purchase private sector assets financed by Treasury bills and the DMO's cash management operations. Its remit was extended to enable the Facility to be used as a monetary policy tool on 3 March 2009. All purchases of assets between 6 March 2009 and 4 February 2010 were financed by , central bank reserves. All purchases of private sector assets since 4 February 2010 have been financed by the issuance of Treasury bills and the DMO's cash management operations. All purchases of gilts since 10 October 2011 have been financed by central bank reserves. The Chancellor's letter is available at
- www.hm-treasury.gov.uk/d/chx_letter_090212.pdf. (4) Further details of individual operations are available at
- www.bankofengland.co.uk/markets/Pages/apf/gilts/results.aspx.
- The 8% 2021 gilt was excluded from all operations over the period for this reason. For more details on the gilt lending facility see the box 'Gilt lending facility' in the
- Bank of England Quarterly Bulletin, Vol. 50, No. 4, page 253. (7) The SCP facility is described in more detail in the Market Notice available at www.bankofengland.co.uk/markets/Documents/marketnotice090730.pdf.

Chart 5 UK implied five-year RPI inflation rate, five years forward



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

UK breakeven inflation rates also fell markedly (Chart 5). Contacts attributed this to a number of factors mostly specific to the index-linked gilt market, rather than a reassessment of UK inflation prospects. Consistent with that, the fall in implied inflation derived from swaps was more muted.

⁽¹⁾ For further discussion on asset purchases see the Asset Purchase Facility Quarterly Report available at www.bankofengland.co.uk/publications/Pages/other/markets/ apf/quarterlyreport.aspx.

Bank funding markets

Bank funding markets were also affected by concerns about euro-area developments. For example, banks' CDS premia — a measure of longer-term wholesale funding costs for banks rose markedly over the review period, approaching the levels they had reached in late 2011 prior to the ECB's longer-term refinancing operations (LTROs) (Chart 6).

Chart 6 Selected international banks' CDS premia^(a)



Sources: Markit Group Limited and Bank calculations.

(a) Unweighted averages of five-year, senior CDS prices.

(b) Average of Banco Santander, BBVA, BNP Paribas, Crédit Agricole, Credit Suisse Deutsche Bank, Société Générale, UBS and UniCredit.

(c) Average of Bank of America, Citi, Goldman Sachs, JPMorgan Chase & Co. and Morgan Stanley.

(d) Average of Barclays, HSBC, Lloyds Banking Group, Nationwide, Royal Bank of Scotland and Santander UK.

Secured and unsecured bank debt issuance in public markets has fallen since the end of 2012 Q1 (Chart 7). The period did, however, see the first AA-rated RMBS issuance in the UK public market since 2007; contacts noted that issuers had hitherto considered the cost of issuing RMBS below AAA as prohibitive. During the review period, there was also the first issuance under the Government National Loan Guarantee Scheme (NLGS).⁽¹⁾

Contacts noted a number of factors, that had contributed to the slowdown in public debt issuance. In addition to the deterioration in market conditions in response to growing concerns about euro-area developments, contacts emphasised that many institutions were ahead of their funding plans for the year following strong issuance in the first quarter. Banks were also expected to raise less term wholesale funding than in 2011 given plans to reduce the size of their balance sheets and increase their reliance on retail deposits. Against that backdrop, contacts expected banks to have greater freedom to issue debt opportunistically in response to market conditions.

While bank debt issuance in public markets slowed over the review period, contacts noted that private issuance, which is an important source of funding for banks, had remained robust. Contacts thought that this reflected the bespoke nature of the private market, which allows issuers and investors to tailor debt instruments to match their preferences.

Chart 7 Term issuance by European (including UK) lenders in public markets



(a) Commercial and residential mortgage-backed securities
 (b) Medium-term notes.

(b) Medium-term notes. (c) Asset-backed securities

One measure of conditions in short-term funding markets is the spread of the London interbank offered rate (Libor) over OIS rates of a similar maturity. Recent trends in Libor-OIS spreads differed across currencies, for example, euro spreads continued to fall back from the highs they had reached in the second half of 2011, but sterling spreads remained little changed, at somewhat higher levels than observed in early 2011 (Chart 8).





(a) Three-month Libor-OIS spreads derived from Libor fixings and OIS rates.

(b) Forward spreads derived using data as at 31 May. The squares are implied forward spreads using forward Libors derived from forward rate agreements, and forward OIS rates derived from the OIS curve.

The NLGS allows banks to issue guaranteed unsecured debt to enable them to lend to small businesses at a lower cost than would otherwise be the case. More detail on the NLGS can be found at www.hm-treasury.gov.uk/nlgs.

Contacts cited a number of possible explanations for the divergence between sterling and euro Libor-OIS spreads. In particular, contacts pointed to the impact of the ECB's two LTROs, which had markedly increased the supply of euros in the market. But the subdued volume of interbank lending in the sterling market was also thought to be a factor. In addition, pricing in foreign exchange swap markets implied that banks that could borrow in either euro or sterling faced similar short-term unsecured funding costs in either currency. Nonetheless, contacts recognised that these factors may not provide a full explanation for the persistently elevated level of sterling Libor-OIS spreads.

On 15 June 2012, after the end of the review period, the Bank announced that it would activate the Extended Collateral Term Repo Facility, providing sterling liquidity with a term of six months against collateral pre-positioned for use in the Bank's Discount Window Facility. The minimum bid rate in these auctions would be a spread to Bank Rate of 25 basis points. The first operation would be held on 20 June 2012.⁽¹⁾ Immediately following the announcement, forward sterling Libor-OIS spreads fell.

Conditions in short-term US dollar funding markets for European banks improved a little further: the difference between the cost of raising US dollar funding by borrowing in euro and swapping via the foreign exchange market and the cost of direct US dollar borrowing fell by 10 basis points.

During the review period, credit rating agencies downgraded a number of bank ratings. Many of these downgrades were part of Moody's previously announced banking sector review. The immediate response in financial markets was relatively muted. Contacts thought this in part reflected the fact that Moody's reviews had been pre-announced, banks had taken mitigating actions and that some investors and asset managers were expected to respond to the downgrades by adapting their internal ratings criteria.

At the end of the review period, Moody's review of banks with global capital market operations, which included several UK and US banks, had not been concluded.

Corporate capital markets

International equity indices fell substantially over the review period, reversing many of the increases observed earlier in the year (Chart 9). There were, however, differences across regions, with the S&P 500 falling by less than other indices.

According to contacts the falls in equity prices reflected a reduction in risk appetite and a downward revision in growth prospects associated largely with the renewed concerns about euro-area developments. Contacts reported that, relative to elsewhere, US equity prices had been supported by US economic data.

Chart 9 International equity indices^{(a)(b)}



(a) Indices are quoted in domestic currency terms, except for the MSCI Emerging Markets index,

which is quoted in US dollar terms. (b) The MSCI Emerging Markets index is a capitalisation-weighted index that monitors the

performance of stocks in emerging markets

In the United Kingdom, falls in equity prices were broad-based, but most pronounced in the basic materials and oil and gas sectors (Chart 10). In part, this reflected falls across a range of commodity prices, with, for example, Brent crude oil prices falling by 17.3% in sterling terms.





Sources: Bloomberg and Bank calculations

In corporate bond markets, the yields on investment-grade non-financial corporate bonds were little changed, while those on non-investment grade corporate bonds rose (Chart 11). Contacts largely attributed this rise to a reduction in investors' risk appetite.

Gross issuance by UK private non-financial corporations (PNFCs) in corporate bond markets remained stronger than in

www.bankofengland.co.uk/markets/Documents/marketnotice120615.pdf.

⁽¹⁾ Further details are available at

Operations within the Sterling Monetary Framework and other market operations

The level of central bank reserves continued to be determined by (i) the stock of reserves injected via the Asset Purchase Facility (APF), (ii) the level of reserves supplied by long-term repo open market operations (OMOs) and (iii) the net impact of other sterling ('autonomous factor') flows across the Bank's balance sheet. This box describes the Bank's operations within the Sterling Monetary Framework over the review period, and other market operations. The box on pages 102–03 provides more detail on the APF.

Operational Standing Facilities

Since 5 March 2009, the rate paid on the Operational Standing Deposit Facility has been zero, while all reserves account balances have been remunerated at Bank Rate. Reflecting this, average use of the deposit facility was £0 million in each of the maintenance periods under review. Average use of the lending facility was also £0 million throughout the period.

Indexed long-term repo OMOs

As part of its provision of liquidity insurance to the banking system, the Bank conducts indexed long-term repo (ILTR) operations. The Bank offers reserves via ILTRs once each calendar month; typically, the Bank will conduct two operations with a three-month maturity and one operation with a six-month maturity in each calendar quarter. Participants are able to borrow against two different sets of collateral. One set corresponds with securities eligible in the Bank's short-term repo operations ('narrow collateral'), and the other set contains a broader class of high-quality debt securities that, in the Bank's judgement, trade in liquid markets ('wider collateral').

The Bank offered ± 5 billion via three-month ILTR operations on both 13 March and 10 April, and ± 2.5 billion via a six-month operation on 15 May (**Table 1**).

The stop-out spread — the difference between clearing spreads for wider and narrow collateral — is an indicator of potential stress in the sterling short-term money market. The stop-out spread reached a new low for three-month operations in the March and April ILTRs, falling to 6 basis points in both operations. In the May six-month operation, there were no bids against narrow collateral, hence the clearing spread for wider collateral — 15 basis points was the stop-out spread. This was also the lowest stop-out spread in any six-month ILTR operation to date.

The cover ratios — also a potential indicator of stress in the sterling short-term money market — continued to fall, setting a new low of 0.07 for three-month operations in the March

Table 1 Indexed long-term repo operations

	Total	Collateral se	Collateral set summary		
		Narrow	Wider		
13 March 2012 (three-month maturity)					
On offer (£ millions)	5,000				
Total bids received (£ millions) ^(a)	365	5	360		
Amount allocated (£ millions)	365	5	360		
Cover	0.07	0.00	0.07		
Clearing spread above Bank Rate (basis points)		1	7		
Stop-out spread (basis points) ^(b)	6				
10 April 2012 (three-month maturity)					
On offer (£ millions)	5,000				
Total bids received (£ millions) ^(a)	435	200	235		
Amount allocated (£ millions)	335	200	135		
Cover	0.09	0.04	0.05		
Clearing spread above Bank Rate (basis points)		4	10		
Stop-out spread (basis points) ^(b)	6				
15 May 2012 (six-month maturity)					
On offer (£ millions)	2,500				
Total bids received (£ millions) ^(a)	600	0	600		
Amount allocated (£ millions)	175	0	175		
Cover	0.24	0	0.24		
Clearing spread above Bank Rate (basis points)		n.a.	15		
Stop-out spread (basis points) ^(b)	15				

(a) Due to the treatment of paired bids, the sum of bids received by collateral set may not equal total bids

(b) Difference between clearing spreads for wider and narrow collateral.

Chart A ILTR allocation and clearing spreads



ILTR. The cover ratio of 0.24 in the May operation equalled the low set in the previous six-month operation in February (Chart A).

There are a number of possible reasons for the low demand seen from banks for three and six-month liquidity via the ILTR

operations. First, short-term secured market interest rates remain below Bank Rate, making repo markets a potentially cheaper source of liquidity. Second, the APF asset purchase programme and the ECB's three-year longer-term refinancing operations (LTROs) supplied liquidity to the banking system, which may have reduced the need for counterparties to use the ILTR operations to meet their short-term liquidity needs.

Reserves provided via ILTRs during the review period were more than offset by the maturity of loans provided in previous ILTR operations. Consequently, the stock of liquidity provided through these operations declined.

Discount Window Facility

The Discount Window Facility (DWF) provides liquidity insurance to the banking system by allowing eligible banks to borrow gilts against a wide range of collateral. On 3 April 2012, the Bank announced that the average daily amount outstanding in the DWF between 1 October and 31 December 2011, lent with a maturity of 30 days or less, was £0 million. The Bank also announced that the average daily amount outstanding in the DWF between 1 October and 31 December 2010, lent with a maturity of more than 30 days, was £0 million.

The Bank encourages banks to pre-position collateral for potential use in the DWF, so that there would not be a need to assess the collateral at short notice in the event of a sudden and unexpected request to borrow from the DWF. The Bank reported that banks had pre-positioned collateral with a total lendable value of around £160 billion in the DWF as of 29 March 2012.⁽¹⁾

Extended Collateral Term Repo Facility

The Extended Collateral Term Repo Facility is a contingent liquidity facility, designed to mitigate risks to financial stability arising from a market-wide shortage of short-term sterling liquidity.⁽²⁾ As of 31 May 2012, no operations under the Facility had been announced.

Other operations

US dollar repo operations

On 11 May 2010, the Bank reintroduced weekly fixed-rate tenders with a seven-day maturity to offer US dollar liquidity, in co-ordination with other central banks, in response to renewed strains in the short-term funding market for US dollars. As of 31 May 2012, there had been no use of the Bank's facility.

On 30 November 2011, the Bank announced, in co-ordination with the Bank of Canada, the Bank of Japan, the ECB, the Swiss National Bank, and the Federal Reserve, that the authorisation of the existing temporary US dollar swap arrangements had been extended to 1 February 2013, that 84-day US dollar tenders would continue until this time, and that seven-day operations would continue until further notice. It also announced that the central banks had agreed to lower the pricing on the US dollar swap arrangements by 50 basis points to the US dollar overnight index swap rate plus 50 basis points. As a contingency measure, the six central banks agreed to establish a network of temporary bilateral liquidity swap arrangements that will be available until 1 February 2013.

Bank of England balance sheet: capital portfolio

The Bank holds an investment portfolio that is approximately the same size as its capital and reserves (net of equity holdings, for example in the Bank for International Settlements, and the Bank's physical assets) and aggregate cash ratio deposits. The portfolio consists of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity; nevertheless sales may be made from time to time, reflecting for example, risk management, liquidity management or changes in investment policy.

The portfolio currently includes around £3.5 billion of gilts and £0.4 billion of other debt securities. Over the review period, gilt purchases were made in accordance with the quarterly announcements on 3 January and 2 April 2012.

See the speech by Paul Fisher, 'Liquidity support from the Bank of England: the Discount Window Facility', 29 March 2012, available at

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech561.pdf. (2) Further details are available at

www.bankofengland.co.uk/markets/Pages/money/ectr/index.aspx.





Sources: Bank of America/Merrill Lynch and Bank calculations

(a) Dashed lines: 1997-2007 averages for investment-grade bonds and 1998-2007 averages for non-investment grade bonds

recent years, albeit concentrated in the investment-grade segment of the market since the start of April (Chart 12). Contacts noted that corporate bond issuance had been supported by a number of factors. Despite a pickup in corporate bond spreads, the level of yields on investment-grade bonds remained low. Corporates had also reportedly pre-funded upcoming redemptions to guard against the risk that corporate bond issuance became more difficult later in the year and the risk that access to bank credit became scarcer. Meanwhile, PNFCs' share buybacks continued to outstrip equity issuance.





Sources: Dealogic and Bank calculations.

Foreign exchange

The sterling exchange rate index (ERI) appreciated by 2.5% over the review period (Chart 13). Most of sterling's appreciation over the review period was accounted for by an increase in value against the euro. Against the US dollar sterling appreciated during the first half of the review period





Sources: Bloomberg and Bank calculations

but subsequently depreciated to end the review period 2% lower.

Contacts suggested that sterling's appreciation largely reflected market concerns about developments in the euro area, which had resulted in some flows out of the euro and into sterling-denominated assets. Sterling had also responded to perceptions of the future path of UK monetary policy; the sterling ERI rose following the publication of the April MPC minutes, but fell following the release of the May Inflation Report. Towards the end of the review period, contacts reported that some investors had sold sterling to realise profits on their trading positions, contributing to the sterling ERI falling back a little.

Market-based measures suggested that the balance of risk to the value of sterling was to the upside; information derived from options markets implied that investors were placing an increasing weight on a large appreciation of sterling against the euro relative to a large depreciation (Chart 14).





Sources: Bloomberg, British Bankers' Association and Bank calculations

(a) Returns are defined as the logarithmic difference between the current forward rate and the

(b) The simplified sterling ERI places 70% weight on the euro-sterling bilateral exchange rate and 30% weight on the US dollar-sterling bilateral exchange rate.

Developments in market structure

This section describes two recent developments in market structure. First, it describes the development of Standardised Credit Support Annexes used in over-the-counter derivatives transactions, using market intelligence gathered from a wide range of contacts. And second, it describes recent changes to intraday liquidity provision by the Bank of England in the CREST system.

Standardised Credit Support Annexes

Credit Support Annexes (CSAs) relate to derivatives contracts that are agreed and settled bilaterally between two counterparties (rather than via an exchange or trading platform). Such over-the-counter (OTC) derivatives make up the majority of derivatives trades between banks and end-users, such as corporates and asset managers.

Over time, the value of a derivative trade will change as, for example, market prices change. This creates a so-called mark-to-market gain or loss and exposes the counterparty with a positive mark-to-market position to counterparty credit risk. Such counterparty credit risk is usually managed via collateralisation of the mark-to-market position.⁽¹⁾ This requires regular flows of collateral between the two counterparties depending on how the mark-to-market position changes — this is known as margining.

The rules around collateralising OTC derivatives are set out within the CSA which forms part of the International Swaps and Derivatives Association (ISDA) Master Agreement defining the trading relationship between two counterparties. The primary purpose of CSAs is to mitigate counterparty credit risk, through collateralisation. This section describes CSAs, and the remaining challenges a Standardised CSA (SCSA) is designed to address.

Role of CSAs

CSAs outline:

- The type of collateral that each counterparty can provide as security to cover the net mark-to-market position of OTC derivatives.
- How frequently positions are margined.
- Whether thresholds exist for calling additional margin collateral.

Contacts note that there are a wide variety of CSAs in existence because they are negotiated bilaterally between individual counterparties and are tailored to suit specific requirements; often particular to the time the CSA was agreed.⁽²⁾ In many cases, CSAs give the counterparty that has a negative mark-to-market value the option to choose which collateral to deliver from a defined list of several types of collateral.

Challenges with current CSAs

Counterparties are not indifferent when it comes to what collateral they receive. Consequently, the range of collateral defined in the CSA can affect the valuation of OTC derivatives. For example, when a bank trades an interest rate swap with a client it will normally enter into an offsetting trade in the interbank market, to hedge its market risk. This offsetting trade would also usually be subject to a collateralisation agreement. If the interest rate swap has positive mark-to-market value for the bank, the client will have to provide collateral as set out in the CSA. The bank can typically use the collateral it receives from the client to collateralise the offsetting trade, which should have a negative mark-to-market value.

If the collateral on the two trades match, the bank has no additional costs of trading. But if the CSA allows the client to post collateral that the bank cannot use to collateralise its offsetting trade, the bank would need to use repo and/or FX swap markets to convert the collateral received into the collateral it is allowed to deliver.⁽³⁾ This can change the bank's expected profit and loss, and hence the value of the swap.

Where optionality to provide different types of collateral exists it creates uncertainty about the future profit and loss. This uncertainty is most significant where there is an option to provide collateral in different currencies. Estimating the value of this optionality is very complex. It involves forecasting the expected future mark-to-market value of the swap, which collateral will likely be delivered at different points in time, and the estimated future costs of converting collateral in repo and/or FX swap markets.

According to contacts, some banks have tried to address this problem by charging clients for this collateral option. But differences in assumptions and pricing methodology mean that OTC derivatives with different CSAs are not always priced consistently by market participants. This can lead to disputes about the valuation of derivatives, and consequently make it more difficult to cancel a trade or find an external party to 'step in' and take the client's place at an agreed price so-called 'novation'. Where counterparties cannot agree a value to cancel or novate existing derivatives, they may trade new, offsetting swaps with other counterparties instead. This increases the interconnectedness of the financial system.

A formal industry initiative to deal with the valuation problems created by collateral optionality is under way through ISDA's proposed SCSA.

ISDA undertakes an annual survey providing information on the use of collateral in the OTC derivatives market. Surveys can be found at www2.isda.org/functional-areas/research/surveys/margin-surveys.

⁽²⁾ CSAs are not always symmetric; in some cases, only one of the counterparties is required to post collateral on positions that are out-of-the-money, so-called one-way CSAs.

⁽³⁾ Alternatively, the bank could use other CSA-eligible collateral it has available on its balance sheet. But this has an opportunity cost, as that collateral cannot therefore be used for other purposes.

Description of SCSA

Under the SCSA, counterparties collateralise the mark-to-market value of their OTC derivatives daily with cash, rather than securities. The SCSA provides that the two counterparties agree on a single currency to settle the daily cash collateral transfer; a so-called 'transport' currency. The cash to be used as collateral is computed so that it is equal to the mark-to-market value of the OTC derivatives in each currency, before being converted to a net amount in the transport currency. Having a single transport currency eliminates potential foreign exchange settlement risk arising from paying cash margin in different currencies at different times.⁽¹⁾

Interest must be paid on cash collateral. Under an SCSA this interest is paid at the overnight unsecured interest rate for the underlying currency components, rather than the transport currency. Contacts expect both parties will likely want to use the FX swap market to reconvert the transport currency into the individual currencies for which they have derivative positions and upon which they will accrue and pay the overnight interest. Operationalising this, however, is complex given the additional daily trades involved.

Once converted back to the individual currencies, the counterparty has achieved effectively the same cash collateral and interest flows as would have been the case if cash collateral had been provided separately for derivatives in each currency. This replicates the margining process at many central clearing houses, including LCH.Clearnet Ltd, which require that cash be posted as variation margin in the currency of the underlying OTC derivative trade.

Once the cost of the FX swaps is taken into account, the counterparty receiving cash collateral should, in theory, be indifferent between receiving collateral in the individual currencies, or the single transport currency.

Benefits and risks associated with an SCSA

As the collateralisation in an SCSA no longer affects the profit associated with each trade, derivatives should be simpler to value. Pricing should be more transparent. When market participants want to trade OTC derivatives, any difference in pricing between counterparties should therefore largely reflect only the relative competitiveness of each counterparty to win the trade (ie differences in bid-offer spreads).

With more consistent valuation, it is easier to agree on the mark-to-market value of OTC derivatives positions. This in turn makes it easier for counterparties to cancel or novate existing swaps, meaning counterparties are less likely to enter into offsetting trades with third parties. The SCSA should therefore reduce the frictions involved in eliminating offsetting OTC derivatives positions between counterparties and should contribute to reduced gross OTC derivatives exposures. In turn, this should reduce financial interconnectedness and the potential financial stability fragilities that can arise from this.

Costs associated with an SCSA

While the SCSA offers significant benefits to market participants, it also comes with costs. For instance, contacts expected FX swaps will likely be used to convert the transport currency into the individual currencies, potentially requiring users of the SCSA to devote greater resources to their trading and settlement functions. There may also be greater operational risk stemming from these transactions.

Contacts expect that take-up of the SCSA by non-bank participants will be modest, at least initially. Non-banks often only have small cash balances available, so there may be resource costs involved in setting up new or enlarged FX swap and repo trading functions. Some contacts also believe the added complexity of the SCSA — specifically around the conversion of the transport currency — may deter some non-bank investors from adopting it.

Banks are initially expected to be the main OTC derivatives participants to use the SCSA. Banks are the largest users of OTC derivatives, and have established platforms for trading FX swaps and repos. Contacts expect that the benefits to banks will likely outweigh the costs involved.

Changes to intraday liquidity provision in the CREST system

In order to facilitate the efficient settlement of payments and securities trades, the Bank provides central bank money to the banking system intraday — known as 'intraday liquidity'. In doing so, the Bank seeks to minimise counterparty credit risk by lending against high-quality collateral and taking prudent haircuts on the collateral. The Bank seeks in addition to limit the expansion of its intraday balance sheet that arises from the provision of intraday liquidity.

This section describes two ways in which the Bank has worked with infrastructure providers and market participants to limit the value of intraday liquidity provided by the Bank to be no more than is necessary to support orderly settlement in CREST.

Intraday liquidity provision for CREST settlement

In the United Kingdom, transactions in gilts, equities and money market instruments are settled in CREST — a securities settlement system operated by Euroclear UK & Ireland Limited (EUI), the central securities depository. Thirteen market participants provide banking services to the rest of the market to facilitate the settlement of trades: these are known as CREST settlement banks.

Counterparties are exposed to FX settlement risk where they make payment on one leg of a foreign exchange transaction before they receive payment on the other leg.

Since 2001, CREST settlement has operated on a simultaneous delivery versus payment (DvP) basis. This means that when a CREST member settles a securities purchase, a simultaneous transfer of central bank money is made from the purchasing member's settlement bank to the selling member's settlement bank. A CREST settlement bank must have access to central bank money in CREST intraday, in order to honour the payment leg of DvP purchase transactions entered into by that settlement bank's clients.

Settlement banks can use central bank money from their reserves accounts at the Bank to meet these intraday CREST liquidity needs. Where additional central bank money is required in order to settle large DvP payment obligations, the Bank is willing to provide intraday liquidity to settlement banks, in pursuit of its financial stability objective.

The provision of intraday liquidity exposes the Bank to counterparty credit risk. While intraday liquidity is collateralised by high-quality assets with prudent haircuts, there is always a residual risk that market prices would move significantly at times of stress and the Bank may not be able to recover the full value of a loan in a timely manner in the event of a counterparty default; this would complicate the Bank's management of its balance sheet.⁽¹⁾

Such risks are small, but as they are not zero it is prudent for the Bank to limit the creation of intraday liquidity to no more than the amount that is required to support orderly settlement.

Removing the automated oversupply of intraday liquidity

The first way in which intraday liquidity provision is being optimised is a recent change to the technical design of the CREST system.

In order to support the settlement of high-value transactions such as Delivery by Value (DBV) — a collateralised cash lending and borrowing product in CREST — a mechanism to automate intraday liquidity provision was introduced in 2001 with the launch of DvP settlement in CREST. This mechanism, known as 'Auto Collateralising Repo' (ACR), is triggered automatically by the CREST system, providing the necessary additional intraday liquidity to settlement banks in real time to fund the cash settlement leg of a DvP transaction. The ACR mechanism ensures that this intraday liquidity is provided via a repo against eligible collateral and is subject to Bank haircuts.⁽²⁾

Until 23 April 2012, the ACR mechanism was triggered automatically even when the purchasing client's settlement bank already had sufficient liquidity wholly or partly to fund the purchase. Consequently, this supply-driven mechanism consistently generated substantially more liquidity in aggregate than was needed to support settlement needs, leading to a greater expansion of the Bank's intraday balance sheet than was necessary. Technical enhancements launched by EUI on 23 April 2012 mean that the ACR mechanism now only generates intraday liquidity on a demand-driven basis. This change means that intraday liquidity is only provided when a settlement bank would otherwise have insufficient funds to settle the transaction. The oversupply of intraday liquidity inherent in the previous model can therefore no longer occur.

The effect has been a reduction of close to 50% in total ACR liquidity provision to the CREST settlement banks each day (Chart 15), without causing any degradation in securities settlement throughput in CREST. This meets the objective of keeping the supply of intraday liquidity, and associated risks, to a minimum while still supporting efficient settlement.





Further reducing intraday liquidity provision

The second way in which intraday liquidity provision can be reduced is through growth in the use of Term DBV to settle gilt repo.

The majority of the demand for intraday liquidity in CREST arises from daily cash lending and borrowing in the DBV market.

Until 1 July 2011, irrespective of the term of a repo transaction, each trade needed to be settled as a series of overnight DBVs. Since then, market participants entering into a term repo transaction secured against general collateral have had the option to settle term repo trades either as a series of daily 'overnight' DBVs, or as a single Term DBV. Under the Term DBV settlement model, there are no daily cash flows between the opening and closing dates of the Term DBV. In addition to reducing operational risk inherent in the daily settlement of gilt repo, this reduces directly the daily demand

The Bank's collateral risk management is described in a speech by Paul Fisher, 'Central bank policy on collateral', available at

www.bankofengland.co.uk/publications/Documents/speeches/2011/speech491.pdf. (2) Gilts, Treasury bills or Bank of England bills.

for intraday liquidity (supplied in practice by ACR), compared with the settlement of daily unwinds and re-inputs under the overnight DBV settlement model.⁽¹⁾

At end-May 2012, approximately 4% of total DBV settlement value in CREST was Term DBV (the remainder being overnight DBV). This suggests that many genuinely term transactions are still being settled as overnight DBVs. Market intelligence suggests an impediment to greater use of Term DBV is that at present no central counterparty service provider can centrally clear the transactions. LCH.Clearnet Ltd is working with its clients and with EUI to schedule the development of a new centrally cleared Term DBV product. It is expected that the use of Term DBV could rise further when the new product is introduced.

Given the risk-reduction benefits of widespread market adoption of Term DBV, the Bank is supportive of further growth in the use of this method of settlement and the steps that will facilitate this outcome.⁽²⁾

⁽¹⁾ The 'Markets and operations' article in the 2011 Q3 *Quarterly Bulletin* described the introduction of the CREST 'Term DBV' service in July 2011 (pages 197–98).

⁽²⁾ See the speech by Chris Salmon on 5 July 2011, 'The case for more CHAPS settlement banks', available at

www.bankofengland.co.uk/publications/Documents/speeches/2011/speech508.pdf, and the Market Notice, available at

www.bankofengland.co.uk/markets/Documents/marketnotice110615.pdf.

Research and analysis

PROMISE

How has the risk to inflation from inflation expectations evolved?

By Rashmi Harimohan of the Bank's Monetary Assessment and Strategy Division.⁽¹⁾

During 2011, the Monetary Policy Committee expressed concern that persistently above-target outturns of CPI inflation might lead to inflation expectations becoming less well anchored by monetary policy. And in turn, that could make inflation itself more persistent via changes in price-setting or wage-setting behaviour. But inflation is now more than 2 percentage points lower than in September 2011. In light of that, this article discusses recent movements in inflation expectations and looks at a range of indicators to assess how the risk to inflation from expectations has evolved. While the upside risk has receded a little relative to the 2010–11 H1 period, so long as inflation is above target, some risk remains.

Introduction

Inflation, as measured by the consumer prices index (CPI), has been more than 1 percentage point above the 2% target set by the Government for much of the past four years. That largely reflects the temporary effects of a range of factors: rising food and energy prices, changes in the standard rate of VAT and higher import prices following the substantial depreciation in sterling.

As inflation rose between 2010 and 2011 H1, the Monetary Policy Committee (MPC) became increasingly concerned that a continued period of above-target inflation might prompt households, companies and financial market participants to expect inflation to persist above the target. That might happen if individuals believed that the MPC had become more tolerant of deviations of inflation from target in the near term. Or if they had doubts about the ability, or willingness, of the MPC to return inflation to target in the medium term. Either would suggest that expectations of inflation had become less well anchored by the monetary policy framework. If inflation expectations were to become less well anchored, changes in price-setting or wage-setting behaviour, or both, may lead inflation itself to become more persistent. As a result, during 2011, the MPC judged there was an upside risk to inflation from inflation expectations.

Following its rise between 2010 and 2011 H1, CPI inflation has fallen from its peak of 5.2% in September 2011 to 3.0% in April 2012.⁽²⁾ That fall has been accompanied by declines in some measures of households' inflation expectations (**Chart 1** and **Chart 5**). Companies' inflation expectations and financial market implied measures of future inflation have also fallen relative to the 2010–11 H1 period. The outlook for inflation is

Chart 1 Inflation and survey measures of household inflation expectations



(a) The last data point is April 2012.
(b) Respondents to the Bank/GfK NOP survey are asked how much they would expect prices in the shops generally to change over the next one, two and five years respectively.

uncertain, but the MPC judges that inflation is likely to remain above target throughout 2012, before falling back during 2013 as the impact of spare capacity pulls down on inflation.⁽³⁾

This article analyses how the upside risk to inflation from inflation expectations has evolved over the past eight months relative to the 2010–11 H1 period. A previous article in the 2011 Q2 *Quarterly Bulletin* set out a framework for assessing the risk to inflation from inflation expectations.⁽⁴⁾ This article applies that framework to recent developments, and is structured as follows. The first section assesses the extent to

(4) See Macallan, O'Grady and Taylor (2011).

⁽¹⁾ The author would like to thank Alice Pugh for her help in producing this article.

⁽²⁾ This analysis was done before the release of the May 2012 CPI outturn.

⁽³⁾ For the MPC's latest assessment of the outlook for inflation, see Section 5 of the May 2012 Inflation Report.

				P	er cent		
	Time horizon	Start of data	Series average	2010	2011 H1	2011 H2	2012 H1
Surveys of hou	ıseholds						
Bank/GfK NOP	5 years	Feb. 2009	3.2	3.2	3.4	3.5	3.4
Barclays Basix	5 years	Aug. 2008	3.9	3.8	3.7	4.0	4.0
YouGov/Citigro	oup 5–10 years	Nov. 2005	3.4	3.3	3.6	3.6	3.4
Surveys of pro	fessional forecast	ers					
Bank	3 years	May 2006	2.0	2.0	2.1	2.1	2.1
HM Treasury	4 years	Mar. 2006	2.1	2.2	2.1	2.2	2.4
Measures deriv	Measures derived from financial instruments ^(a)						
Swaps	Five-year, five-year forward	Oct. 2004	2.5	2.7	2.6	2.5	2.5
Gilts	Five-year, five-year forward	Jan. 1996 ^(b)	2.4	2.8	2.9	2.3	2.4
Memo:							
CPI		Jan. 1996	2.1	3.3	4.3	4.7	3.4

Sources: Bank/GfK NOP, Barclays Capital, Bloomberg, Citigroup, HM Treasury, ONS, YouGov and Bank calculations.

(a) Financial instruments are linked to RPI inflation. The measures shown assume that market participants expect RPI inflation to be 0.8 percentage points higher than CPI inflation in the long term, around the average size of the difference between RPI and CPI over 1996–2012. But there is considerable uncertainty over financial market participants' estimates of that difference. That means that actual CPI expectations may differ from these figures. The average for 2012 H1 is taken as the average of daily prices between 1 January 2012 and 31 May 2012.

(b) The series for five-year, five-year forward RPI inflation derived from gilts, started in January 1985. But for the purpose of this table, the series average is taken over 1996–2012 to be consistent with the start of the CPI data.

which long-term and short-term expectations remain well anchored. The second section evaluates the latest evidence on the extent to which inflation expectations have affected wage and price-setting behaviour. The final section concludes.

Assessing the extent to which expectations remain anchored

Inflation expectations could become less well anchored in two ways. First, households, companies and financial market participants may become less confident in the ability, or willingness, of the MPC to bring inflation back to target in the medium to long term. Second, they may perceive the MPC to have become more tolerant of deviations in inflation from target in the near term, and, therefore, expect inflation to return towards the target more slowly. The former would be signalled by changes in longer-term expectations, and the latter would be reflected in shorter-term measures. This section therefore reviews movements in both longer-term and shorter-term expectations over the past eight months to assess how the upside risk to inflation from inflation expectations has evolved relative to 2010–11 H1.

Longer-term expectations

If inflation expectations were to become less well anchored to the inflation target in the longer term, then this might become evident in at least one of three ways: the level of inflation expectations might deviate from target; inflation expectations might become more responsive to developments in the economy; and uncertainty around expected future inflation might increase.

If the level of longer-term inflation expectations deviates far from the inflation target, it might indicate that individuals have less confidence in inflation coming back to target in the long term. The MPC monitors a range of measures of longer-term inflation expectations, including expectations taken from surveys of households, forecasts by professional economists, and estimates derived from inflation-indexed instruments in financial markets.⁽¹⁾ The annex describes these available survey measures in more detail.

The level of longer-term inflation expectations appears to suggest that the upside risk from longer-term expectations has not crystallised (**Table A**). All measures of longer-term expectations are either at, or just above, their series averages.⁽²⁾ But the household surveys have relatively short backruns of data: for two of the surveys, the series averages are calculated over a period when inflation had been well above target. Perhaps more reassuring, inflation expectations as measured by the YouGov/Citigroup survey (which goes back further) are in line with their series averages. While inflation expectations have fallen or stayed the same for many of these measures, two of the measures have risen slightly relative to the 2010–11 H1 period.

A second way to gauge the extent to which longer-term expectations are well anchored is to test the responsiveness of these measures to developments in the economy. In an environment of well-anchored expectations, news in economic variables such as CPI, RPI, GDP and industrial production, should not affect individuals' expectations of inflation in the long term. But if inflation expectations were to become less well anchored, then they might become more responsive to news in such data.⁽³⁾ Moreover, longer-term inflation expectations might also become more closely correlated with shorter-term expectations if individuals believed that factors affecting inflation in the short term would also have an effect on inflation in the long term.⁽⁴⁾

In financial markets, there are few signs that implied measures of longer-term expectations have become more responsive to developments in the economy over the past eight months. Between 2004 and 2007, when inflation had been close to target, longer-term measures of expectations tended to respond very little to news in CPI, RPI, GDP and industrial

⁽¹⁾ Companies' inflation expectations are not available beyond the one-year horizon.

⁽²⁾ But as discussed in Macallan, O'Grady and Taylor (2011), there are uncertainties around all of these indicators. For example, none of the surveys of households reference a specific inflation measure. It is therefore not clear what measure of inflation households have in mind when answering the question. And estimates derived from financial market instruments may be influenced by market-specific factors, such as liquidity or demand from pension funds for index-linked cash flows. See McGrath and Windle (2006).

⁽³⁾ See Gürkaynak, Levin and Swanson (2006).

⁽⁴⁾ But changes in the correlation might also reflect variations in liquidity in the markets for short and long-maturity instruments.

production on the day of the publication of the data. That remained the case during 2010–11 H1 and over the past eight months (Chart 2). While the responsiveness of five-year, five-year forward inflation to news has increased a little in the most recent period, it is statistically insignificant.⁽¹⁾ These estimates are, however, based on small sample sizes and hence there are large uncertainties around them, as indicated by the standard error bars on the chart. The bars cover two standard errors on either side of the regression coefficients estimated over the 2011 H2 to current period.

Chart 2 Estimated average changes in five-year, five-year forward inflation derived from swaps in response to economic news^{(a)(b)(c)}



Sources: Bloomberg, ONS and Bank calculations

(a) Average changes are the estimated slope coefficients from regressions of the change in five-year, five-year forward rates on news in the various economic releases, on the day or which the data were published.

(b) News is defined as the difference between the ONS data outturn and the Bloomberg median forecast. For CPI, RPI and IoP, news is based on monthly data outturns. For GDP, news is

based on quarterly data outturns. (c) The bars cover two standard errors on either side of the estimated slope coefficients over the

2011 H2 to current period (d) Index of Production (IoP). This is the ONS release for industrial production.

Although it is easier to isolate the impact of news on measures of inflation expectations derived from financial markets — as these are available on a daily frequency — the Bank/GfK NOP household survey can also be used to assess the responsiveness of longer-term inflation expectations to CPI news. The sample size of the Bank/GfK survey is boosted in February each year by carrying out the survey in two waves. For the past two years, the first wave has been conducted before the ONS's release of the January inflation outturn, and the second after it. That provides a way to test the responsiveness of households' longer-term inflation expectations to CPI news: changes in households' perceptions of inflation between the two waves are likely to be, in part, related to news in CPI inflation for households.

The annual inflation outturn fell from 4.2% in December 2011 to 3.6% in January 2012, in line with financial market participants' expectations. But households' perceptions of inflation picked up between the two waves in the

February 2012 survey. And five year ahead expectations rose by the same amount as inflation perceptions between the two waves (Table B). That may suggest that households were surprised by the strength of the January CPI release, and that they revised up their longer-term expectations in response to news in actual inflation. But there are many other factors affecting households' inflation expectations. For example, households may have been reacting to movements in food and energy prices in the shops. At the time of the February 2011 survey, the inflation outturn had increased from 3.7% in December 2010 to 4% in January 2011, in line with financial market participants' expectations. Households' perceptions of inflation picked up between the two waves of this survey, although longer-term inflation expectations fell. To sum up, longer-term inflation expectations were positively correlated with inflation perceptions in the two waves of the February 2012 survey. And expectations were negatively correlated with inflation perceptions in the February 2011 survey. But it is hard to assess whether this change in responsiveness of households' inflation expectations is significant as the analysis presented here is based only on two years' worth of data.

Table B Median household inflation expectations in the first and second survey waves of the Q1 Bank/GfK NOP survey

	Inflation pe	rceptions ^(a)	One year ahead ^(a)		Five years ahead ^(a)	
	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2
Feb. 2012 ^(b)	4.7	4.9	3.4	3.6	3.1	3.3
Feb. 2011 ^(c)	4.3	4.5	3.9	4.1	3.6	3.3

Source: Bank/GfK NOP.

(a) The survey asks households how prices in the shops generally have changed over the past twelve months and how they expect them to change over the next one, two and five years, respectively.
(b) The February 2012 survey was conducted between 9–21 February, with the first wave being conducted

(c) The February 2011 survey was conducted between 10–22 February, with the first wave being conducted between 10–15 February and the second wave being conducted after the CPI release on 14 February.

Finally, uncertainty around expected future inflation might rise if individuals become less certain about how the MPC will react to current or future developments in the economy that push inflation away from target. That said, this may not necessarily indicate that inflation expectations are less well anchored: uncertainty could also rise if individuals change their views about the size and persistence of shocks that are likely to affect the economy in the future.

Uncertainty can reveal itself in one of two ways: greater uncertainty for any one individual about the range of possible outcomes, or greater disagreement across individuals about what inflation is likely to be.⁽²⁾ Different indicators can be used to monitor each type of uncertainty. Measures of dispersion across surveys of households and companies provide evidence on the range of views across individuals, but cannot capture individual uncertainty. The Bank of England's

⁽¹⁾ The results are similar for the reaction of implied measures of long-term inflation expectations derived from gilts, rather than swaps.

⁽²⁾ For more on uncertainty and disagreement, see Boero, Smith and Wallis (2008).

survey of external forecasters provides evidence on individual uncertainty, because it asks each forecaster to attach specific probabilities to a range of different outcomes for future inflation. It also contains information about the range of views across market participants. And option prices, which can be used to estimate the weight that market participants collectively attach to different future inflation outturns, are likely to contain information about both.

Uncertainty around professional forecasters' longer-term inflation expectations was broadly stable during 2004-07 when CPI inflation had been close to target (Chart 3).⁽¹⁾ But between 2008 and 2011 H1, there was a significant rise in both professional forecasters' and option-implied uncertainty around future inflation. And both these measures have remained elevated over the past eight months. But that does not necessarily mean that individuals doubt the MPC's ability to bring inflation back to target. The volatility in inflation over the past few years may have led individuals to reassess their expectations of shocks to future inflation.⁽²⁾





Sources: Bank of England, Bloomberg and Bank calculatio

- (a) Professional forecasters' uncertainty is calculated as the average probability that inflation will be more than 1 percentage point away from target. Calculated from the probability distributions for inflation in the medium term reported by forecasters responding to the Bank's survey. Forecasters reported probability distributions for CPI inflation two years ahead between February 2004 and February 2006; and for CPI inflation three years ahead from 1ay 2006 onwards.
- (b) Standard deviation of the probability distribution of annual RPI outturns for three years (c) Standard deviation of the probability distribution of annual in restance in the standard deviation of the probability distribution of annual in the standard deviation of the probability of the standard deviation of the probability of the standard deviation of t
- and February 2009, it is not possible to construct a full set of probability distributions for that period

While dispersion across households cannot capture individual uncertainty, changes in the distribution of longer-term expectations might shed light on how the upside risk from inflation expectations has evolved over the past eight months. The YouGov/Citigroup survey, which is the longest-running survey of households' longer-term inflation expectations, suggests that the upside risk from inflation expectations appears to have receded a little in the past eight months. According to the survey responses, the proportion of households who think that inflation will be above 3% has

fallen a little (Chart 4). And for the Bank/GfK NOP and Barclays Basix surveys, the proportion of households who expect inflation to be greater than 3% has remained broadly constant, and in line with their series averages.

Chart 4 Distribution of households' inflation expectations in the long term(a)(b)



Source: YouGov/Citigroup

(a) The YouGov/Citigroup survey started in November 2005 and is the longest-running survey of

 (a) The foldow range of a start at a start develop over the next five to ten years

Shorter-term expectations

Even if longer-term expectations remain anchored, people might believe that it will take the MPC longer to get inflation back to target following a temporary deviation from target. That might manifest itself in at least one of three ways: movements in short-term inflation expectations may not be consistent with developments in the economy; individuals might place less weight on the target while forming expectations; and short-term inflation expectations might become more responsive to news.

Near-term inflation expectations have fallen across a range of measures relative to the 2010-11 H1 period. Households' near-term expectations are much lower than their 2011 peaks (Chart 5). And this has been accompanied by a fall back in companies' expectations as well (Chart 10). An indicator of the extent to which these short-term inflation expectations are well anchored is to test whether movements in inflation expectations are warranted by other developments in the economy. For example, inflation expectations could rise/fall due to a marked rise/fall in economic activity. While forming their forecasts for inflation, the MPC take into account the determinants of inflation. Therefore, one approach is to compare movements in inflation expectations with the MPC's own forecast for one year ahead inflation.

⁽¹⁾ Option price data are not available prior to 2008 and therefore it is hard to say what level of uncertainty is consistent with inflation expectations being well anchored.

⁽²⁾ Moreover, inflation option-implied uncertainty is likely to have been amplified by financial market participants' desire for protection against extreme inflation outcomes





(a) See the annex for the precise questions asked in these household surveys.

During the 2010–11 H1 period, one year ahead inflation expectations rose across a range of measures but the movements in these expectations were closely correlated with movements in the MPC's own one year ahead forecast. The fall in households' and professional forecasters' one year ahead inflation expectations also appear to be broadly in line with the downward revisions to the MPC's forecast, from Autumn 2011 to 2012 Q2 (Chart 6). Companies' inflation expectations, as measured by the expected average change in the general level of prices, have also fallen relative to the peak in the series in the 2010–11 H1 period.

Chart 6 MPC's one year ahead forecast and inflation expectations for a year ahead



Sources: Bank/GfK NOP, Bank of England, Barclays Basix, Citigroup, Confederation of British Industry (CBI) and YouG

- (a) Averages from 2006 Q1 for households. Averages from 2006 Q2 for professional forecasters
- and from 2008 Q2 for companies. Averages from 2004 Q1 for MPC forecasts. (b) Companies CBI data for the manufacturing, business/consumer services and distribution sectors, weighted together using nominal shares in value added. Companies are asked about the expected percentage price change over the coming twelve months in the markets in which they compete.
- (c) Households based on averages of expectations for inflation from the Barclays Basix (d) Hostroids and YouGov/Citigroup surveys. These surveys do not reference a specific price index and are based on the median estimated price change.
 (d) Professionals — based on expectations of CPI inflation from the Bank of England survey.
- (e) The MPC measure is based on modal projections under market interest rat

An alternative approach to gauge whether movements in shorter-term expectations are consistent with developments in the economy is to use a statistical model, such as a structural vector autoregression (SVAR). The SVAR approach involves estimating a system of equations where each variable is regressed on past movements of itself and other variables in the model. That can then be used to decompose changes in each variable into an 'explained' component and an 'unexplained' component, under specific identifying assumptions. The 'explained' component of the inflation expectations equation can be thought of as the component that can be explained by past outturns of all variables in the model, in this case inflation expectations, GDP, wages, CPI inflation, Bank Rate and real oil prices. And the 'unexplained' component can be thought of as shocks to inflation expectations that cannot be explained by these factors.⁽¹⁾

While the unexplained component of the model has fallen slightly relative to the 2010–11 H1 period, it remains positive (Chart 7). That suggests that one year ahead expectations have been higher than can be explained by variables in the model. To the extent that this persists, it might suggest that inflation may return more slowly towards the target than it otherwise would. Alternatively, the unexplained component might be picking up the effect of factors omitted from the model.

Chart 7 SVAR model estimate of the unexplained component of one year ahead inflation expectations^{(a)(b)}



Sources: Bank/GfK NOP, Barclays Basix, Bloomberg, ONS and Bank calculations

(a) The SVAR model includes: CPI inflation, GDP growth, Bank Rate, wages, real oil prices and one year ahead inflation expectation. The model is estimated using data from 1987 Q3 to 2012 Q2. The inflation expectation series is based on the Barclays Basix estimate until 2009 O4 and the Bank/GfK estimate from 2010 O1 onwards. The Bank/GfK measure has been spliced to abstract from the recent volatility in the Barclays Basix measure. (b) With thanks to James Cloyne, who helped with this analysis.

A second way to gauge if shorter-term inflation expectations had become less well anchored, is to test if individuals were placing less weight on the inflation target while forming their expectations. The Bank/GfK NOP survey asks households which factors are important in forming their one year ahead expectations of inflation. The latest survey suggests that households continue to take account of a range of factors.

(1) For a fuller explanation of how inflation expectations shocks can be identified using an SVAR, see Barnett, Groen and Mumtaz (2010).

Although the proportion of households putting weight on the inflation target is less than those putting weight on other factors, it has remained fairly constant over time (**Chart 8**).

Chart 8 Factors cited by households as important when forming their one year ahead inflation expectations^(a)



Source: Bank/GfK NOP

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

Finally, if shorter-term inflation expectations were to become less well anchored, then, similar to long-term expectations, they might become more responsive to news in data such as CPI and RPI. Financial market implied measures of inflation expectations at the one-year horizon have become a little less responsive to CPI news over the past eight months but expectations have become more responsive at the two-year horizon (Chart 9). And expectations have become more responsive to RPI news at both the one and two-year horizons over the past eight months. But, as in the case of longer-term expectations, these differences are statistically insignificant.⁽¹⁾ They are also based on small sample sizes, so it is hard to conclude that responsiveness of near-term expectations has increased over the past eight months.

To conclude, it seems that the upside risk from longer-term inflation expectations — a belief that the MPC is less able, or willing, to return inflation to target in the longer term — has not crystallised. Despite the elevated level of longer-term uncertainty, most measures of inflation expectations are either at, or just above, their historical averages. And the near-term element of the upside risk — a belief that the MPC has become more tolerant of deviations of inflation from target — appears, if anything, to have receded a little. Shorter-term expectations have fallen over the past eight months and the inflation target continues to be an important factor in forming households' inflation expectations. But despite the tick down in the unexplained component of one year ahead inflation expectations, estimated using an SVAR, it remains positive.

Chart 9 Estimated average changes in instantaneous forward inflation rates derived from swaps in response to CPI and RPI news ${}^{(a)(b)(c)}$



Sources: Bloomberg, ONS and Bank calculations

 (a) Average changes are the estimated slope coefficients from regressions of the change in instantaneous forward inflation rates at each horizon on news in the CPI and RPI releases, on the day on which the data were published.
 (b) News is defined as the difference between the ONS data outturn and the Bloomberg median

b) News is defined as the difference between the ONS data outturn and the Bloomberg median forecast.

(c) The bars cover two standard errors on either side of the estimated slope coefficients over the 2011 H2 to current period.

And some risk remains so long as inflation remains above target.

Assessing price and wage-setting behaviour

If inflation expectations were to become less well anchored, inflation itself might become more persistent. That might materialise through changes in price or wage-setting behaviour, or both. Against the backdrop of declines in some measures of inflation expectations over the past eight months, this section assesses the extent to which past inflation expectations have fed, or are feeding through, into prices and wages. While evidence on price and wage-setting behaviour is limited, this section looks at the range of available indicators.

Price-setting behaviour

If companies' inflation expectations were to become less well anchored, that might lead to changes in price-setting behaviour, and result in inflation being persistently away from target. For example, if companies think that inflation will be higher in the future, they might raise the price of their own goods and services by more than they otherwise would.

Indicators of companies' pricing intentions are limited. Surveys of businesses, such as those conducted by the British Chambers of Commerce (BCC) and Confederation of British Industry (CBI), are the main source of evidence. The CBI survey asks respondents how they expect their own output prices and

The results are broadly similar when looking at the responsiveness to IoP and GDP news.

their competitors' prices to change over the next twelve months. And the BCC survey asks respondents about their price expectations over the next three months.

Survey estimates show that companies expected their own prices and the general level of prices to rise only modestly and less than they did in 2010–11 H1. The CBI survey shows that the fall in companies' pricing intentions (as measured by their own price expectations) has been accompanied by a fall in companies' general inflation expectations (as measured by the expected average change in the general level of prices) since 2010 (Chart 10). And the net percentage balance of companies in the BCC survey expecting to raise their own prices in the following three months has also fallen over the same period (Chart 11).

Chart 10 Companies' expected changes to prices over the next twelve months



Sources: CBI and ONS.

 (a) Companies are asked: 'What percentage change is expected to occur over the next twelve months in your own average output price for goods sold into UK markets?'
 (b) Companies are asked: 'What percentage change is expected to occur over the next twelve months in the general level of prices in the markets that you compete in?'.

Chart 11 BCC survey measures of companies' price expectations versus cost expectations



Sources: BCC, ONS and Bank calculations

(a) The exact question on price expectations is 'Over the next three months, do you expect the price of your goods/services to: increase/remain the same/decrease?'.
(b) The exact question on wage cost expectations is 'Is your business currently suffering

- pressures to raise prices from pay settlements?'.
- (c) The exact question on input cost expectations is 'Is your business currently suffering pressures to raise prices from raw material prices?'.

It is hard, however, to assess whether there has been a causal link from companies' general inflation expectations to their own pricing intentions. For example, companies may plan to increase prices because they have experienced higher non-wage costs, like import prices, and they might expect competitors to do the same. That would not necessarily signal that inflation expectations had led to a rise in pricing intentions.

One way to isolate the impact of inflation expectations on companies' price-setting behaviour from other factors like input costs is to assess the extent to which firms are seeking to raise prices relative to those input costs. Responses to the BCC survey suggest that the net balance of respondents expecting prices to rise is above its long-run average (Chart 11). But the net balance of respondents expecting prices to rise is less than those who are facing increased pressure to raise prices from higher raw material prices. That could suggest that above-average price expectations are being driven by higher raw material prices, rather than less well-anchored inflation expectations.

An alternative way to assess how companies' inflation expectations are affecting price-setting is to look at the rate of inflation of goods and services in sectors that change their prices infrequently. If a company changes its prices only once in a while, then the prices that it sets are more likely to depend on its expectations for future inflation. That means that changes in the prices of these 'sticky price' goods and services might provide some information about companies' expectations of future inflation.⁽¹⁾ The average inflation rate





Sources: ONS and Bank calculations.

(a) The CPI basket is divided into twelve subcomponents, based on the classification of individual consumption according to purpose categories. These twelve subcomponents were divided between flexible and sticky price sectors based on the frequency at which the prices of different types of goods and services change. These frequencies were calculated from the price quotes that underpin the monthly CPI, which the ONS makes available to researchers via its secure Virtual Mircodata Laboratory (described in Ritchie (2008)). The flexible price sector comprises those components of the basket in which prices on average change more regularly than the median frequency and the sticky price sector comprises those components of the Dasket in which prices on average change less often than the median frequency. This method is described in more detail in Bunn and Ellis (2011). The sticky price series excludes utility prices, which are more likely to be changed due to changes in gas and other commodity prices rater than developments in the wider economy. Both the flexible and sticky price series include the impact of VAT.

(1) For more information about this method see Bryan and Meyer (2010).

of goods and services with sticky prices had remained broadly stable during the 2010–11 H1 period, and in the past eight months. Moreover, it remains close to 2%, its average level since 1997. That may indicate that companies do not expect inflation to remain above target (Chart 12).

To conclude, companies' inflation expectations and pricing intentions have fallen over the past eight months. But it is hard to know for sure whether or not past rises in companies' expectations have affected price-setting behaviour.

Wage-setting behaviour

This section assesses the extent to which higher inflation expectations in the past have fed into wage-setting behaviour. Inflation expectations may affect wage-setting in one of two ways. First, if households expect higher inflation, they might push for higher wages. And an increase in labour costs might put pressure on companies to raise prices. Second, if companies expect higher prices in the future, they might be willing to grant higher wages, in particular, if they thought that an erosion in real wages may affect their ability to retain and mobilise their workforce. Higher wages might then in turn create further inflationary pressure by boosting spending. Inflation expectations are not the only factor affecting wages, however. For example, companies may pay higher wages if employees become more productive. Or a fall in unemployment might push up wages because it reduces the pool of employees a company can look to use in place of their current employees.

Surveys of households and companies may help to isolate the impact of inflation expectations on wages. For example, the Bank/GfK NOP survey asks households whether they are planning to push for higher pay with their current employer in light of their inflation expectations. And the CBI survey asks companies if they are likely to increase wages on account of higher inflation expectations. The Bank/GfK NOP survey continues to suggest that a low proportion of households are pushing for higher pay in light of their inflation expectations (Chart 13).

According to the CBI survey, companies do not appear to have become more willing to pay higher wages because they expect to be able to recoup those costs by raising prices. If companies expected above-target inflation to persist and were therefore more willing to allow higher wages, then that might result in a high correlation between changes in companies' expectations of own prices and general prices and changes in their expectations of wage costs in the data. Over the past year, the correlation between companies' price expectations and wage expectations continues to be weak, as in the 2010–11 H1 period (Chart 14) and has dropped further in the latest survey.

To conclude, private sector wage growth continues to be weak.⁽¹⁾ This could be accounted for by factors other than

Chart 13 Working households' planned actions in light of their short-term inflation expectations^(a)



Source: Bank/GfK NOP.

(a) Respondents to the Bank/GfK survey were asked which actions they are taking, or planning to take, in light of their expectations of price changes over the next twelve months. The list included four actions in addition to those shown on the chart: bring forward major purchases; move savings out of banks or building societies into other assets such as shares, bonds, housing or gold; other (unspecified); and take no action. Respondents could select up to three actions.





Sources: CBI (all rights reserved) and Bank calculations

inflation expectations like labour market slack and/or weak productivity.⁽²⁾ But there is little evidence that households have been pushing up wage demands in response to elevated inflation expectations, or that firms have been more willing to grant them.

Conclusion

During 2011, the MPC became increasingly concerned that a sustained period of above-target inflation might lead inflation

For a fuller discussion of the factors driving wage growth, see the May 2012 Inflation Report.

⁽²⁾ For descriptive analysis of the recent weakness in UK labour productivity, see Hughes and Saleheen (2012).

expectations to become less well anchored to the target. In turn, this could make inflation itself more persistent via changes in price-setting or wage-setting behaviour. At that time, the MPC judged that there was an upside risk to inflation from inflation expectations.

Over the past eight months, inflation has fallen by more than 2 percentage points relative to its 2011 peak. And, on balance, the indicators discussed in this article suggest that the upside risk from inflation expectations may have receded a little relative to Autumn 2011.

The upside risk from longer-term expectations appears to have not crystallised. Despite the elevated level of longer-term uncertainty, most measures of inflation expectations are either at, or just above, their historical averages. The near-term element of the inflation expectations risk appears, if anything, to have receded a little. Shorter-term expectations have fallen over the past eight months and the inflation target continues to be an important factor in forming households' inflation expectations. But while the unexplained component of one year ahead inflation expectations, estimated using an SVAR, has fallen slightly relative to the 2010–11 H1 period, it remains positive.

There are also few signs that past inflation expectations have fed into wages. And while companies' inflation expectations have fallen over the past few months, it is hard to know for sure whether or not past rises in these expectations have affected price-setting behaviour.

Nevertheless even if it is diminished, the upside risk from inflation expectations remains so long as inflation remains above target.

Annex Available indicators of inflation expectations

	Time horizons	Start of data	Survey question/measure of inflation
Surveys of households			
Bank/GfK NOP	1 year 2 and 5 years	Nov. 1999 Feb. 2009	How much would you expect prices in the shops generally to change over the next one, two and five years?
Barclays Basix	1 and 2 years 5 years	Dec. 1986 Aug. 2008	What do you expect the rate of inflation to be over the next twelve months and over the next five years?
YouGov/Citigroup	1 and 5–10 years	Nov. 2005	How do you expect consumer prices of goods and services will develop over the next 1 and 5–10 years, respectively?
Surveys of companies			
BCC	3 months	Feb. 1997	Over the next three months, do you expect the price of your goods/services to increase/remain the same/decrease?
СВІ	1 year	Apr. 2008	What percentage change is expected to occur over the next twelve months in the general level of prices in the markets you compete in?
Surveys of professional forecasters	5		
Bank	1, 2 and 3 years	May 2006	Point forecasts for CPI.
HM Treasury	1, 2, 3 and 4 years	Mar. 2006	Point forecasts for CPI.
Consensus	5–10 years	Oct. 2004	Point forecasts for CPI.
Measures derived from financial ins	struments		
Swaps	1 to 50 years ahead	Oct. 2004	RPI-linked.
Gilts	1 to 50 years ahead	Jan. 1985	RPI-linked.

123

References

Barnett, A, Groen, J and Mumtaz, H (2010), 'Time-varying inflation expectations and economic fluctuations in the United Kingdom: a structural VAR analysis', *Bank of England Working Paper No.* 392.

Boero, B, Smith, J and Wallis, K (2008), 'Uncertainty and disagreement in economic prediction: the Bank of England survey of external forecasters', *The Economic Journal*, Vol. 118, Issue 530, pages 1,107–27.

Bryan, M and Meyer, B (2010), 'Are some prices in the CPI more forward looking than others? We think so', *Federal Reserve Bank of Cleveland Economic Commentary No.* 2010/2.

Bunn, P and Ellis, C (2011), 'How do individual UK consumer prices behave?', Bank of England Working Paper No. 438.

Gürkaynak, R, Levin, A and Swanson, E (2006), 'Does inflation targeting anchor long-run inflation expectations? Evidence from long-term bond yields in the US, UK and Sweden', *Federal Reserve Bank of San Francisco Working Paper No. 2006–09*.

Hughes, A and Saleheen, J (2012), 'UK labour productivity since the onset of the crisis — an international and historical perspective', *Bank of England Quarterly Bulletin*, Vol. 52, No. 2, pages 138–46.

Macallan, C, O'Grady, T and Taylor, T (2011), 'Assessing the risk to inflation from inflation expectations', *Bank of England Quarterly Bulletin*, Vol. 51, No. 2, pages 100–10.

McGrath, G and Windle, R (2006), 'Recent developments in sterling inflation-linked markets', *Bank of England Quarterly Bulletin*, Vol. 46, No. 4, pages 386–96.

Ritchie, F (2008), 'Secure access to confidential microdata: four years of the Virtual Microdata Laboratory', *Economic and Labour Market Review*, Vol. 2, No. 5, pages 29–34.

Public attitudes to monetary policy and satisfaction with the Bank

By Rashmi Harimohan of the Bank's Monetary Assessment and Strategy Division and Rosey Jeffery of the Bank's Public Communications and Information Division.⁽¹⁾

The past few years have been an extraordinary period for the UK economy and monetary policy. This article examines how that has affected households' awareness and understanding of monetary policy. Results from the Bank/GfK NOP survey suggest that public awareness of the policy framework has remained broadly constant throughout the life of the survey, but that the Bank's asset purchase programme appears to be less well understood than the setting of interest rates. Satisfaction with the way the Bank sets interest rates has fallen since the onset of the financial crisis, but remains positive. That may, in part, reflect ongoing concerns about the economic outlook.

Introduction

The Bank of England's monetary policy objective is to maintain price stability. Stable prices are defined by the Government's inflation target, which is currently 2% as measured by the annual change in the consumer prices index (CPI). Subject to that, the Bank is also tasked with supporting the Government's economic objectives, including those for growth and employment.

The Monetary Policy Committee (MPC) has historically sought to achieve its objectives by setting the level of Bank Rate. But in March 2009, the MPC voted to cut Bank Rate to 0.5%, and at that time judged that further reductions would be ineffective at providing additional stimulus to the economy.⁽²⁾ The Committee, therefore, began a programme of asset purchases, financed through the issuance of central bank reserves — commonly referred to as quantitative easing (QE). The purpose of the asset purchases was, and is, to inject money directly into the economy in order to boost nominal demand. Without that extra spending in the economy, the MPC thought that inflation would be more likely than not to undershoot the target in the medium term.⁽³⁾

The Bank's success in meeting its objective of price stability will depend, in part, on the public's understanding of, and support for, the monetary policy framework. If people understand the MPC's objective, then they may behave in such a way that deviations of inflation from target are more short-lived: households, for example, may moderate their wage demands and companies may be less likely to raise prices in response to higher costs.⁽⁴⁾ In recognition of the importance of public understanding in determining the effectiveness of monetary policy, the Bank uses a variety of methods to explain the MPC's role of setting monetary policy to meet the inflation target to the public (such as speeches, academic papers, interviews, op-eds and panel sessions).

The Bank has sought to quantify the impact of its efforts to increase the public's understanding of, and support for, the monetary policy framework. Since 1999, the Bank has commissioned GfK NOP to conduct a survey of households' attitudes to inflation expectations and monetary policy on its behalf.⁽⁵⁾ This article draws on the results from the latest surveys to assess the public's awareness of monetary policy and their satisfaction with the way in which the Bank has set monetary policy to control inflation. In particular, the results are examined in the light of the recent period of low interest rates, expansionary monetary policy and above-target inflation.

Public awareness of monetary policy

The past few years have marked an extraordinary period for the UK economy and monetary policy. GDP growth contracted sharply and deeply during 2008. It gradually picked up between 2009 and 2010. But by late 2011 the prospects for the UK economy had deteriorated, prompting

⁽¹⁾ The authors would like to thank Alice Pugh for her help in producing this article.

⁽²⁾ For more information, see March 2009 MPC minutes.

⁽³⁾ For further discussion of QE, see the box on pages 12–13 of the November 2011 Inflation Report.

⁽⁴⁾ For more information on inflation expectations, see 'How has the risk to inflation from inflation expectations evolved?' in this edition of the *Bulletin*.

⁽⁵⁾ Data from the survey are available on the Bank's website at www.bankofengland.co.uk/publications/Pages/other/nop.aspx. The spreadsheets show the precise wording of the questions.

the MPC to resume its asset purchase programme in October 2011, and again in February 2012. Inflation has been above the 2% target for much of the past four years, hitting a peak of 5.2% in September 2011. More recently, inflation has fallen and annual CPI inflation stood at 3% in April 2012. Output has been broadly flat since early 2011, and growth is likely to remain subdued in the near term (see the May 2012 Inflation Report).

Public awareness of the United Kingdom's monetary policy framework has been broadly constant over time. The percentage of respondents who are able to name, unprompted, the MPC or the Bank of England as the group that sets the United Kingdom's basic interest rate level has remained at around 35%–40% since the survey began. And throughout the life of the survey, around 70% have selected the Bank of England as the group that sets interest rates when asked to choose from a list which includes, among others, government ministers and high street banks.

The level of understanding among households of the way in which monetary policy affects inflation — the transmission mechanism of monetary policy — also appears to have been broadly constant over time, although it dropped slightly in the February 2012 survey.⁽¹⁾ According to the standard view in economics, a rise in Bank Rate would be unlikely to affect inflation immediately because many wage and price decisions would already have been made. But a higher level of Bank Rate would tend to push down inflation one or two years ahead, for example by reducing demand and weakening companies' ability to charge higher prices. That view is shared by some respondents to the Bank/GfK NOP survey. Around 35% of households surveyed in February 2012 either agreed or strongly agreed with the statement that 'a rise in interest rates would make prices in the high street rise more slowly in the medium term — say a year or two'. But that is a slightly smaller proportion than in recent years.

The Bank/GfK NOP survey monitors public awareness of interest rate changes in the past and going forward. Households are asked how they think interest rates on things like mortgages, bank loans and savings have changed over the preceding twelve months. From May 2010 to May 2012, the biggest group of respondents (around one third in each survey) said that interest rates had remained the same. That could, in part, reflect the fact that Bank Rate has remained at 0.5% over this period. The number of respondents saying that interest rates had risen, increased in the most recent survey. That might, in part, reflect the slight pickup in average rates paid on outstanding deposits (ie effective deposit rates) over the past twelve months. It may also reflect the recent rises in interest rates charged on new mortgages, even though interest rates on outstanding borrowing (ie effective loan rates) have fallen over the past twelve months. Overall, the net balance of respondents who thought interest rates had risen over the past year increased in the most recent survey (Chart 1).

Chart 1 Interest rate perceptions and effective household interest rates



Sources: Bank of England and Bank/GfK NOP survey

(a) Percentage of respondents who thought that interest rates had risen over the past year less

the percentage who thought that rates had fallen. Data are quarterly observations. (b) Effective loan rate is the three-month average of household secured and unsecured

borrowing effective stock rates weighted by the outstanding balances

(c) Effective deposit rate is the three-month average of household time and sight deposit effective stock rates weighted by the outstanding balances.

(d) Bank Rate is the three-month average

Households' expectations of future interest rates have varied somewhat over the past year. The net balance of respondents expecting a rise in interest rates over the subsequent twelve months fell from 50% in May 2011 to around 35% more recently (**Chart 2**). That may, in part, reflect the deterioration in economic prospects over the past year, and the recent fall in CPI inflation. Around a third of households expect interest rates to stay the same over the next twelve months. That is in line with financial market implied measures of expected interest rates which are also broadly flat over that time frame (see Chart 1.1 of the May 2012 Inflation Report).





(a) Percentage of respondents who thought that interest rates would rise less the percentage who thought that rates would fal

(1) These questions are asked only once a year, in February

To gauge the public's awareness of the primary objective of the programme of asset purchases announced by the MPC in October 2011 and February 2012, a new question was included in the February 2012 survey. As previously stated, the primary objective of asset purchases is to stop inflation from falling below the target in the medium term. Selecting from a list of options, around 26% of respondents thought that the primary objective of the expansion in QE was to increase confidence in the UK economy (Table A). That is reassuring in that confidence in the economy is necessary for achieving the primary objective of QE. But only 9% of households thought that the primary objective was to stop inflation falling below target in the future. Thirty-six per cent of respondents answered 'don't know' to this question. The MPC has agreed that explaining QE should continue to be an important area for the Bank's communication strategy. The box on page 127 describes how to find out more about QE.

Table A Perceptions of the primary objective of quantitative easing^(a)

Objective	Percentage of respondents
Stop inflation falling below target in the future	9
Increase access to finance for companies/households	9
Increase confidence in the UK economy	26
Support the UK Government	6
Support the UK banking system	10
None of these	5
Don't know	36

Source: Bank/GfK NOP survey

(a) Respondents to the February 2012 Bank/GfK NOP survey were asked what they thought was the primary objective of the increases in the MPC's asset purchase programme in October 2011 and February 2012. They were given a range of options as outlined in the above table.

Satisfaction with the Bank

The latest survey results show that satisfaction with the Bank remains positive. More respondents to the survey were satisfied with the Bank than were dissatisfied. But satisfaction is lower than it was before the onset of the financial crisis. It has also been more volatile in the past few quarters than has been observed previously. Net satisfaction dipped in November 2011 to a survey low, but remained positive. It picked up in February 2012, when the net balance of households satisfied with the Bank was around 20%. But in the most recent survey, satisfaction dropped again to 11%. This subsection looks at the factors which might be driving these movements in households' satisfaction with the Bank.

Households' satisfaction with the way in which the Bank has set interest rates to control inflation has tended to be lower when their perceptions of the current rate of inflation have been higher. Across time, changes in net satisfaction have broadly mirrored changes in household perceptions of changes in prices over the past twelve months, as reported in the same survey (Chart 3).

Chart 3 Satisfaction with the Bank and inflation perceptions



(a) The percentage of respondents who were fairly or very satisfied with the way in which the Bank of England is doing its job to set interest rates in order to control inflation, less the percentage who were fairly or very dissatified

percentage who were fairly or very dissatisfied. (b) Respondents were asked how they thought prices had changed over the past twelve months

Households' satisfaction with the Bank has also been related to their perceptions of monetary policy. Historically, those households who have perceived interest rates to have stayed the same or fallen, have been — on average — more satisfied with the Bank. Satisfaction was also higher among respondents who thought QE either boosts confidence in the UK economy or stops inflation falling below target in the future (Chart 4).





(a) The 'Other' bar includes all the other options households could choose from: increase access to finance for companies and/or households, support the UK Government, support the UK banking system, none of these and don't know.

But other factors are likely to have pulled down on satisfaction. For example, households may have become less satisfied with the Bank following the financial crisis and the associated weakness in demand (**Chart 5**). Movements in net satisfaction also appear to be closely related to general

How to find out more about quantitative easing

The Bank has actively taken steps to communicate the purpose and implementation of the asset purchase programme, or quantitative easing (QE).

A range of resources are available on the Bank's website, which has a specific section collating all the information about QE.⁽¹⁾ These resources include a short animated film (*Quantitative easing* — *How it works*) and a pamphlet (*Quantitative easing explained*), both produced by the Bank. A page provides the most recent views of the Monetary Policy Committee (MPC) members on some of the more commonly raised questions on QE. These follow up on questions from the media, and also from queries that come into the Bank's Public Information and Enquiries Group. The website also provides specific information about the asset purchase programme for market participants, including a revised version of the 'Red Book',⁽²⁾ which includes a chapter on QE.

Several of the Bank's major publications have contained material explaining QE including two *Quarterly Bulletin*

Chart 5 Satisfaction with the Bank and real GDP

articles, several working papers and regular commentary in the *Inflation Report*, including specific boxes. The minutes of the MPC meetings, which are published two weeks after the monetary policy decision, also provide an account of the reasoning behind the Committee's decision-making.

MPC members seek to explain their actions regularly on an individual basis through speeches, interviews and to parliamentary committees. And they speak to businesses and industries throughout the country several times a year as part of a programme of visits organised in collaboration with the Bank's twelve regional Agents. In 2009, shortly after the MPC embarked on the first tranche of asset purchases, Charlie Bean, Deputy Governor for Monetary Policy, undertook a special programme of visits to explain QE to a wide range of audiences across the country. When QE was voted for by the MPC in March 2009 and in October 2011, the Governor was interviewed by the major broadcasters on the day of the monetary policy decision in order to provide the public with an explanation of the Committee's thinking and actions.

Available at www.bankofengland.co.uk/monetarypolicy/Pages/qe/default.aspx.
 Available at www.bankofengland.co.uk/markets/Pages/sterlingoperations/redbook.aspx



⁽a) Chained-volume measure at market prices.(b) See footnote (a) to Chart 3.

economic sentiment, such as that conveyed in survey measures of consumer confidence (Chart 6).

Conclusion

The level of public awareness of the monetary policy framework has remained broadly constant throughout the life of the survey. But the survey indicates that the effects of QE are less well understood than interest rates. The MPC has

Chart 6 Measures of consumer confidence and net satisfaction with the Bank



(a) See footnote (a) to Chart 3.

(b) Swathe includes: GfK consumer confidence balances on households' own financial situation over the past and future twelve months and expectations of unemployment over the next twelve months. The last data point is based on the average of April and May confidence balances.

agreed that explaining QE should continue to be an important area for the Bank's communication strategy.

Households' understanding of the way in which monetary policy affects inflation appears to have been broadly constant over time. The majority of respondents continue to think that interest rates have remained the same over the past year. And the net balance of respondents expecting a rise in interest rates over the subsequent twelve months fell from 50% in May 2011 to around 35% more recently. A similar proportion of households expect interest rates to stay the same over the next twelve months. That is in line with financial market implied measures of expected interest rates.

Satisfaction with the way in which the Bank has set interest rates to control inflation has fallen since the financial crisis, but

remains positive. It has also been more volatile in the past few quarters than has been observed previously. Following a survey low for satisfaction in November 2011, the net balance picked up in February 2012, but dipped again in May 2012. That may, in part, reflect ongoing concerns about the economic outlook.
Using changes in auction maturity sectors to help identify the impact of QE on gilt yields

By Ryan Banerjee, David Latto and Nick McLaren of the Bank's Macro Financial Analysis Division and Sebastiano Daros of the Bank's Sterling Markets Division.⁽¹⁾

Using the information contained in economic news and data releases, financial markets have widely anticipated recent Monetary Policy Committee announcements about the amount of assets the Bank of England intends to purchase as part of its quantitative easing (QE) policy. This makes it increasingly difficult to identify the impact of QE on gilt yields. This article uses three 'natural experiments' associated with operational changes to the distribution of gilt purchases — in March 2009, August 2009 and February 2012 — to help overcome this identification problem. It finds that the 'local supply' channel, which can be identified using these events, can explain around half of the total impact of QE on gilt yields. The estimates of this effect are broadly similar across the three events; so the strength of this channel of QE does not appear to have changed significantly since gilt purchases were introduced in early 2009.

In March 2009, the Bank of England announced that it would begin a programme of large-scale asset purchases financed using central bank money; a policy widely referred to as quantitative easing (QE). By May 2012 the Bank's purchases totalled £325 billion, almost exclusively in UK government bonds (gilts). The aim of asset purchases is conceptually the same as a cut in Bank Rate: to stimulate nominal spending in order to meet the 2% inflation target in the medium term.

There are a number of channels through which asset purchases might affect spending and inflation.⁽²⁾ The first leg of many of these channels is the impact of asset purchases on gilt yields: purchases by the Bank increase the price of gilts and therefore lower their yields. But identifying this impact on yields has become increasingly difficult as financial markets have begun to anticipate future purchases. This article uses a novel approach to isolate part of the impact of QE on gilt yields, by using 'natural experiments' associated with operational changes that contained news about the distribution of future gilt purchases.

Given that financial markets are forward looking, the majority of the impact of asset purchases on gilt yields is likely to occur when expectations of purchases are formed — rather than when the purchases are actually made.⁽³⁾ Therefore changes in gilt yields will be observed when there is 'news' that changes expectations about future purchases. When QE was first introduced, the policy was unfamiliar to financial market participants. So it is likely that their expectations of the size of asset purchases were formed primarily from Monetary Policy Committee (MPC) announcements about the planned amount of QE purchases. Therefore these initial announcements contained significant news and so could be used to estimate the effect of QE on gilt yields.

Over time, however, gilt market participants have learned how the MPC's QE decisions depend on the United Kingdom's economic outlook. Expectations of gilt purchases are therefore increasingly formed when economic news and data are released, that is, in advance of the MPC announcement itself. Subsequent MPC announcements have thus contained less news about gilt purchases, making it harder to identify the impact of QE on gilt yields from the immediate market reaction to these announcements. Just as with changes in Bank Rate, expectations of policy changes which are already widely anticipated will have little market impact when they are actually announced.

⁽¹⁾ The authors would like to thank Michael Chin and Zhuoshi Liu for their help in producing this article.

⁽²⁾ For a more detailed discussion see the previous Quarterly Bulletin article by Joyce, Tong and Woods (2011).

⁽³⁾ Forthcoming work by Daines, Joyce and Tong (2012) finds that there may have been some impact on yields at the time of purchases during the early stages of QE purchases in 2009. But the majority of the impact was observed when purchases were announced.

This article tries to overcome this identification problem by using the reaction of gilt yields to market notices which contained operational changes to the distribution of gilt purchases that were largely unanticipated. These notices are unlikely to have changed the total amount of gilt purchases market participants were expecting the Bank to make in the future. But the notices did have implications for how these expected purchases were likely to be spread across different groups of gilts. Therefore these events can be used to determine how each gilt's yield changes given a change in the amount of that gilt that is expected to be purchased. Although this does not capture all of the effects of QE on gilt yields, it can help to identify a part of the effect. Furthermore, because the timings of these notices (in March 2009, August 2009 and February 2012) span the period of QE purchases, they can also be used to determine if the strength of this effect has changed over time

The first section of this article outlines the channels through which asset purchases affect gilt yields, and discusses which of these can be identified using these natural experiments. The second section explains how the news in the operational market notices can be quantified. The third section uses a regression approach to investigate the link between this measure of news and the change in yields, to help quantify this part of the impact of QE. The fourth section puts the results into context by comparing them to other work on QE for the United Kingdom and the United States. The final section concludes.

Channels from QE to gilt yields

This section outlines the links between QE and gilt yields, and then explains which of these channels can be identified using the operational market notice events. The link between QE and gilt yields is usually explained by the following effects:

- Local supply: if some investors do not view gilts of different maturities as perfect substitutes (for example, some investors will strongly prefer to hold longer-maturity assets to match their long-dated liabilities) then central bank purchases expected in a specific maturity range can reduce the remaining supply of gilts expected to be available to private sector participants, driving up prices and lowering yields in that part of the yield curve.⁽¹⁾
- Duration:⁽²⁾ if the marginal investor in the market dislikes the risk associated with holding long-maturity assets, then market prices will contain a 'term premium' which will, in part, compensate the holder for bearing this 'duration risk'. Purchases of long-maturity assets, such as long-dated gilts, by the central bank will reduce the aggregate amount of this duration risk remaining in the private market. This reduces the compensation required for investors to hold the remaining bonds. As a result each gilt's term premium will

fall, with the extent of the fall increasing with the maturity of the gilt.

- Interest rate signalling: QE announcements may convey information about the central bank's view of the economy and so the likely future path of Bank Rate. This news about the path of short-term interest rates would be expected to have a larger impact on shorter-maturity gilts than longer-maturity gilts.
- Liquidity: the presence of the central bank in the gilt market as a buyer may provide a 'backstop' which improves market functioning and increases liquidity. This reduces the cost of trading bonds, and so will reduce the 'illiquidity premium' demanded to compensate investors for holding the remaining bonds.

As noted, the market notices contained news about the way expected purchases would be distributed across different gilts. This would have changed expectations of both the local supply of gilts and the aggregate amount of duration risk remaining in the private market. It is unlikely, however, that the market notices would have signalled anything about the path of Bank Rate; and given the size and depth of the gilt market, it is also unlikely that overall market liquidity would have changed greatly. This suggests the market notices might be useful in helping to identify local supply and duration effects.

But while it is possible to estimate the local supply effects, it is not possible to identify the duration effects. The difficulty is that market notices were released on the same day as MPC announcements about the total planned amount of asset purchases. It is possible to take this into account when estimating the local supply effects. But these announcements may also have been interpreted as signalling a change to the expected path of Bank Rate, for instance that interest rates would remain lower for a longer period. Such signalling effects cannot be distinguished from the effect of the announcements on duration risk. This is because both of these effects vary monotonically depending on the maturity of the gilt: duration risk effects are smoothly increasing with maturity and interest rate signalling effects are smoothly decreasing with maturity. So it is difficult to distinguish the variation due to each effect. Fortunately, it is possible to control for the *joint* effect of these channels, so the market notice announcements can still be used to isolate the local supply effects.

In theory, these differences may be short-lived if other market participants without such preferences are able to exploit arbitrage opportunities across bonds of different maturities. But if there are some constraints on arbitrageurs' ability to bear risk, then these differences can persist.

⁽²⁾ Duration is a measure of the remaining maturity of a bond which also takes into account the time profile of coupon payments associated with the bond. For a theoretical model incorporating this channel, see Vayanos and Vila (2009).

Analysing changes in the distribution of gilt purchases

The three natural experiments used in this article are the result of operational changes to the Bank's gilt purchases. Gilt purchases are implemented through a series of 'reverse auctions' where bidders offer gilts for the Bank to purchase, specifying the amount and price at which they are willing to sell.⁽¹⁾ Separate auctions are held for different groups of gilts depending on their remaining maturity. These groupings or 'auction maturity sectors' are specified in advance, and have only been changed infrequently, and for operational reasons. **Table A** summarises all the changes to the auction maturity sectors to date, and the box on page 132 outlines the rationale for these choices.

Table A Changes in auction maturity sectors^(a)

Market Notice	Auction details
11 February 2009	February <i>Inflation Report</i> and associated press conference give strong indication that gilt purchases financed using central bank money are likely. But no details on the quantity or distribution of purchases.
5 March 2009	Gilt purchases financed from central bank money are announced. Purchases split between two auction maturity sectors for gilts with remaining maturities of: (i) 5–10 years (ii) 10–25 years.
6 August 2009	Purchases split between three auction maturity sectors for gilts with remaining maturities of: (i) 3–10 years (ii) 10–25 years (iii) 25 years and greater.
9 February 2012	Purchases split between three auction maturity sectors for gilts with remaining maturities of: (i) 3–7 years (ii) 7–15 years (iii) 15 years and greater.

(a) A gilt with remaining maturity exactly on the boundary of these ranges is classified in the higher sector. For instance, for the 5 March 2009 Market Notice a gilt with exactly 10 years' remaining maturity would be included in the 10–25 year maturity sector.

The August 2009 and February 2012 events are directly comparable as both involved a change to the auction maturity sectors. March 2009 is slightly different because this is when the auction maturity sectors were first defined. But as this event contained considerable news about how gilt purchases would be distributed, it provides a useful comparison to the other two events.

Quantifying the news in operational market notices

To assess the reaction of gilt yields to changes in the auction maturity sectors, it is necessary to calculate a measure of the news contained in the market notices. For each gilt, this is the difference between expected purchases before and after the market notice.

The first step is to estimate expectations of total future QE purchases, before and after the market notice. The former is

taken from the mean response to the Reuters survey of private sector economists conducted *before* the market notice.⁽²⁾ But all of the market notices were on the same day as MPC announcements about the planned amount of gilt purchases. And these MPC announcements affected market expectations of the total future amount of QE, particularly in the period after QE was first introduced. To account for these changes, total expected purchases after the market notice are estimated using the mean response to the Reuters survey conducted *after* the market notice. **Table B** summarises the surveys used.

 Table B
 Market expectation of amount of gilt purchases expected in the future, mean response to Reuters survey^{(a)(b)}

£ billions

Date of MPC announcement and Market Notice	5 March 2009(c)	6 August 2009	9 February 2012
Expected before	0	27	86
	(n.a.)	(30 July 2009)	(1 February 2012)
Expected after	142	62	92
	(1 April 2009)	(6 August 2009)	(9 February 2012)
Total QE 'surprise'	142	35	6

Source: Thomson Reuters.

(a) The Reuters poll asks respondents about the amount of gilt purchases they expect the Bank of England to make in total. The figures above subtract from this the amount of gilts already purchased, but not those which have been announced but are yet to be purchased. Surveys on the same day were snap polls conducted after the MPC announcement and market notice.

(b) Date of Reuters survey in brackets.

(c) For the other survey prior to the March announcement. Therefore, total QE expectations are assumed to have been zero prior to the February *Inflation Report*, with the total change in expectations over this entire period given by the April Reuters survey.

The second step is to estimate how market participants would have expected these total purchases to be distributed across each of the gilts. The distribution of the total purchases expected before the market notice will depend on the previous auction maturity sectors. The distribution of the total expected after will depend on the new auction maturity sectors announced in the market notice.

Total purchases by the Bank have been split evenly *between* the maturity sectors. But how these purchases are spread *within* each sector is not known until the purchases are actually made, because it depends on the market offers received in the auctions. In each auction, purchases of each gilt seem equally likely. Therefore this article assumes that agents start from the expectation that *within* each maturity sector, an equal amount of each individual gilt will be purchased.

This means that expected purchases of each gilt will depend on the number of other gilts in the same sector. For instance,

⁽¹⁾ In each auction the Bank offers to purchase a fixed total value of gilts. The preferred bids chosen to fulfil this total value are selected based on the attractiveness of offers for each gilt relative to market yields, as published by the Debt Management Office, at the close of the auction. For more details of the auction process see www.bankofengland.co.uk/markets/Documents/marketnotice120301con.pdf.

⁽²⁾ This method was first outlined in Joyce et al (2011). The Reuters poll of economists regularly surveys a panel of about 50 City economists on their future Bank Rate expectations. During the period of QE purchases, Reuters also included a question in its poll on the total amount of gilt purchases respondents expected. Although this does not cover Cilt-edged Market Makers, market intelligence suggests that the responses to this survey provide a good proxy for market expectations of QE.

The rationale behind the changes in gilt auction maturity sectors

The primary objective of the Bank's QE gilt auction programme is to purchase the total amount of gilts announced by the MPC in their policy meetings. But the design has also taken into account the implications for the operation and functioning of the gilt market.⁽¹⁾ One particular operational concern was that the Bank should not own large proportions of individual gilts or specific parts of the yield curve, in order to avoid undue disruption to market liquidity. As a result, it has been necessary to review the design of the operations over time, in light of the Bank's increased gilt holdings and changing conditions in the gilt market. This has motivated two changes in the auction maturity sectors over the period of QE purchases.⁽²⁾

In March 2009, the Bank announced it would initially buy conventional gilts with a residual maturity of 5–25 years. These purchases would be split into two auction maturity sectors: 5–10 years and 10–25 years.

As the size of the gilt purchase programme increased, the Bank began to accumulate a large percentage of the 'free float' (total outstanding issuance less government holdings of gilts) in the 5–25 year sector. In order to increase the amount of purchases further without disrupting this sector of the gilt market, in August 2009 the Bank decided to extend the purchase range to include all gilts with a residual maturity of three years and greater. These purchases would be split into three auction maturity sectors: 3–10 years, 10–25 years and 25 years and greater. This led to a significant increase in the amount of gilts in private ownership within the purchase range, as shown in **Table 1**.

Table 1 Private sector gilt holdings within QE purchase range

Date	Purchase range	Face value of gilts remaining in private sector (£ billions)	Percentage of free float remaining in private sector
5 March 2009	5–25 years	192	99(a)
6 August 2009 (before Market Notice)	5–25 years	129	54
6 August 2009 (after Market Notice)	3 years and greater	283	72
9 February 2012	3 years and greater	411	66

Sources: Bank of England, Debt Management Office and Bank calculations.

(a) Even prior to gilt purchases for the purposes of QE, the Bank held a small amount of gilts as a result of its open market operations.

The initial £200 billion QE programme was completed in January 2010, but in October 2011 the MPC announced a further £75 billion of purchases, and this was extended by

£50 billion in February 2012. New issuance by the Debt Management Office (DMO) since 2010 meant that in February 2012 there was still a large amount of privately held gilts with maturities of greater than three years (**Table 1**). But the distribution of these gilts across the existing maturity sectors was somewhat uneven (**Chart A**). Although the relative scarcity of gilts in the 10–25 year sector had not yet reached levels likely to disrupt the functioning of the gilt market in this sector, the Bank acted pre-emptively to avoid these issues arising in the future. In February 2012 the Bank changed the auction maturity sectors: purchases would now be split into three sectors of 3–7 years, 7–15 years and 15 years and greater. **Chart A** shows the impact of that change on the distribution of private sector gilt holdings across each of the maturity sectors.

Chart A Privately held gilts, by maturity, based on auction maturity sectors used before and after 9 February 2012 Market Notice



Sources: Bank of England, DMO and Bank calculations.

For more details about the operational design of the Bank's gilt purchases, see Fisher (2010).

⁽²⁾ The Bank has also taken other measures to avoid undue pressure on specific gilts. Since the start of gilt purchases, the Bank has avoided buying gilts with an outstanding issue size below £4 billion. In July 2009, the Bank announced it would not buy individual gilts where its holdings were in excess of 70% of the free float. In order to alleviate that pressure further, in August 2009 the Bank also announced it was offering to lend gilts via the DMO.



Chart 1 Relationship between local supply surprise and two-day change in gilt yields, February 2012

Sources: Bank of England, DMO, Thomson Reuters and Bank calculations.





Sources: Bank of England, DMO, Thomson Reuters and Bank calculations.





Sources: Bank of England, DMO, Thomson Reuters and Bank calculations

when a maturity sector is extended to include a larger number of gilts, purchases are expected to be spread more thinly across each of the gilts. It is, therefore, possible to estimate how the total amount of purchases is expected to be split across each of the gilts. The difference between the expected purchases of each gilt before and after the market notice is a measure of the news contained in the market notice.

The final step is to take into account how much the change in expected purchases affected the supply of gilts remaining in the market. Therefore the size of the change in expected purchases is measured relative to the amount of gilts of similar maturity remaining in the private sector.

The resulting measure is referred to as the 'local supply surprise'. The box on page 134 describes its construction in more detail using the February 2012 Market Notice as an example.

The relationship between the change in expected future purchases and gilt yields

Chart 1 plots the 'local supply surprise' (blue line) against the change in gilt yields (green diamonds) following the February 2012 Market Notice. **Charts 2** and **3** plot the equivalent series for the August 2009 and March 2009 Market Notices respectively. As in Joyce *et al* (2011) a two-day window is used to measure the change in gilt yields;⁽¹⁾ and the change in yields for the March 2009 announcement is combined with the change following the February 2009 *Inflation Report* so as to capture the full impact of the introduction of QE.⁽²⁾

In all three instances, the pattern of changes in gilt yields matches the local supply surprise. This supports the view that local supply effects are one of the channels through which QE affects gilt yields. That said, the relationship shown in the charts is not perfect, so it is likely other channels also play a part. For instance, in March 2009 there was a significant reduction in gilt yields at longer maturities even though none of the purchases were initially conducted in this part of the yield curve.

A regression approach

Drawing inferences directly from the charts implicitly assumes that changing the distribution of asset purchases affects gilt

 Defined as the yield to maturity at close of business one day after the announcement minus the yield to maturity at close of business the day before.

⁽²⁾ As it is assumed total QE expectations were 0 before the February Inflation Report, the change in yields following the Inflation Report are combined with the reaction to the March announcement to give the total change in yields associated with the initial QE announcements. In addition, the Reuters interest rate poll suggests the February Inflation Report also led markets to anticipate a further 25 basis point cut in Bank Rate. In order to isolate the change in gilt yields due to just QE, an adjustment is made to remove this effect: instantaneous forward rates are reduced on a sliding scale by 25 basis points at zero years to 0 basis points at five years, and the corresponding impact on yields to maturity is calculated from this.

Estimating the local supply surprise for February 2012

Table 1 shows how the local supply surprise variable wascalculated for February 2012.

Expected purchases prior to the market notice

The mean of the Reuters survey prior to the February announcement was for an additional £86 billion of purchases. Under the pre-existing operational procedures there were three auction maturity sectors: 3-10 years, 10-25 years and greater than 25 years. Therefore the expected purchases for each sector were £86 billion/3 = £28.7 billion. Taking the 3-10 year sector as an example: there were twelve eligible gilts,⁽¹⁾ so assuming purchases were expected to be evenly spread across the bonds, expected purchases per bond were £28.7 billion/12 = £2.4 billion.

Expected purchases after the market notice

After the February announcement, the mean of the Reuters survey increased to £92 billion (additional purchases relative to what had been announced *prior* to 9 February). Under the new procedures, there were still three auction maturity sectors, but now for maturities of: 3–7 years, 7–15 years and greater than 15 years. Expected purchases per bond can be calculated in a similar manner to above. For instance, for the 3–7 year maturity sector: there were seven eligible gilts, so expected purchases per bond were (£92 billion/3)/7 = £4.4 billion.

The change in expected purchases

For each gilt the difference is taken between expected purchases before and after the market notice. For instance, for the 2% 2016 gilt: \pm 4.4 billion– \pm 2.4 billion = \pm 2.0 billion. Because purchases were assumed to be uniform within each sector, this results in six groups for which the change is identical. For instance the change in expected purchases for all the gilts in the 15–25 maturity group is - \pm 1.5 billion.

Relative to the outstanding private stock of gilts in each group

The change in expected purchases is aggregated across each of the gilts within these subgroups.⁽²⁾ This is then divided by the 'privately held free float' of gilts (total issuance minus Bank of England and government holdings) remaining within this range. The remaining amounts of ineligible bonds⁽³⁾ are excluded from this calculation. As expectations are forward looking, the outstanding amount of each bond is adjusted to account for expected Debt Management Office (DMO) issuance.⁽⁴⁾ As an example, the outstanding stock of gilts in the 3–7 year group is £142 billion. The change in expected purchases for this group is £2 billion*7 = £14 billion. Therefore the change in expected purchases relative to the privately held free float (the 'local supply surprise') is £142 billion = 10%.

Gilt	Years to maturity	Ave	Average expected purchases per bond (£ billions)			Change, as proportion of privately held free float in sector (per cent)
		Before	After	Change		
51/4% 2012	0.3	0.0	0.0	0.0	22	0
9% 2012	0.5	0.0	0.0	0.0	0	0
41⁄2% 2013	1.1	0.0	0.0	0.0	24	0
8% 2013	1.6	0.0	0.0	0.0	4	0
21⁄4% 2014	2.1	0.0	0.0	0.0	26	0
5% 2014	2.6	0.0	0.0	0.0	19	0
2¾% 2015	3.0	0.0	0.0	0.0	24	0
4¾% 2015	3.6	2.4	4.4	2.0	22	10
8% 2015	3.8	2.4	4.4	2.0	5	10
2% 2016	4.0	2.4	4.4	2.0	35	10
4% 2016	4.6	2.4	4.4	2.0	28	10
1¾% 2017	5.0	2.4	4.4	2.0	28	10
8¾% 2017	5.5	2.4	4.4	2.0	6	10
5% 2018	6.1	2.4	4.4	2.0	18	10
41⁄2% 2019	7.1	2.4	4.4	2.0	19	8
3¾% 2019	7.6	2.4	4.4	2.0	25	8
4¾% 2020	8.1	2.4	4.4	2.0	20	8
3¾% 2020	8.6	2.4	4.4	2.0	25	8
8% 2021 ^(a)	9.3	0.0	0.0	0.0	8	8
3¾% 2021	9.6	2.4	4.4	2.0	28	8
4% 2022	10.1	3.6	4.4	0.8	16	5
5% 2025	13.1	3.6	4.4	0.8	16	5
4¼% 2027	15.8	3.6	2.0	-1.5	13	-12
6% 2028	16.8	3.6	2.0	-1.5	7	-12
4¾% 2030	18.8	3.6	2.0	-1.5	14	-12
41⁄4% 2032	20.3	3.6	2.0	-1.5	14	-12
41⁄2% 2034	22.6	3.6	2.0	-1.5	15	-12
41⁄4% 2036	24.1	3.6	2.0	-1.5	15	-12
4¾% 2038	26.8	3.2	2.0	-1.1	13	-8
41⁄4% 2039	27.6	3.2	2.0	-1.1	15	-8
41⁄4% 2040	28.8	3.2	2.0	-1.1	21	-8
41⁄2% 2042	30.8	3.2	2.0	-1.1	13	-8
4¼% 2046	34.8	3.2	2.0	-1.1	14	-8
41⁄4% 2049	37.8	3.2	2.0	-1.1	15	-8
3¾% 2052	40.4	3.2	2.0	-1.1	7	-8
4¼% 2055	43.8	3.2	2.0	-1.1	14	-8
4% 2060	48.0	3.2	2.0	-1.1	14	-8
Total		86	07	6	624	

Table 1 Local supply surprise calculation, February 2012

Sources: Bank of England, DMO, Thomson Reuters and Bank calculations

(a) Gilt ineligible for purchase.

(1) The 8% 2021 gilt was excluded as the Bank already holds more than 70% of the free float (total outstanding issuance less government holdings). The auctions also excluded gilts issued by the DMO within the past week or to be issued in the next week. However, these gilts are not excluded from the calculations, as they can still be purchased in auctions after this one-week window. For more details of eligibility criteria for February 2012, see the Market Notice available at www.bankofengland.co.uk/markets/Documents/apf/marketnotice120209.pdf.

(2) The change in expected purchases could be divided by the privately held free float on a gilt-by-gilt basis. However, there is likely to be some substitutability between gilts of similar maturities. Therefore this measure is designed to capture the change in purchases for each sector of the yield curve. The groupings used are those defined naturally by the change in the maturity sectors.

(3) See footnote (1) above.

(4) The privately held free float is adjusted to incorporate announced DMO issuance for the next six months. The pattern of issuance across the sectors is assumed to be the same as the previous year. Within each sector, new issuance is proportional to the amount of each gilt currently in issue. yields through only the local supply channel. But there will be other channels in operation so a regression can be used to estimate the strength of the local supply effects while controlling for these other effects.

Methodology

For each of the three market notices, a separate regression is estimated to explain how the yield of each gilt changed following the operational announcement. The dependent variable is the change in gilt yields in the two-day window after each announcement (Δy_n , for all conventional gilts in issue, *n*). The first explanatory variable included is the local supply surprise (Δq_n), measured as discussed above. To account for the other channels, a constant term (α) and the duration of each bond (d_n) are also included. Equation (1) is the preferred specification:⁽¹⁾

$$\Delta y_n = \alpha + \beta \Delta q_n + \gamma d_n + \mathcal{E}_n \tag{1}$$

The coefficient on the local supply surprise (β) is the primary focus. If the local supply of a gilt does matter, then this would be consistent with a significantly negative value for this coefficient — such that an unexpected decrease in the available supply of a gilt (an increase in expected purchases) is associated with a rise in the price and fall in the yield of that gilt.

The constant term and the duration of each bond are included in the regression to control for systematic changes across the yield curve that are not directly related to the local supply of gilts. Including the duration of each bond will control for any effects which vary depending on the maturity of the bond.

Results

Table C reports the results of estimating the preferred specification for each of the market notice announcements. In all three instances, the local supply coefficients are negative and significantly different from 0 at the 5% level. This is consistent with the local supply channel operating.

Table C Yield change regression results^(a)

		2	2012	
Independent variables		5 March	6 August	9 February
Constant	α	-17.2 (0.00)	1.8 (0.24)	-3.9 (0.01)
Local supply surprise	Δq_n	-0.81 (0.00)	-0.74 (0.04)	-0.80 (0.00)
Bond duration	d _n	-2.8 (0.00)	-0.6 (0.18)	0.2 (0.09)
R-squared		0.94	0.80	0.91
Observations		30	34	36

(a) Dependent variable: change in gilt yields in the two-day window after each announcement. P-values for heteroskedasticity and autocorrelation consistent standard errors shown in parentheses. The estimated local supply surprise coefficients are of a similar order of magnitude for all three events, and the hypothesis that the coefficients are the same cannot be rejected at the 5% level (**Table D**). So the strength of the local supply channel of QE does not appear to have changed significantly since gilt purchases were introduced in early 2009.

Table D Tests of equality of local supply surprise coefficients to February 2012 estimate $^{(a)}$

		2009
	5 March	6 August
t-statistic	0.10	-0.27
p-value	0.92	0.78
Significantly different at 5% level?	No	No

(a) Test of hypothesis that $\beta_{\text{Feb. 2012}} = \beta_t$, for t = Mar. 2009, Aug. 2009. Based on White standard errors.

There are quite large differences between the constant and duration coefficients across the different events. The constant picks up any effects not captured by the other variables included in the regression. The absolute value of the constant is greatest for March 2009. This is not surprising since there was more news about the total amount of QE in March 2009, and so the size of these other effects was likely to be greater. But since the size of the news was different across the events, this does not necessarily tell us anything about the strength of the other channels. As discussed above, it is difficult to interpret the size of the bond duration coefficient because it captures both duration risk and interest rate signalling effects, and so the estimated coefficient could conflate these two effects.

Robustness checks

The regressions above were re-run to check whether the results are robust, rather than specific to the particular data used and specification chosen. In general, the findings appear to be similar across a range of different data and specifications.

For instance, increasing the length of the window over which the change in gilt yields is measured does not greatly affect the local supply surprise coefficient estimates. Using a three-day rather than a two-day window gives very similar results. And although the one-day window estimates do differ markedly (**Table E**), there appear to be good reasons for choosing a longer window. The choice of the two-day window in Joyce *et al* (2011) was originally motivated because it is believed it took markets more than a day to evaluate the news associated with the announcement of this unconventional monetary policy tool. And further work by Daines, Joyce and

⁽¹⁾ A number of alternative specifications were tested allowing for more complicated non-linear relationships with duration. But the functional form chosen did not significantly affect the coefficients on the local supply variable. Therefore, the simple linear specification was chosen. The preferred specification also assumes that the strength of the local supply effects are the same for gilts of all maturities (the β coefficient does not vary with maturity). Due to the relatively small sample sizes the regressions are not re-estimated with a maturity-varying coefficient.

Tong (2012), using intraday data and comparing movements in international yields, supports the use of a two-day window for the March 2009 event; the further falls in gilt yields the day after seem to suggest that the market was still digesting the consequences of the announcement.

 Table E
 Local supply surprise coefficient using different event

 windows to measure the gilt yield reaction

	2	2012	
Event window	5 March	6 August	9 February
One-day	0.02	-0.76	-0.37
Two-day	-0.81	-0.74	-0.80
Three-day	-0.85	-0.86	-0.82

There is also a risk that the total change in QE expectations, taken from the Reuters survey, is mismeasured, and so not an accurate representation of the change in market expectations associated with each MPC announcement. The surveys were not always conducted immediately before and after the market notice announcements, and, as with any survey, it is subject to sampling error. But it does not appear that the results are driven by the precise number taken from the survey. Changing the total QE surprise for each event by \pounds 10 billion in either direction has only a small impact on the estimated coefficients.

Therefore, only a large mismeasurement of the change in total QE expectations would greatly affect the results. There is probably most uncertainty over the total change in QE expectations for March 2009. As there was no Reuters survey prior to the March announcement, an assumption must be made about expectations before this date. The solution used in this article is to group together the March 2009 announcement with the February 2009 Inflation Report. It is assumed that expectations of QE were formed only from these two events, and so it is assumed that no gilt purchases were expected prior to the February 2009 Inflation Report. This seems reasonable since the Bank had not publicly discussed gilt purchases prior to this date. However, an asset purchase facility for private sector assets had already been established and the possibility of QE had been discussed by some market analysts; so it is possible the change in expectations is overestimated. If, for instance, £50 billion of purchases were already expected prior to the February Inflation Report, then the estimated coefficient for March 2009 would be -1.24; consistent with a considerably larger local supply effect than the -0.81 central estimate.

Putting the results in context

Forthcoming Bank analysis by Daines, Joyce and Tong (2012) also finds evidence that the reaction of gilt yields to MPC announcements about QE is consistent with local supply (and duration) effects. This article complements that work by attempting to quantify the size of the local supply channel. To put these estimates in context, the total contribution of the local supply surprise variable can be compared to the total change in gilt yields attributed to QE.

For March 2009, the contribution can be estimated by multiplying the local supply surprise variable by the corresponding coefficient estimate from **Table C**. This suggests that the local supply effect accounted for 46 basis points of the total 93 basis point decline in 5–25 year maturity gilt yields. The March 2009 event should provide a good approximation of the overall importance of the local supply channel because this event contained such a large amount of news about the total amount of QE.⁽¹⁾

An alternative way to test the importance of the local supply effect is by computing the relative importance of each regressor (Kruskal (1987)). The advantage of this test is that it can be applied to all three events, even where there was little news about the total amount of QE. This test finds that 42%–62% of the variation of the change in yields can be explained by the local supply channel, with the duration of each bond accounting for around 31%–38% (**Table F**).

Table F Relative importance of the local supply surprise and bond duration regressors^(a)

Dor	cont

	20	2012	
Event window	5 March	6 August	9 February
Total variation explained (R-squared)	94	80	92
of which, local supply surprise	62	42	61
of which, bond duration	32	38	31

(a) Based on the relative importance of regressor test (Kruskal (1987)).

These results are similar to estimates of the relative importance of the local supply channel for the first round of large-scale asset purchases in the United States. D'Amico *et al* (2012) find that around two thirds of the fall in US government bond yields could be explained by the local supply channel, albeit using a different methodology. For the second round of US large-scale asset purchases, they find that local supply effects played a larger role, and explained most of the decline in yields.⁽²⁾

⁽¹⁾ This exercise involves averaging the local supply surprise and the change in yields over a range of maturities. The exercise is informative for March 2009 because the changes over this range are all in the same direction. But a similar exercise is not appropriate for the other two events, because this would involve averaging over a range for part of which the local supply surprise is zero or even in opposite directions.

⁽²⁾ US\$300 billion of US government bonds were purchased in the first round of US purchases, commencing in March 2009 and completed in October 2009. A large amount of agency debt and agency mortgage-backed securities was also purchased. US\$600 billion of US government bonds were purchased in the second round of purchases, announced in November 2010 and completed in June 2011. D'Amico et al (2012) suggest the larger role for local supply in the second round reflects the more modest impact on aggregate duration of these purchases.

The above analysis suggests that the local supply channel is an important mechanism which may explain around half of the impact of QE on gilt yields. Therefore the natural experiments approach is useful for identifying a considerable portion of the effect of QE, and so some weight can be attached to the results which suggest that the strength of this channel has not changed since 2009.

The other channels from QE to gilt yields have not been separately identified, so it is not possible to draw conclusions about how they may have changed. Furthermore, the impact on gilt yields is only the first leg of the transmission to spending and inflation. Therefore, even though the strength of the local supply channel does not appear to have changed, the analysis in this article cannot necessarily be used to draw conclusions about the wider economic effects of QE.

Conclusion

Estimating the impact of QE on gilt yields has become increasingly difficult as MPC announcements about the amount of assets the Bank intends to purchase are now widely anticipated by financial market participants, based on economic news and data releases. To overcome this problem, this article uses a novel way of identifying part of the impact of QE on gilt yields, using natural experiments associated with changes in the auction maturity sectors used for gilt purchases.

The reaction of gilt yields to these market notices closely matches the news they contained about the way in which future purchases were expected to be distributed across gilts of different maturities. This is consistent with an important role for the local supply channel. The regression estimates in this article suggest this channel can account for around half of the reduction in gilt yields due to QE, so the approach used in this article is useful for identifying a considerable portion of the impact of QE on gilt yields.

The estimated strength of the local supply channel is broadly similar across the three market notice events. These events span the period of QE purchases, so the strength of this particular channel does not appear to have changed significantly since QE was introduced in early 2009.

References

D'Amico, S, English, W, López-Salido, D and Nelson, E (2012), 'The Federal Reserve's large-scale asset purchase programs: rationale and effects', *Federal Reserve Board Working Paper*, forthcoming.

Daines, M, Joyce, M and Tong, M (2012), 'QE and the gilt market: a disaggregated analysis', *Bank of England Working Paper*, forthcoming.

Fisher, P (2010), 'An unconventional journey: The Bank of England's asset purchase programme', available at www.bankofengland.co.uk/publications/Documents/speeches/2010/ speech453.pdf.

Joyce, M, Lasaosa, A, Stevens, I and Tong, M (2011), 'The financial market impact of quantitative easing in the United Kingdom', *International Journal of Central Banking*, Vol. 7, No. 3, pages 113–61.

Joyce, M, Tong, M and Woods, R (2011), 'The United Kingdom's quantitative easing policy: design, operation and impact', *Bank of England Quarterly Bulletin*, Vol. 51, No. 3, pages 200–12.

Kruskal, W (1987), 'Relative importance by averaging over orderings', *The American Statistician*, Vol. 41, No. 1, pages 6–10.

Vayanos, D and Vila, J-L (2009), 'A preferred-habitat model of the term structure of interest rates', *NBER Working Paper No.* 15487.

UK labour productivity since the onset of the crisis — an international and historical perspective

By Abigail Hughes and Jumana Saleheen of the Bank's International Economic Analysis Division.⁽¹⁾

UK labour productivity has been persistently weak since the onset of the recent financial crisis. This suggests that there is significant spare capacity within UK companies, but business surveys instead point to little spare capacity. This article aims to shed light on this puzzle by looking at cross-country and historical evidence. It finds that it has been unusual to see persistently weak labour productivity after previous financial crises in advanced economies. UK labour productivity stands out as being weak relative to historic episodes; it is also weak compared to other countries in the recent crisis. This weakness is concentrated in the energy and service sectors, suggesting the supply potential of the economy has grown more slowly than usual since the start of the crisis.

Introduction

Following very large falls in output during and after the recent financial crisis, labour productivity — measured both as output per person and output per hour worked — in the United Kingdom and a number of other European countries, has been recovering slowly (Charts 1 and 2).⁽²⁾

Chart 1 Labour productivity across countries (output per person)^(a)



(a) Dashed line shows 2008 Q1.

Labour productivity often falls in the initial stages of a recession, as the fall in output is not always accompanied by

an immediate fall in employment. But weak labour productivity four years into a crisis is more unusual to see. Typically companies shed labour if activity is expected to remain weak — boosting productivity.

The retention of labour suggests companies have been operating with a margin of spare capacity. In other words, the potential output they could produce given their current levels of capital and labour is somewhat greater than their actual level of output. Similarly, potential or underlying productivity will be greater than actual productivity. The gap between these is one metric of 'slack' in companies; understanding this and, more generally, slack in the economy as a whole is crucial for monetary policy as it is an important source of inflationary pressure.

Underlying productivity is a key determinant of the supply potential of the economy and is influenced by technology, innovation and the capital stock. It is difficult to judge how underlying productivity has evolved over the recession as it is not observable. One useful benchmark is the continuation of a simple pre-crisis trend (**Chart 3**). In the United Kingdom actual productivity is below this benchmark suggesting that there is spare capacity within companies.

But, as noted in the May *Inflation Report*, a range of UK business surveys suggest that capacity utilisation has

The authors would like to thank Adrian Chiu and William Naughton for their help in producing this article.
 This article focuses on labour productivity per person, as data on average hours

⁽²⁾ This article focuses on labour productivity per person, as data on average hours worked by industrial sector are less readily available on a consistent basis across countries.

returned to just below normal levels. These conflicting signals, also seen in other countries (see the box on pages 144–45), mean that there is uncertainty about the current amount of spare capacity.

Chart 2 Labour productivity across countries (output per hour worked)^(a)



Sources: Eurostat, ONS, Statistics Norway, Thomson Reuters Datastream and Bank calculations. (a) Dashed line shows 2008 O1.

Chart 3 UK labour productivity^(a)



Source: ONS (including the Labour Force Survey).

(a) Dashed line shows 2008 Q1. Final data point is 2012 Q1.
(b) The pre-crisis trend is computed over 1998 Q1–2004 Q4 following the IMF (2009b) method. The trend is given by the average growth rate over a seven-year period that ends three years prior to the start of the crisis; the past three years are excluded to ensure the pre-crisis trend is not boosted by any elevated growth that often precedes a recession.

This article provides a descriptive analysis of cross-country and historical evidence on the behaviour of labour productivity during episodes of recession that are accompanied by a financial crisis. It explores whether a common feature of these recessions is persistently weak labour productivity. It also considers patterns across industrial sectors to see if the disaggregated data can shed any light on whether there has been a fall in underlying productivity following the recent crisis in the United Kingdom. As such, the analysis can help inform a view of the amount of spare capacity within companies. The UK experience is compared to that of the United States, Germany, France, Spain, Italy, Sweden, Norway and Denmark.

Is weak labour productivity a feature of all financial crises?

The IMF (2009a) and Reinhart and Rogoff (2008, 2009) have found that episodes of recession accompanied by a financial crisis are different from normal recessions: the average loss of output during the downturn tends to be larger in the former and the recession more prolonged. Could it be that the recent weakness of UK labour productivity is a common feature of recessions that are accompanied by financial crises? This section explores this possibility.

IMF (2009b) work considered 88 historical episodes that span both advanced and emerging economies. It shows that, in some crises, the path of output evolves differently in emerging and advanced economies. Productivity in advanced economies may as a result also evolve differently from emerging economies. This article considers, therefore, the experience of advanced economies only.⁽¹⁾ The disadvantage of excluding emerging economies is that the sample size falls to only thirteen episodes of recession and financial crisis.⁽²⁾

Chart 4 puts the recent financial crisis into historical context by comparing the most recent experience of the United Kingdom and other countries with a swathe of historical episodes.

It shows the path of productivity and its components, output and employment.⁽³⁾⁽⁴⁾ These are shown relative to country-specific pre-crisis trend growth rates. So when an observation is at zero it implies a country has recovered its initial productivity losses and is at the level it would have reached had it continued along a simple pre-crisis trend.

The grey swathe in **Charts 4.A–C** refers to the interquartile range of outcomes for each variable during previous episodes; the solid light blue line at the centre of the grey swathe describes the average of those past episodes; and the full range of outturns is depicted in the light blue dashed lines.

It is hard to know if the experience of advanced or emerging economies is the right comparison for the recent UK crisis. This article considers the former. The experience of both emerging and advanced economies can be found in IMF (2009b).

⁽²⁾ Financial crises are identified using the narrative analysis of Reinhart and Rogoff (2008), this approach is also used in IMF (2009a). The sample used in this article includes the following episodes of recession and financial crisis: Australia (1990 Q2–1991 Q2), Denmark (1987 Q1–1988 Q2), Finland (1990 Q2–1993 Q2), France (1992 Q2–1993 Q3), Italy (1992 Q2–1993 Q3), Japan (1993 Q2–1993 Q4, 1997 Q2–1999 Q1), New Zealand (1986 Q4–1987 Q4), Norway (1988 Q2–1988 Q4), Spain (1978 Q3–1979 Q1), Sweden (1990 Q2–1993 Q1) and the United Kingdom (1973 Q3–1974 Q1, 1990 Q3–1991 Q3). The sample excludes Greece and Germany because of data limitations.

⁽³⁾ The analysis in this article uses the latest vintage of data. It is possible that there will be some revisions to this vintage because it is difficult to accurately measure productivity in real time. See the box on pages 22–23 of the August 2011 Inflation Report on GDP mismeasurement.

⁽⁴⁾ Sweden and Denmark are excluded from this section mainly to prevent the charts from becoming overcrowded.

Chart 4 Comparison of recent financial crisis to previous episodes of financial crisis^(a)

Chart 4.A Productivity





Chart 4.C Employment



Sources: Eurostat, OECD, ONS, Thomson Reuters Datastream and Bank calculations.

(a) Dashed lines show the latest data point for the recent crisis, 2011 Q4. Pre-crisis trends are computed using the IMF (2009b) method which is described in footnote (b) to Chart 3. Results are robust to changes in the period over which the pre-crisis trends are estimated.

Results are robust to changes in the period over which the pre-crisis trends are estimated. (b) For Spain, the pre-crisis trend is computed over a shorter period (2000 Q1–2004 Q4) due to lack of historic data For example, six years after previous crises, labour productivity ranged from being 10% above the pre-crisis trend in some countries to 15% below in others.

Chart 4.A shows labour productivity. Several features are worth noting: first, previous financial crises in advanced economies have not, on average, been accompanied by a sustained period of below-trend productivity. The average line goes back to zero after about four years and initial productivity losses are more than recovered.⁽¹⁾ **Charts 4.B** and **4.C** show that this recovery in productivity was achieved, on average, because the falls in output were eventually accompanied by falls in employment rather than rising output.

Second, in the initial phases of the 2008 recession, productivity in a number of countries was weaker than the interquartile range of past episodes. More generally, there has been a more varied productivity response across countries in the recent crisis. The United Kingdom was among the weakest but Germany and Italy had similar experiences.

The composition of weak productivity in the recent crisis has also differed across countries. For the United Kingdom, weak productivity can be accounted for by a very large fall in output — the United Kingdom is at the bottom of the output swathe (**Chart 4.B**) — with employment remaining close to the average of the past.⁽²⁾ The weakness in German productivity is, however, accounted for by unusually strong employment relative to the past, driven in part by exceptional country-specific policies.⁽³⁾

Spain is another exception, with measured labour productivity rising relative to trend — that appears to have come from an aggressive shedding of labour compared to past episodes (Chart 4.C).⁽⁴⁾ The United States has also seen a large labour market shakeout which has gone hand in hand with its relatively stronger productivity performance.

Third, as economies around the world have entered the recovery phase, productivity has also begun to recover in some countries, including the United States and Germany. But this is less clear in the United Kingdom where labour productivity remains persistently weak. Indeed UK labour productivity has weakened further relative to its pre-crisis trend and the United Kingdom is notably outside of the dashed line: it has been weaker than in all thirteen previous episodes.

(4) See IMF (2011b).

⁽¹⁾ That said, when considering the sample of both advanced and emerging economies, the IMF (2009b) has found that aggregate productivity does not return to trend. They find that there is a sustained period of below-trend total factor productivity and a fall in the capital labour ratio which persists for seven years.

⁽²⁾ See Faccini and Hackworth (2010), for how the behaviour of the UK labour market compares with previous recessions.

⁽³⁾ The German government's sponsored short-time working scheme (Kurzarbeit) and other labour market reforms are widely thought to have contributed to resilient employment during the downturn (see Möller (2010) and IMF (2011a)).

But Chart 4.A will give a misleading steer on the persistence of weak labour productivity this time around if there has been a change in the trend growth rate of productivity since the start of the crisis. Chart 5 shows the cumulative change in the absolute level of labour productivity and shows that setting aside differences in trends alters the picture.

Chart 5 Level of labour productivity compared to previous episodes of financial crisis^(a)



⁽a) Dashed lines show latest available data point for the recent crisis, 2011 Q4

Chart 5 shows that Spain, the United States and France are at or above their pre-crisis productivity levels. But labour productivity in the United Kingdom, Germany, Italy and Norway remains below its level at the beginning of the crisis. This is at odds with past historical experiences: on average labour productivity was about 10% above its pre-crisis level at this point. So even when comparing the absolute level of labour productivity to their levels at the start of the recent crisis, labour productivity in a number of countries has been persistently weak. This does not seem to have been a feature of past episodes of financial crisis.

Productivity across countries and sectors

The implications of persistently weak labour productivity for monetary policy depend on whether the weakness in actual productivity reflects a cyclical fall in demand where companies have retained employees (Martin and Rowthorn (2012)), or whether it has been associated with weak underlying productivity. Benito et al (2010) and the February 2012 Inflation Report investigate how changes to production inputs may have led to a fall in underlying productivity and the supply potential of the economy. This article uses a different approach; it considers the differences in aggregate and sectoral productivity across countries before and after the

recent crisis to try to shed light on whether underlying productivity has fallen.

Pre-crisis average growth rates of labour productivity, computed over the period 1998 Q1-2004 Q4, are shown in Chart 6. These show the United Kingdom's pre-crisis average growth rate was in line with that of Sweden and the United States. These differences in aggregate productivity trends could reflect differences in industrial structures and/or differences in sectoral trends across countries.





Sources: Bureau of Economic Analysis, Eurostat and Bank calculations

(a) Pre-crisis averages are computed using the IMF (2009b) method which is described in

(b) It construction and the second start of the secon

(c) For Spain, the pre-crisis average is computed over a shorter period (2001 Q1–2004 Q4) due to lack of historic data.

The industrial structure across the panel of countries is broadly similar and remains relatively unchanged since the crisis (Table A).⁽¹⁾ The United Kingdom looks most similar to the United States — particularly with regards to the importance of business and consumer services. But Norway stands out with the largest extraction and utilities sector, Germany with the largest manufacturing sector and Spain with the largest construction sector. The bottom panel of **Table A** shows that these output shares have been rather stable over the crisis.

But while the shares of output across countries is broadly similar, the average growth rates within sectors are very different. Table B shows that much of the disparity in the pre-crisis average growth rates comes from heterogeneity within the service sector — particularly business services, where growth had been high and positive in some countries like the United Kingdom, but negative in others. This suggests that the United Kingdom may have had an advantage in business services pre-crisis.

⁽¹⁾ The employment shares across industry follow a broadly similar pattern to the output shares reported in Table A. Spain is an exception where employment in construction fell by 4 percentage points to 9% in 2010.

Table A Industry structure across countries

2007 weight in value added

	United Kingdom	United States	Germany	France	Spain	Italy	Norway	Denmark
Agriculture	1	1	1	2	3	2	2	1
Extraction/utilities	4	4	3	3	3	2	26	5
Manufacturing	11	12	23	12	14	18	9	14
Construction	7	5	4	6	13	6	5	5
Consumer services ^(a)	26	22	20	24	27	26	21	26
Business services ^(b)	29	33	27	29	19	26	18	23
Other services	22	24	21	24	20	19	20	25
Total	100	100	100	100	100	100	100	100

2010 weight in value added

	United Kingdom	United States	Germany	France	Spain	Italy	Norway	Denmark
Agriculture	1	1	1	2	3	2	2	1
Extraction/utilities	3	3	3	2	3	3	24	4
Manufacturing	10	12	20	12	13	17	9	13
Construction	7	4	4	5	12	6	5	5
Consumer services ^(a)	26	22	22	24	28	26	20	25
Business services ^(b)	30	33	28	29	20	27	19	25
Other services	23	26	23	25	22	21	21	27
Total	100	100	100	100	100	100	100	100

Sources: Bureau of Economic Analysis, Eurostat, ONS and Bank calculations.

(a) Consumer services include wholesale and retail, hotels and restaurants, and transport.
 (b) Business services include financial intermediation, real estate, renting and other business activity.

Table B Average annual productivity growth before and after the crisis

Pre-crisis (1998 Q1-2004 Q4)

	United Kingdom	United States ^(a)	Germany	France	Spain ^(b)	Italy	Sweden ^(c)	Norway	Denmark
Total	2.4	2.2	1.0	1.0	-0.1	0.1	2.3	1.6	1.4
Manufacturing	4.3	7.1	2.7	3.2	1.9	0.1		3.5	2.5
Services	2.3	1.7	0.1	0.4	-0.8	-0.2		1.3	1.0
Consumer services ^(d)	3.0	3.3	1.7	1.3	-0.6	0.2		1.5	2.5
Business services ^(e)	2.6	2.1	-1.8	-0.8	-4.0	-2.2		1.9	-0.7

Recovery (2009 Q3-2011 Q4)

	United Kingdom	United States ^(a)	Germany	France	Spain ^(b)	Italy	Sweden ^(c)	Norway	Denmark
Total	0.5	2.2	1.3	1.0	2.9	0.8	2.4	0.0	1.8
Manufacturing	2.9	8.5	4.9	4.2	5.8	3.2		3.2	5.7
Services	0.4	1.2	0.5	0.8	2.0	0.2		0.8	1.9
Consumer services ^(d)	0.8	1.8	2.4	1.5	2.7	0.6		2.5	4.4
Business services ^(e)	0.2	2.6	-1.4	0.2	2.5	-0.2		1.1	2.4

Sources: Bureau of Economic Analysis, Eurostat, ONS and Bank calculations.

(a) US data are only available at an annual frequency and on a consistent sectoral basis from 1998. The top and bottom panel show average growth over the period 1999–2004 and 2009–10 respectively, as the latest data are for

2010. (b) For Spain, the average is computed over a shorter period (2001 Q1–2004 Q4) due to lack of historic data.

(c) Eurostat does not report sectoral data for Sweden.
 (d) Consumer services include wholesale and retail, hotels and restaurants, and transport.
 (e) Business services include financial intermediation, real estate, renting and other business activity.

Table B also shows that, while during the pre-crisis period, productivity growth in the United Kingdom averaged 2.4% per year, during the recovery, since 2009 Q3, it has grown at a mere 0.5% per year. So in the recovery so far, the United Kingdom's productivity is growing well below its pre-crisis average rate. In contrast, the United States and

France have already returned to their pre-crisis average growth rates, while Germany is growing faster, suggesting it has begun to catch up to its pre-crisis path.

These differences, in industrial structure and industry growth rates, can be summarised by the contribution of each sector to the overall change in the level of productivity over the crisis period.⁽¹⁾ **Chart 7** shows the total change in the level of productivity in the United Kingdom (the grey diamond), broken down into the separate contributions of each sector over the recession and recovery period. The black diamond shows what the level of productivity would have been (in 2011 Q4) had it grown in line with its pre-crisis trend since 2008 Q1.⁽²⁾

Chart 7 Change in the level of UK productivity by sector^(a)



Sources: ONS and Bank calculations.

(a) The bars below the zero line show the extent to which total labour productivity fell during the recession, split into the contribution of manufacturing, services, construction and extraction. The bars above the zero line show the recovery in productivity by sector.

The bars in **Chart 7** illustrate that the fall in UK labour productivity during the downturn was spread across all sectors, but clearly dominated by a deterioration in the service sector (shown in red).⁽³⁾

During the recovery phase, productivity has picked up in all sectors except energy and utilities, where productivity has continued to fall. As noted in Dale (2011), productivity growth has slowed in the energy and extraction sector since around 2005, that is before the onset of the financial crisis, as North Sea oil fields have aged and extracting oil has become more difficult.

The recovery in manufacturing and construction since the trough in output has been enough to regain the level of productivity that was reached in those industries before the recession, as shown by comparing the pale and dark colour blue and orange bars in **Chart 7**. But to catch up to the level of labour productivity implied by a continuation of pre-crisis trends within the manufacturing and construction sectors, productivity growth would need to continue to be much faster for a period of time. This can also be seen by comparing the top and bottom panels of **Table B**: productivity growth in

manufacturing during the recovery (2.9%) is still below pre-crisis growth rates (4.3%).

Chart 7 also shows that services have not regained the level of productivity that was reached before the recession. **Table B** shows that in services, average growth rates seen in the recovery period so far are well below pre-crisis growth rates (0.4% compared to 2.3%). In an accounting sense, this poor performance in services is the main reason why UK aggregate labour productivity remains well below the level implied by a continuation of the aggregate pre-crisis trend (black diamond).

How has productivity evolved across sectors in other countries? Four themes emerge.

Norway is similar to the United Kingdom; both have seen falls in energy and utilities productivity over both the recession and recovery periods. This is not a surprise as they extract oil from common waters — the North Sea. The absolute fall at the aggregate level is larger in Norway, as extraction and utilities are a larger share of GDP (**Table A**).⁽⁴⁾ As the decrease in oil production from the North Sea is likely to be structural rather than cyclical in nature, this evidence points to a fall in the level and growth rate of aggregate underlying labour productivity (**Chart 8**).

Chart 8 Change in the level of productivity across countries by sector^(a)



Sources: Bureau of Economic Analysis, Bureau of Labor Statistics, Eurostat, ONS and Bank calculations.

(a) See footnote (a) to Chart 7.

- The contribution of each industrial sector will be determined by its share in output and the average growth rate of that sector.
- (2) This counterfactual path of productivity is shown by the dashed line in Chart 3.
 (3) UK manufacturing sector productivity did fall quite sharply during the downturn, but
- its share in the total fall is small because manufacturing has a small weight in total output.
- (4) See Hagelund (2009) for more details on Norway.

Is the productivity puzzle evident elsewhere?

It is not unusual to see conflicting signals about the amount of spare capacity within firms. Chart A shows that manufacturing labour productivity fell sharply in a number of countries during the recession. Surveys of manufacturers also indicate an opening up of spare capacity within companies at that time (Chart B). But these two measures give different steers on the current amount of spare capacity.





Sources: Eurostat, ONS, Thomson Reuters Datastream and Bank calculations

(a) Dashed line shows 2008 Q1.
 (b) Due to data availability, the United States line shows industrial production

Chart B Capacity utilisation survey balances in manufacturing^{(a)(b)}



Sources: Thomson Reuters Datastream and Bank calculations

(a) Dashed line shows 2008 Q1. To estimate the amount of slack, the survey responses are shown in terms of deviation from pre-crisis averages based on the same seven-year period as the productivity trend. The latest data point on this chart is 2012 Q1.

(b) A comparable measure of capacity utilisation in manufacturing is not available for Norway.

The current signals from the two measures are shown for a range of countries in Chart C. Like the United Kingdom,

business surveys in Germany suggest there is limited spare capacity, but the weakness of labour productivity relative to its pre-crisis trend suggests a margin of spare capacity remains. In some countries the puzzle goes in the opposite direction, with business surveys pointing to more spare capacity than the productivity data.

Chart C Two measures of spare capacity across countries in 2011 Q4^{(a)(b)}



Sources: Eurostat, ONS, Thomson Reuters Datastream and Bank calculations

(a) This is the latest data point for which data on both labour productivity and surveys are

(b) The United States is not included as the survey data relate to manufacturing only which is

not comparable to labour productivity data for industrial production. (c) See footnote (b) to Chart 3.

(d) A comparable measure of capacity utilisation in manufacturing is not available for Norway

Inflation Reports have discussed potential explanations that can reconcile this conflicting evidence from surveys and measured productivity in the United Kingdom. There may indeed be less spare capacity within companies — supply capacity may have grown more slowly since the crisis. That would suggest that the persistent weakness in labour productivity has been associated with weakness in underlying productivity. This could have taken place through a number of channels: a reduction in the growth rate of the capital stock due to a sharp fall in investment spending during the recession; fewer opportunities for staff to acquire skills due to lower employment and hours worked; and through a reduced rate of new company formation due to tighter credit conditions.⁽¹⁾

The two measures might also pick up different aspects of spare capacity. Business surveys may not give a reliable read on long-run capacity, and instead may be a better guide to immediately available spare capacity.⁽²⁾ For example, company responses may exclude production lines that were shut down during the recession. Also, in some industries, productivity may be closely related to the demand for goods and services, but effort, and therefore perceived capacity, may not be. In these sectors companies may have had to continue

to work their factors of production, even as output has fallen. As an example, estate agents may be working intensively even though the volume of business has declined, because it has become harder to match buyers and sellers in a thin market. If this were the case, labour productivity could recover when demand recovers, even though the survey responses indicate little spare capacity. Similarly, if companies have held on to employees during the recession because they have felt it

In contrast to the United Kingdom, the falls in productivity in Germany, France and Italy are concentrated in manufacturing. Over the recovery, manufacturing productivity has grown faster in these countries than in the United Kingdom, which explains why they have started to reclaim some of their lost ground.

In the service sector, before the crisis, average productivity growth rates in the United Kingdom were high, particularly in business services. But growth has been weak during the recovery. It is difficult to explain this weakness as a cyclical pattern: the fall in services output was greater here than elsewhere, which might otherwise have suggested a stronger recovery. It is possible that the financial nature of the crisis has reduced underlying labour productivity in business and financial services. But the challenge to this view is why such weakness is not evident in the United States, where the financial crisis originated and where the business services sector is just as big as it is in the United Kingdom.

In the United States and Spain, productivity has continued to grow since the onset of the crisis as companies have shed labour at a faster rate than output has fallen. The diametrically opposite behaviour of labour productivity in the United Kingdom and the United States is of particular interest. These two countries have a similar industrial structure, but companies in each have reacted very differently in the extent to which they have shed or retained labour.

Conclusion

The behaviour of labour productivity in the United Kingdom has been puzzling: it has been persistently weak, suggesting that as demand has remained weak there has been much more spare capacity in companies than implied by business surveys. would be too costly to fire and then rehire skilled staff when demand recovers, productivity growth could rise quite sharply if output growth picks up, although it might also pick up if companies decide to let surplus staff go.

- (1) For evidence on each of these channels see Disney, Haskel and Heden (2003), and the November 2011 and February 2012 *Inflation Reports*.
- (2) Also, it is not straightforward to map the qualitative information that is collected in the surveys into quantitative measures of spare capacity. See Cunningham (1997).

Persistently weak labour productivity is not a feature of past episodes of financial crisis, although it does seem to be common across countries after the recent financial crisis.

Before the crisis, the United Kingdom had seen the fastest average rate of productivity growth in our sample. This performance has worsened considerably since the crisis started and average rates of productivity in the United Kingdom have been one of the slowest in our sample.

It is too early to say whether the level and growth rate of UK labour productivity will remain weak, or whether, when demand recovers, productivity will return to the higher rates seen during the pre-crisis period. Cross-country, cross-sector analysis shows the weakness to be concentrated in the energy and service sectors. The energy sector trends are more likely to be structural rather than cyclical and so point to a possible fall in underlying productivity. While there is no hard evidence that low productivity in the service sector is structural, the low growth rates witnessed in the post-crisis period have been so much weaker than the pre-crisis average rates for so long that it is hard to ignore the possibility that underlying productivity in this sector may have slowed.

Overall, these findings are consistent with the Monetary Policy Committee's judgement in the May 2011 *Inflation Report* (page 55) that underlying productivity growth is likely to have been weaker than usual since the start of the crisis, although there is considerable uncertainty in any evaluation of underlying productivity growth. It is, however, likely that, alongside substantial spare capacity within the labour market, a margin of spare capacity remains within companies.

References

Benito, A, Neiss, K, Price, S and Rachel, Ł (2010), 'The impact of the financial crisis on supply', *Bank of England Quarterly Bulletin*, Vol. 50, No. 2, pages 104–14.

Cunningham, A (1997), 'Quantifying survey data', *Bank of England Quarterly Bulletin*, August, pages 292–300.

Dale, S (2011), 'Productivity and monetary policy', available at www.bankofengland.co.uk/publications/Documents/speeches/2011/ speech519.pdf.

Disney, R, Haskel, J and Heden, Y (2003), 'Restructuring and productivity growth in UK manufacturing', *Economic Journal*, Vol. 113, Issue 489, pages 666–94.

Faccini, R and Hackworth, C (2010), 'Changes in output, employment and wages during recessions in the United Kingdom', *Bank of England Quarterly Bulletin*, Vol. 50, No. 1, pages 43–50.

Hagelund, K (2009), 'Productivity growth in Norway 1948–2008', Norges Bank Report, 2/2009.

IMF (2009a), 'From recession to recovery: how soon and how strong?', *World Economic Outlook*, April, Chapter 3, pages 103–38.

IMF (2009b), 'What's the damage? Medium term output dynamics after financial crises', *World Economic Outlook*, October, Chapter 4, pages 121–51.

IMF (2011a), 'Germany — Staff Report for the 2011 Article IV Consultation', *IMF Country Report No. 11/168*, July.

IMF (2011b), 'Spain — Staff Report for the 2011 Article IV Consultation', *IMF Country Report No. 11/215*, July.

Martin, B and Rowthorn, R (2012), 'Is the British economy supply constrained?', Centre for Business Research, University of Cambridge.

Möller, J (2010), 'Germany's job miracle in the world recession — shock-absorbing institutions in the manufacturing sector', *Applied Economics Quarterly*, Vol. 61, pages 9–28.

Reinhart, C and Rogoff, K (2008), 'Is the 2007 US sub-prime financial crisis so different? An international historical comparison', *American Economic Review*, Vol. 98, No. 2, pages 339–44.

Reinhart, C and Rogoff, K (2009), *This time is different: eight centuries of financial folly*, Princeton University Press.

Considering the continuity of payments for customers in a bank's recovery or resolution

By Emma Carter of the Bank's Customer Banking Division.⁽¹⁾

The robustness of payments infrastructure, and the associated ability of payments to flow seamlessly, is an important contributor to financial stability. The United Kingdom's payments infrastructure has historically proved to be efficient and robust. But, in a situation where a bank is in difficulty or fails, the need to ensure that customers can continue to make and receive payments may become challenging. This article draws together and discusses some of the issues in the way that UK payments and payment schemes work in stressed scenarios. It highlights some possible enhancements which could help to achieve minimal disruption to payment flows in the event that a bank gets into difficulty or fails — a subject the authorities, payment schemes and banks have been addressing in recent months. It looks at elements of recovery and resolution planning from the specific perspective of retail payments.⁽²⁾

Introduction

A payment is the transfer of money from one individual or business to another. Payments are crucial to the efficient functioning of the economy. They are essential for individuals to receive their salary and pay their bills, for businesses to buy and sell goods and services, and for the Government to receive taxes and make welfare payments.

The systems that facilitate payments⁽³⁾ are a key component of the United Kingdom's financial infrastructure, ensuring that bank⁽⁴⁾ customers' payment instructions result in payments reaching the intended destination on time. They are therefore important to maintaining financial stability and confidence in the banking system. Payment schemes, such as Bacs and Cheque & Credit Clearing Company (C&CCC), are responsible for system governance and rules for participation.

When banks are operating under normal financial conditions, payments flow seamlessly between participants in the banking system. But when a bank is recovering from a period of stress it may need to take specific actions to retain access to the payment schemes while it recovers (so that its customers can continue to make and receive payments). A recovering bank may be able to take these actions itself. But when a bank fails, and is taken into 'resolution', it is the authorities⁽⁵⁾ that will take action to ensure the failed bank's customers can continue, or resume, their payments activity with minimal disruption. This is critical to support financial stability because if a failed bank's customers were unable to receive their salaries and pay their bills for a prolonged period of time, this could impact the wider economy and cause a loss in confidence in the banking system. The Bank of England is the resolution authority⁽⁶⁾ and as such leads and manages the resolution process for such firms (see the box on page 151) including aspects on payments.

Bank recovery and resolution methods used in the past have resulted in little or no disruption to payments. But the landscape for bank recovery and resolutions is evolving and it is important that in future these processes do not result in undue disruption to payments. Following the publication of the Financial Stability Board's⁽⁷⁾ (2011) 'Key attributes of effective resolution regimes for financial institutions', the authorities will be thinking about developments to the United Kingdom's resolution planning which could potentially impact plans for payment operations in resolution scenarios.

(6) See Davies and Dobler (2011).

⁽¹⁾ The author would like to thank Andrew Forrest for his help in producing this article.

⁽²⁾ It is not intended to represent in any way a comprehensive analysis or assessment of any other aspect of recovery and resolution plans or resolution planning.

⁽³⁾ Interbank payment systems are arrangements designed to facilitate or control the

transfer of money between financial institutions who participate in the arrangements. (4) This article refers to all credit institutions as banks.

⁽⁵⁾ In this article 'authorities' refers to one or more of HM Treasury, the Financial Services Authority and the Bank of England.

⁽⁷⁾ The Financial Stability Board was established to co-ordinate internationally the work of national authorities and international standard setters and to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies in the interest of financial stability.

Name of payment scheme	Types of payments offered	Key information	Daily average volume of payments in 2011	Daily average total value of payments in 2011 (£ millions)
Bacs Payment Schemes Limited (Bacs)	 Direct debits (eg mobile phone and utility bills). 	Three working day clearing cycle.	22,776,896	17,383
	 Direct credits (eg salary and pension payments). 	 Deferred multilateral net settlement.^(a) 		
Faster Payments Service (FPS)	 Internet and telephone banking payments (eg person-to-person). 	 Same-day payment usually credited within a few hours. 	2,092,931	936
	• Standing orders (eg rent payments).	 Deferred multilateral net settlement three times daily. 		
Cheque & Credit Clearing Company (C&CCC)	 Cheques (eg person-to-person and paying small businesses). 	Three working day clearing cycle.	2,932,339	2,804
	• Bankers' drafts (eg car purchases).	 Deferred multilateral net settlement. 		
CHAPS Clearing Company Limited (CHAPS)	CHAPS payments (eg business-to-business transactions	 Used by individuals for high-value payments. 	135,550	254,489
	and house purchases).	Real-time gross settlement.		
LINK	 ATM withdrawals (eg for cash purchases). 	 Deferred multilateral net settlement the following day. 	11,450,199	762

Table A Examples of UK payment schemes

Sources: Bank of England and Payments Council.

(a) In a deferred multilateral net settlement system, details of payments are released to the receiving bank prior to the members settling their payment obligations. Settlement is achieved when net obligations are posted to accounts at the settlement agent bank (see the box on page 149 for more details). This requires members to generate less liquidity than would be required in a gross settlement system.

And as part of banks' own recovery and resolution plans⁽¹⁾ (RRPs) (which will be required by the Financial Services Authority (FSA) under forthcoming rules)⁽²⁾ they will have to consider in detail their payment operations and interactions with the payment schemes. The authorities, payment schemes and banks should work jointly towards ensuring that payment operations do not act as an undue constraint on future recovery and resolution options.

This article focuses on payments-specific aspects of the United Kingdom's work in relation to bank recovery and resolution. The article begins by explaining some of the payment schemes used by bank customers in the United Kingdom, and sets out how these are managed to ensure robustness and efficiency in their day-to-day processing of payments. The article goes on to outline how payments have been dealt with in a number of the United Kingdom's past bank resolutions. Finally, drawing on these examples, the article will highlight some areas where changes could be considered by payment schemes and banks, in conjunction with the authorities, so that all parties are best prepared for the payments implications of future recovery and resolution scenarios.

UK payment schemes

In the United Kingdom there are a variety of payment schemes, each providing a different service. Both wholesale and retail payments are used by individuals and businesses in the United Kingdom, but this article will focus on retail payments which individuals primarily use in their day-to-day activities. Some examples of payment schemes are given in **Table A**. Payment schemes can be accessed by banks either directly as scheme members, or indirectly using payment services provided by a direct member. For example, there are only 16 direct members of Bacs, but many more banks are able to provide Bacs payments to their customers via indirect participation.

Payment schemes in the United Kingdom have proved efficient and robust in handling their day-to-day business. The major payment schemes adhere to international standards⁽³⁾ to ensure that risks within the systems are identified and minimised, and that the schemes can withstand periods of financial stress. Examples of these standards include: settlement being conducted in central bank money where practical and available (see the box on the Bank of England's role in payments on page 149); payment schemes having objective, risk-based and publicly disclosed criteria for participation; and payment schemes having clearly defined rules and procedures to manage the default of one of their members, so that losses and liquidity pressures are contained, and payments can continue to function smoothly. The payments infrastructure worked well during the recent financial crisis and the rules and operations of the core payment systems did not amplify shocks.

⁽¹⁾ The recovery plans will reduce the likelihood of failure by requiring banks to identify options for regaining financial strength in the event that they get into difficulty. The resolution plans will show how a bank will wind down if it fails, and thereby enable an assessment of the potential effect on financial stability and identification of any significant barriers to resolution.

⁽²⁾ See Financial Services Authority (2012).

⁽³⁾ See Bank of England (2012), Payment Systems Oversight Report 2011, available at www.bankofengland.co.uk/publications/Pages/news/2012/038.aspx for the most recent assessment of overseen payment systems against international standards.

The Bank of England's role in payments

The Bank has a variety of roles in relation to payments largely stemming from its objective to support financial stability:

- The Bank acts as settlement agent for members of CHAPS, Bacs, Faster Payments, LINK⁽¹⁾ and C&CCC. This means that it provides accounts to payment scheme members to enable them to settle their payment obligations between one another. These accounts are held in the Bank's real-time gross settlement system (which provides for the immediate settlement of payments with finality). Settling using money held at the central bank is less risky than settling using money held at a commercial bank as central bank money is the ultimate risk-free settlement asset.
- The Bank oversees systemically important payment systems⁽²⁾ under the statutory framework set out in Part 5 of the Banking Act 2009.⁽³⁾ It assesses the risks that each system could pose to financial stability and identifies areas where action should be taken to reduce risks (for further details see Bank of England (2012), *Payment Systems Oversight Report 2011*).

The United Kingdom's existing payment schemes were not built with bank recovery and resolution scenarios in mind. Therefore, schemes and banks may like to consider the impact that these challenging scenarios may have on their operations. The ultimate goal is that disruption to payments is minimised during a bank's recovery or resolution process, and that payments infrastructure and operations do not present barriers to the execution of any bank resolution method.

Considering retail payments in past bank resolutions

During a bank resolution, the ability of customers to continue, or resume, making and receiving payments is important to maintaining financial stability (this includes retaining access to their insured deposits).⁽¹⁾ The Bank has been involved in a number of resolutions in recent years, both before and after the creation of the Special Resolution Regime (SRR) in 2009.

In all past resolutions the authorities have worked towards there being little or no disruption to the payment activities of the failed banks' retail customers. One way that continuity of payments was achieved was by keeping the whole of a bank running as one entity. For example, in the case of Northern Rock, HM Treasury took the bank into temporary public ownership in February 2008. It remained solvent and could continue to meet its payment obligations. It could therefore continue to provide banking services, including

- The Bank requires payment scheme access itself in order to provide banking services to its own customers (including other central banks and UK Government departments), so it is also an operational user of some of the schemes.
- The Bank attends meetings of the Payments Council Board (the organisation which sets strategy for UK payments). It participates in these meetings as an observer only and does not vote on decisions. It also has representation on the boards of relevant payment schemes.
- The Bank of England is the resolution authority for UK-incorporated firms authorised by the FSA to accept deposits. It decides which resolution tool to use and manages its implementation.⁽⁴⁾ The Bank and the FSA are working together with individual banks on developing banks' recovery and resolution plans.
- Not all LINK members are able to hold a settlement account at the Bank as some are not banks.
 Construction and CLADE Data Forther Depresente and other provide the provident the provide the providet the providet the providet the providet the providet the pr
- (2) Currently these are CHAPS, Bacs, Faster Payments and others outside the remit of this article (CLS, payments arrangements embedded in CREST, LCH.Clearnet and ICE Clear Europe).
- (3) Banking Act 2009, Part 5, available at www.legislation.gov.uk/ukpga/2009/1/part/5.
 (4) With the exception of taking a bank into temporary public ownership which is the decision of HM Treasury.

payments, to its customers in exactly the same way as it did before. From a payments perspective, a resolution method which keeps a bank together as one whole entity is the least complicated option. This is still an option within the SRR. For example, by taking a whole bank into temporary public ownership, although this exposes public funds to the greatest risk, and therefore the failure of a bank would need to pose a serious threat to financial stability in order for this option to be selected. Alternatively, a whole bank could be transferred to a private sector purchaser or to a bridge bank.⁽²⁾

In the case of Northern Rock, the bank was subsequently split in January 2010 into two entities: Northern Rock plc (a savings and mortgage bank) and Northern Rock (Asset Management) plc (an asset management vehicle providing for the orderly wind-down of the remaining business). Following this split, Northern Rock plc was able to continue to provide payment services to its customers as it acquired the 'old' Northern Rock's payment scheme membership and indirect participation relationships via a statutory Transfer Order,⁽³⁾ which stated the terms for separation. One of the payment

For more information on the Financial Services Compensation Scheme insurance coverage, see www.fscs.org.uk/what-we-cover/about-us/.

⁽²⁾ A bridge bank is a subsidiary company set up by the Bank of England specifically to facilitate a transfer of property, rights and obligations under the UK Special Resolution Regime. It is wholly owned by the Bank of England, and authorised by the FSA to perform whatever regulated activities are required of it (such as taking deposits).

^{(3) &#}x27;The Northern Rock plc Transfer Order 2009', available at www.legislation.gov.uk/uksi/2009/3226/contents/made.

scheme memberships that it acquired was for Bacs, which would normally require an entity to have a minimum credit rating history in order to be eligible. As a new entity, Northern Rock plc did not have any credit rating history and so the Transfer Order included a temporary waiver of Bacs' minimum credit rating membership criterion.

Another example of a successful resolution during which disruption for customers was closely managed was that of Southsea Mortgage and Investment Company Limited in June 2011. In this instance, the Bank Insolvency Procedure (BIP) was used since it was judged that the failure of the bank would not have a systemic impact on the financial system. Southsea customers were paid their insured deposits (up to £85,000) automatically by the Financial Services Compensation Scheme (FSCS) via cheque soon after the resolution. They could then pay this into an alternative bank account, or open another account for this purpose. It was appropriate to use the BIP tool in the case of Southsea as it was a small bank which was not in the business of providing current accounts, meaning that the remaining industry players could easily absorb its customers, and there was not a large number of people needing to contact their employers and service providers to change their payment instructions. Disruption for Southsea's customers was thus effectively managed and the impact on the wider economy was contained.

A resolution can become more complicated when the SRR transfer tools are used to transfer part of a bank to a private sector purchaser or bridge bank (see the box on page 151). When using the transfer tools to conduct a partial bank transfer it is still a priority to ensure the continuity of payments for customers. In the case of the Dunfermline Building Society resolution in March 2009, a private sector purchaser, Nationwide Building Society, acquired core parts of the business. A further portion was transferred to a small Bank of England bridge bank (this was later sold to Nationwide in July 2009) and the remainder of Dunfermline's business was placed into the Building Society Special Administration Procedure. Nationwide acquired Dunfermline's infrastructure and staff needed to run the business it had taken on, by virtue of the Bank's property transfer instrument.⁽¹⁾ Nationwide could then manage its newly acquired bank accounts using Dunfermline's existing banking platform, meaning that banking services continued to operate normally for customers. Some payment services required by the bridge bank were also provided by Nationwide so that customers of the bridge bank received continuity of service also.

Reflecting on use of the SRR

Although resolutions to date have been successfully conducted with minimal impact on the continuity of customer payments, these experiences can still be useful when considering improvements and how to deal with more complicated scenarios in the future.

There are a number of variables which could increase the complexity and risk involved in the continuity of payments in a future bank resolution. Some examples of these are:

- When using the transfer tools it may not always be possible to find a sole private sector purchaser willing to buy the majority of the business. A bank may therefore need to be split up into multiple parts for sale.
- A private sector purchaser may not always be a bank that has existing access to the payment schemes (for example, it may be an entity which did not previously provide a retail banking business).
- A failing bank may be a direct member in the payment schemes providing payment services to indirect participant banks that are not scheme members themselves. These indirect participants may depend upon the failing bank to make their customers' payments and therefore there would also be an impact on these indirect participant banks (and their customers) in the event of the direct member's failure.
- It may not be possible to use the BIP tool on a large bank. Challenges to banking continuity may arise as there would be more customers requiring FSCS payout and potentially requiring new bank accounts to be opened. This could lead to capacity constraints on the FSCS and the remaining banks absorbing the failed bank's customers. The decision to use the BIP tool would depend on the ability to pay out and for customers to resume their banking activities within a reasonable amount of time.

Factors such as these may make a resolution more complex, and the provision of payments with minimal disruption more difficult to achieve. It is therefore important that banks, payment schemes and authorities are well prepared for all eventualities in advance.

Preparing for future bank recovery and resolution scenarios

In 2011, the Bank led a Financial Stability Board (FSB) workstream looking at barriers to recovery and resolution in payment operations. The Bank consulted with banks and payment schemes in the United Kingdom in order to understand the issues from various perspectives. Discussions highlighted some areas for further work and put forward some suggestions for improvements in order to overcome existing

A property transfer instrument is a legal instrument made by the Bank of England under the Banking Act 2009, and has the legal effect of transferring property, rights or liabilities of a failed bank to another entity.

The Special Resolution Regime objectives and tools

Following the financial crisis of 2008, the Banking Act 2009 created the Special Resolution Regime (SRR) which gave the authorities a permanent framework for dealing with distressed banks. The SRR has a number of objectives:

- to protect and enhance the stability of the financial systems of the United Kingdom;
- to protect and enhance public confidence in the stability of the banking systems of the United Kingdom;
- to protect depositors;
- to protect public funds; and
- to avoid interfering with property rights in contravention of a Convention Right (within the meaning of the Human Rights Act 1998).⁽¹⁾

Achieving the continuity of customer payments soon after resolution is necessary in order to meet the SRR objectives for all banks providing a current account service.

The SRR created a set of statutory resolution tools. The use of these tools will be triggered following a decision by the FSA that certain conditions are met. These conditions are, broadly, that:

- i. the bank is failing, or is likely to fail, to satisfy the threshold conditions for authorisation; and
- ii. having regard to timing and other relevant circumstances, it is not reasonably likely that action will be taken that will enable the bank to satisfy threshold conditions.

It is the Bank's responsibility to select from the SRR tools available. The tools allow the authorities to:

 apply to place a bank into the Bank Insolvency Procedure (BIP) which is designed to allow rapid payout to customers who are insured by the Financial Services Compensation Scheme, or to facilitate the transfer of eligible accounts to another bank;

- transfer all or part of a bank to a private sector purchaser;
- transfer all or part of a bank to a bridge bank, pending a future sale;
- apply for the use of the Bank Administration Procedure to deal with a part of a bank that is not transferred. This differs from a BIP as the bank administrator is obliged to ensure that the residual bank continues to provide services to the private sector purchaser and/or bridge bank until new arrangements are in place; and
- place a bank into temporary public ownership if it is HM Treasury's decision to do so. This is not the first tool considered for use as it uses taxpayer funds to recapitalise the bank.

The Bank has managed two resolutions under the SRR to date: Dunfermline Building Society in March 2009, using both the transfer tools and the Building Society Special Administration Procedure; and Southsea Mortgage and Investment Company Limited in June 2011, using the BIP tool. Since the introduction of the SRR, the high-level actions the authorities can take when resolving a bank have been refined and set out publicly so that all parties are able to plan for resolution more precisely.

The UK Government (alongside the other G20 governments) has signed up to the Financial Stability Board's 'Key attributes of effective resolution regimes for financial institutions'. The objective of these attributes is to allow the authorities to resolve banks in an orderly manner without taxpayer exposure to loss from solvency support. The implementation of these would include the introduction of a new resolution tool to 'bail-in' a failing bank — that is, to recapitalise it through subjecting creditors to loss and converting their debt claims to equity.

 Banking Act 2009, Part 1, Section 4, available at www.legislation.gov.uk/ukpga/2009/1/section/4.

barriers to recovery and resolution stemming from payments. The group's recommendations fed into the FSB report on 'Key attributes of effective resolution regimes for financial institutions'.

The FSA's future guidance and rules for RRPs will require banks to consider any payments issues that could hinder their ability to recover or be resolved in an orderly manner. This work will include thinking about how they access the payment schemes and what they would be able to do to ensure that this access is maintained without increasing risk for other payment scheme members, or any direct member providing them with payment services. It will also include, in a resolution context, considering the potential need to split up their business lines while avoiding severe disruption to payments. This will be particularly relevant for large banks which may have numerous business lines and legal entities sharing the same payment scheme membership and pools of liquidity. The remainder of this article sets out some of the issues and ideas that were discussed during the workstream and related consultations.

Retaining payment scheme membership

It is helpful for payment schemes to understand how their rules and processes may play out during the recovery or resolution of a member bank. For example, a minimum credit rating criterion for payment scheme membership is a useful measure for judging and controlling the level of risk that a member may bring to the system. Nevertheless, if a member is financially stressed but still a potentially viable bank and is taking recovery actions, it would not be desirable for it to be mechanistically excluded from a payment scheme due to a credit rating downgrade.

Payment schemes have made progress in this area by considering ways that a member whose credit rating has been downgraded could retain access without increasing risk for other members. For example, by requiring an affected member to increase its provision of collateral to cover its net debit position (the amount it is in debt to other members at any time) in full; an arrangement that was implemented in Bacs in 2011. By clearly outlining such a requirement in scheme rules, members are able to plan in advance for their potential collateral requirements (and incorporate this into their RRPs) so that they are best prepared to meet these additional requirements. Measures to allow a member in difficulty to minimise the additional risk that it could bring to the system supports the member's recovery while containing the risk to other scheme members and hence reducing the chance of contagion.

Acquiring payment scheme membership

It might be necessary for a new entity to take on payment scheme membership quickly if it acquires part of a failing or failed bank, in order to ensure continuity of customer payments. This was necessary in the event of the partial transfer of Dunfermline's business to Nationwide. However, the new entity could be a bridge bank or a private sector purchaser which for some reason does not immediately meet scheme membership eligibility requirements. In business as usual, payment schemes have robust application and checking processes for potential new members to protect the integrity of the scheme. These processes can be lengthy and could act as a barrier to the recovery or resolution of a member bank. It is for this reason that the Bank's property transfer powers explicitly allow for a transferee to be treated 'for any purpose, as the same person as the transferor'.⁽¹⁾ Therefore, if the Bank transfers payment scheme membership to a bridge bank or private sector purchaser they would take on the failed bank's existing payment scheme membership and would not need to apply as a new member. Such a transfer will not, of course, increase risk to the payment scheme or its members as the transferee will, in all cases, be an appropriately authorised entity, and the scheme's existing protections and requirements will continue to apply to that transferee as scheme member, just as they applied to the failed bank as a member. The Banking Act 'Code of Practice'⁽²⁾ explicitly requires the authorities to seek to ensure that any transferee which takes on direct payment scheme membership is suitable to do so. By transferring payment scheme membership to an acquiring entity the acquirer has a grace period to allow it to obtain a

credit rating or otherwise demonstrate to the scheme its creditworthiness.

Ensuring continuity of indirect memberships

Many banks will access payment schemes indirectly via a direct member providing payment services. Payment schemes and banks therefore need to be aware of these interlinkages during the recovery or resolution of either a direct or indirect member. Challenges may arise when an indirect participant gets into difficulty and the direct member providing it access takes unexpected action to protect itself, or when a direct member providing indirect participants with access goes into resolution. The former scenario was observed in the lead up to the failure of Lehman Brothers Holdings Inc.⁽³⁾ when its banks across the world became less willing to grant intraday liquidity with which to make its payments. The banks started to apply additional conditions to reduce their exposures, including requiring Lehman to lodge more collateral. Lehman was not prepared to meet this call for additional collateral, and the act of doing so was therefore a drain on its liquid asset pool. This contributed materially to the speed of its demise. Had Lehman been prepared for the actions these banks would take, it may have been better able to cope with the need to provide the additional collateral. Despite the somewhat different context of an investment bank using the wholesale markets to fund its activities, this case study demonstrates the scope for unexpected actions by payment counterparties to complicate a bank's situation when it is in difficulty.

There are actions that can be considered by direct members and indirect participants to prepare for recovery and resolution scenarios. These might include:

- Indirect participants who are large (either by size or payment flows) could join the payment schemes directly. The Bank has been encouraging this in CHAPS.⁽⁴⁾
- · Smaller indirect members, for whom indirect participation is the only viable option, could ensure that the contracts that they have in place with the direct member provide them with assurance about the continuity of service that they will receive in response to certain events. This would include setting out the circumstances in which additional collateral might be requested from the indirect participant, and on what grounds the relationship could be terminated and with what notice period.
- Although the costs and benefits would have to be assessed, it might be useful for indirect participants to consider having a contingency arrangement in place for payment scheme access via an alternative direct member.

Section 36(1)(b) of the Banking Act 2009.

See 'Banking Act 2009 Special Resolution Regime: Code of Practice', November. See Ball *et al* (2011). (2)

⁽³⁾

⁽⁴⁾ See Salmon (2011)

These relationships need to be carefully managed so that the level of risk is minimised for all parties involved.

Banks' internal management of information

It would be beneficial for banks to be able to segregate FSCS-insured and uninsured deposits in the event of their resolution. This would go further than the single customer view that banks already have in place which provides a single aggregate overview of the compensation amount payable to each depositor in the event that a bank fails. Developing this would be helpful as it may in some instances enable a failed bank's customers to access and make payments with their insured deposits sooner following resolution, while ensuring that uninsured deposits are not used. This could involve banks needing to do some developmental work on their own banking platforms in order that such segregation is achievable.

A bank's management information on payment flows is critical in the event that it goes into recovery or resolution. For example, in resolution it would be important for a bridge bank or private sector purchaser acquiring part of a failing or failed bank's business to understand the payments made and received by that part of the business so that it is able to quickly ascertain and fulfil its financial obligations in the payment schemes. Banks may be required to consider this as part of their RRPs.

Conclusion

Minimising disruption to payments during a bank's recovery or resolution is critical to maintaining financial stability. Without

payments, bank customers would not be able to carry out everyday financial transactions such as receiving their salary and paying their bills. This could cause a loss of confidence which could spread to the wider banking system. To ensure that disruption is minimised, the Bank has been working with the payment schemes and banks to consider the challenges associated with payment systems and operations when a bank is in a recovery or resolution process.

Some of the payment schemes have already implemented specific provisions enabling a member in recovery to retain scheme access without increasing the risk for other members. The Bank has also engaged in discussions with the schemes to explain the process for membership to transfer from a failed bank to an acquiring entity, if necessary, as part of a member's resolution. Banks may also want to consider how they can segregate insured and uninsured deposits in the event of their resolution, and whether any improvements can be made to their management information on payment flows. Payment schemes and banks have both considered the implications of indirect participation in the payment schemes, and how the additional risks it might present in recovery and resolution scenarios could be minimised. Banks should ultimately be able to incorporate any specific actions into their RRPs.

With appropriate preparation, all parties should feel confident that there would be minimal disruption to payments in the event that a bank gets into difficulty or fails. This should be the case regardless of the nature of the bank, or the recovery or resolution actions taken.

References

Ball, A, Denbee, E, Manning, M and Wetherilt, A (2011), 'Intraday liquidity: risk and regulation', *Bank of England Financial Stability Paper No.* 11.

Bank of England (2012), Payment Systems Oversight Report 2011, April.

Davies, G and Dobler, M (2011), 'Bank resolution and safeguarding the creditors left behind', *Bank of England Quarterly Bulletin*, Vol. 51, No. 3, pages 213–23.

Financial Services Authority (2012), 'Recovery and resolution plan (RRP) update', 10 May, available at www.fsa.gov.uk/library/communication/pr/2012/052.shtml.

Financial Stability Board (2011), 'Key attributes of effective resolution regimes for financial institutions', October.

Salmon, C (2011), 'The case for more CHAPS settlement banks', available at www.bankofengland.co.uk/publications/Documents/ speeches/2011/speech508.pdf.

Non-rational expectations and the transmission mechanism

Summary of Working Paper no. 448 Richard Harrison and Tim Taylor

Models are important tools that economists use to help them understand the behaviour of the economy. Many macroeconomic models assume that the decisions of households and firms should depend on their expectation of future events. For example, a household's saving decision is likely to be influenced by an assessment of the income that is expected to be earned in the future. And the price a firm decides to set for its product is likely to depend on its view of the costs of production that it will incur over the period until it next resets its price. An important assumption for such models is how households and firms form their expectations of future earning and costs. The dominant assumption in macroeconomics is that expectations are formed in a way that is 'rational' (or 'model consistent'). An implication is that expectations are correct on average and that the difference between expected and actual outturns is unpredictable. In other words, households and firms do not make persistent mistakes when predicting future earnings or costs.

The rational expectations assumption is a very strong one, implying that households and firms have a lot of information about the structure of the economy. This has led economists and policymakers to examine the effects of alternative 'non-rational' expectations assumptions. Relative to the benchmark assumption of rational expectations, models that include non-rational expectations face two challenges. The first is the need to specify the mechanism through which expectations are generated. The second is how to capture the way that expectations of future earnings and costs affect the decisions that households and firms make about their current savings and pricing.

This paper is concerned with the second challenge. There are two main alternatives to modelling decision making when expectations are non-rational. To see the difference between these, suppose, as an example, that a household makes a decision over how much to save and how much to spend. The decision depends on the household's expectations of future earnings: higher future earnings allow the household to borrow to finance higher spending today. There are two ways to characterise how the household decides how much to spend and save. The first approach relies on the consumption 'Euler equation', which states that the household's current consumption should depend on the expected level of consumption next period and the real interest rate. Other things equal, a higher real interest rate will encourage households to consume less and save more. This approach to non-rational expectations therefore assumes that household consumption is determined by the Euler equation, but with a non-rational expectation of future consumption. The second approach is to characterise the household's consumption decision in terms of the household's expectations of its entire lifetime income. Other things equal, the higher the household's expected lifetime income, the higher the household's current consumption. In this approach, consumption is therefore determined by non-rational expectations of lifetime income. We call this the 'long-horizon' approach.

Under rational expectations, the 'Euler equation' and 'long-horizon' approaches give identical answers: the household's consumption is the same in both cases. But under non-rational expectations, the predictions for consumption can be different. The purpose of this paper is to investigate how significant these differences may be. To do so, we build a model of household and firm behaviour under three assumptions: rational expectations, non-rational 'Euler equation' expectations and non-rational 'long-horizon' expectations. We then compare the behaviour of key variables for these variants of the model.

We find that when households and firms have expectations that are close to rational expectations, there is little difference between the behaviour of the 'Euler equation' and 'long-horizon' versions of the model. This means that the properties of key variables such as consumption and inflation - for example, in response to a change in the interest rate set by the monetary policy maker — are very similar, regardless of the assumptions we make about expectations. But when households and firms use expectations that are further away from rational expectations, the differences between the properties of the 'Euler equation' and 'long-horizon' versions become larger. This key result has implications for economic model builders. For cases in which households and firms have expectations of future income and costs that are very different from rational expectations of those variables, the model builder should choose the approach carefully.

Misperceptions, heterogeneous expectations and macroeconomic dynamics

Summary of Working Paper no. 449 Richard Harrison and Tim Taylor

An important question for economic policy makers is the extent to which the expectations of key decision makers in the economy affect — and are affected by — economic outturns. In particular, it is possible that mistaken beliefs about the behaviour of the economy can influence the behaviour of households and firms in a self-fulfilling manner. For example, a belief that inflation will be more persistent could influence price-setting behaviour so that actual inflation turns out to be more persistent. Such a feedback could reinforce the initial belief causing more households and firms to believe that inflation will be persistent.

This type of mechanism is illustrated in the following quote from the Bank of England's February 2008 *Inflation Report*: 'If households' and businesses' medium-term inflation expectations are heavily influenced by their recent experience, then repeated above-target outturns may cause them to place weight on the assumption that inflation will be persistently above [the inflation target of] 2%. If those expectations were built into higher wages and prices, that would raise medium-term inflationary pressures.'

To investigate this phenomenon, we build a small macroeconomic model in which the decisions of households and firms depend on their expectations for future income and costs, so that spending and price-setting decisions depend on expectations extending into the distant future. We assume that, to form their expectations, households and firms have access to a small set of alternative 'predictors'. These predictors are simple forecasting equations for relevant variables (for example, future inflation could be forecast by inputting recent observations for inflation into a simple equation). Households and firms choose between these predictors based on their recent forecasting performance. So a predictor that has forecast (say) inflation very well over the past few quarters will tend to be used more than a predictor with a worse forecasting record.

This 'dynamic predictor selection' creates the possibility of a feedback process between beliefs about the behaviour of the economy and its actual behaviour. We find that it is straightforward to generate this type of effect in our model under the assumption that households and firms choose between two predictors. The first predictor has very good properties when used by all households and firms. Its forecasting performance is close to the best possible predictor (the 'rational expectation'). The second predictor is a 'misperceptions predictor' which embodies a mistaken belief that inflation is more persistent. When we simulate the model, we are able to generate occasional periods of high, volatile and persistent inflation. This occurs when (random) shocks generate enough persistence in the inflation rate observed by households and firms to lead more of them to choose expectations based on the misperceptions predictor.

Forecasting UK GDP growth, inflation and interest rates under structural change: a comparison of models with time-varying parameters

Summary of Working Paper no. 450 Alina Barnett, Haroon Mumtaz and Konstantinos Theodoridis

In recent years, a number of papers have applied econometric models that allow for changes in model parameters. In general, this literature has examined and investigated how the properties of key macroeconomic variables have changed over the past three decades. So the underlying econometric models in these studies have therefore been used in a descriptive role.

The aim of this paper, instead, is to consider if these sophisticated models can offer gains in a forecasting context — specifically, GDP growth, CPI inflation and the short-term interest rate relative to simpler econometric models that assume fixed parameters. We consider 24 forecasting models that differ along two dimensions. First, they model the time-variation in parameters in different ways and allow for either gradual or abrupt shifts. Second, some of the models incorporate more economic information than others and include a larger number of explanatory variables in an efficient manner while still allowing for time-varying parameters. We estimate these models at every quarter from 1976 Q1 to 2007 Q4. At each point in time we use the estimates of each model to forecast GDP, CPI inflation and the short-term interest rate. We then construct the average squared deviation of these forecasts from the observed value relative to forecasts from a simple benchmark model.

A comparison of this statistic across the 24 forecasting models indicates that allowing for time-varying parameters can lead to gains in forecasting. In particular, models that incorporate a gradual change in parameters and also include a large set of explanatory variables do particularly well as far as the inflation forecast is concerned, recording gains (over the benchmark) which are significant from a statistical point of view. Models that include this extra information also appear to be useful in forecasting interest rates. Models that incorporate more abrupt changes in parameters can do well when forecasting GDP growth. This feature also appears to surface during the financial crisis of 2008–09 when this type of parameter variation proves helpful in predicting the large contraction in GDP growth.

Neutral technology shocks and employment dynamics: results based on an RBC identification scheme

Summary of Working Paper no. 453 Haroon Mumtaz and Francesco Zanetti

Estimating the impact of changes in technology on the economy is one of the key aims of recent empirical research. And policymakers are equally interested, because in order to determine the appropriate stance of monetary policy it is essential to know what shocks are hitting the economy, and what their impact will be. The consensus from this literature is that the estimated impact can depend quite heavily on the way changes or shocks to technology are measured.

This paper contributes to this strand of the literature by proposing an improved procedure for measuring shocks to technology. In particular, we use information from a theoretical model of the business cycle which embeds labour market frictions to disentangle changes in technology from other shocks hitting the economy.

The estimation method comprises the following steps. First, we use the theoretical model characterised by search and matching frictions in the labour market to gauge the impact of the technology shock on vacancies, labour market tightness and other key macroeconomic aggregates. Second, we impose the predicted movements in these variables on US data, which has been the subject of many studies in the past. This is done via an empirical model referred to as a vector autoregression (VAR) where each included variable depends on the past values of all variables in the model. By using restrictions implied by economic theory, we can identify different types of shock, thus

making the model a 'structural' VAR (an SVAR). The restrictions that we use are on the signs of impacts over particular time horizons. The SVAR is then used to estimate the response of key macroeconomic variables to technology shocks. The resulting responses of key macroeconomic variables provide us an approximation of the variables' responses to a change in technology in the United States.

Our main results are as follows. A positive shock to technology which affects labour productivity acts to increase GDP, investment, consumption and employment. This shock explains around 30% to 60% of the variation in each of these variables. This result is robust to a number of different configurations of the benchmark model and transformations of the data, such as controlling for long cycles in the data, choosing different time lags in the VAR, splitting the sample period, using alternative measures of labour market variables, and extending the length of sign restrictions on the SVAR.

One innovation is that we extend the benchmark model to allow the variance of the technology shock to change over time. We find that this shock played an important role in driving the volatility of US output during the 1970s and the 1980s. In particular, the volatility of technology declined since the early 1990s, which could explain the declined macroeconomic volatility over the same period, as highlighted in related studies.

Fixed interest rates over finite horizons

Summary of Working Paper no. 454 Andrew P Blake

Two natural questions to ask about monetary policy are 'what would happen to inflation if interest rates were a bit higher than forecast?' and 'what are the implications of interest rates not changing for some period of time?'. Satisfactory quantitative answers to both of these questions are, perhaps surprisingly, hard to come by. With many widely used forecasting models, this is not a problem. For example, the commonly used vector autoregression (VAR) — a system of equations explaining a set of interrelated variables — would allow us to simply impose a path for one of the variables with no practical consequences. But for policy we need to have a proper economic understanding, and one way of acquiring that is via a 'structural' model, which a VAR is not. Moreover, modern economics recognises the importance of forward-looking behaviour and expectations. Models where the forward-looking behaviour of agents helps explain the dynamic evolution of all variables in a coherent, equilibrium way are known as rational expectations (RE) models. Using an RE model to answer the questions just posed requires a forecaster to solve a number of quite difficult conceptual problems.

Using a general equilibrium RE model it is difficult to formalise how a higher (or indeed a fixed) interest rate is achieved. This is because such models are usually solved incorporating a monetary policy rule. These rules are conditional, and react to variables policymakers care about. Often, they are versions of the well-known Taylor rule that feeds back from inflation and growth. Departing from these rules to induce interest rates that are different from those already implied is hard to manage, and even if the technical problems are overcome it can be that the results sometimes seem perverse. Essentially, we cannot just 'fix' interest rates, as we can with VARs. In a structural model we have to have a coherent explanation of why interest rates follow the path they do (rather than what is implied by the policy rule embedded in the model). And the problem is compounded by the fact that behaviour in the model depends on what agents expect to happen after the fixed-rate path ends.

But the questions we began with are good ones that need reasonable answers. This paper explores a number of potential resolutions to modelling partially fixed interest rates in a common framework. These include imposing a sequence of anticipated or unanticipated interest rate 'shocks' that deliver the desired path, using a shock for each period the path is fixed, which seems a natural way to handle things. Unfortunately, when the strengths and weaknesses of different existing methods are compared they are all found wanting, either because they imply excessively volatile or counterintuitive forecasts. So a new approach is developed that restores more normal behaviour; but at the cost of introducing a new problem.

The new approach takes as a starting point that permanently fixed interest rates imply a well-defined trade-off between inflation and output growth, but do not imply any particular level of inflation. This is a well-known problem but (as we show) does not automatically apply in finite horizon problems, the case relevant for policymakers who publish fixed interest rate forecasts. Although at first sight the approach may seem somewhat perverse, the paper shows how to make sure it does apply for such problems. It can again be done by setting shocks, but using one more than the number of periods the rate is fixed; or by using a rule that specifically targets the interest rate, again for one period longer than the fixed-rate period. This restores intuitively sensible paths; but at the cost of introducing an equilibrium selection problem. This arises because when we use more shocks than we 'need' to fix rates, there are an infinity of well-behaved solutions that the forecaster must choose between. Equivalently, there are an infinity of rules we could use. A degree of arbitrariness in the selected solution is then inevitable. This is not as bad as it seems, though, as some paths are more 'sensible' than others (eg a path that is close to that implied by a Taylor rule). Nevertheless, the paper concludes that there is no easy solution to the finite horizon problem, and any answer to the questions we started with must inevitably be strongly caveated.

PROMISE

Report

A review of the work of the London Foreign Exchange Joint Standing Committee in 2011

This article reviews the work undertaken by the London Foreign Exchange Joint Standing Committee during 2011.

Introduction

The London 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 (FX) market in London, representatives from brokers, trade associations including the Wholesale Markets Brokers' Association, the Association of Corporate Treasurers — representing corporate users of the foreign exchange market, the British Bankers' Association and the Financial Services Authority. A list of the members of the Committee as at end-2011, and a high-level organogram, can be found at the end of this article. The Committee held six meetings during 2011.

Ongoing developments in the regulatory landscape, both in Europe and the United States, were a key theme of the FXJSC 2011 meetings. Presentations by the European Commission and the Global Financial Markets Association FX Division provided the Committee with an overview of regulatory initiatives for over-the-counter derivatives and outlined how the FX industry had engaged with the relevant authorities. Guest speakers included senior staff from Saxo Bank, who discussed the impact of the proposed regulatory changes on non-wholesale FX markets; and from Traiana, who focused on the post-trade market segment.

In 2011 a working group was launched under the auspices of the FXJSC to review developments in electronic trading and propose best-practice recommendations. These were discussed by the Committee and incorporated into the latest version of the Non-Investment Products (NIPs) Code following their approval.

Non-Investment Products Code

The NIPs Code is a voluntary code of good market practice drawn up by market practitioners covering the FX 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 for the relevant sections. An updated version of the Code was published in November 2011⁽¹⁾ to include new sections on electronic trading and capacity and volume management. The Code also included expanded text on standard settlement instructions (SSIs) and updated contingency arrangements in the event of disruption in the sterling wholesale deposit market.

Work of the FXJSC operations subgroup

The operations subgroup was established in 2002. Its members are operational managers from many major banks active in the London wholesale FX market as well as representatives from service providers and trade associations.

In 2011, the operations subgroup sponsored a variety of workstreams feeding into the 2011 NIPs Code update. In particular the group worked on enhancing the best-practice standards for SSIs and, as part of a wider industry group facilitated by CLS, produced guidelines on operational capacity and transaction volume management. The FX novation protocol workstream, in conjunction with the New York Foreign Exchange Committee's operations managers working group, was concluded in the second half of the year.

The operations subgroup has also continued to strengthen its co-operation with other international committees by joint membership of some of its working groups and regular liaison conference calls, as well as a joint meeting in October.

Work of the FXJSC legal subgroup

The legal subgroup was established in 2004 with some fifteen professional members providing in-house legal counsel for

⁽¹⁾ The NIPs Code can be accessed at:

www.bankofengland.co.uk/markets/Documents/forex/fxjsc/nipscode1111.pdf.

many of the major institutions involved in the wholesale FX market in London. The group met three times in 2011. It continued to make an invaluable contribution through its provision of legal support to the work of the FXJSC main Committee and its operations subgroup; in particular reviewing and preparing the updated NIPs Code for publication. During 2011, the legal subgroup welcomed guest speakers on topical issues from Allen & Overy, the Bank of England, International Swaps and Derivatives Association, Clifford Chance and Shearman & Sterling as well as member firms, and kept updated on developments in the global FX market.

The group continued to liaise with a range of other domestic and foreign legal committees to keep abreast of developments in FX markets.

Work of the FXJSC chief dealers' subgroup

The chief dealers' subgroup was established in July 2005. Its membership in 2011 comprised thirteen chief dealers active in the London FX market.

The subgroup met four times during 2011 to discuss conjunctural and structural developments in the FX market. Topics of conversation included market developments in the euro area as well as overseas, the September 2011 BIS Markets Committee report on high-frequency trading in the FX market,⁽¹⁾ and regulatory developments impacting FX markets globally.

International co-operation

Liaison between the eight FX 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 2011, the Canadian Committee hosted the fourth global meeting of the FX committees. Topics discussed included FX-related regulatory initiatives and trends in prime broking and electronic trading.

In October, the FXJSC operations subgroup, together with the New York Foreign Exchange Committee operations managers working group and the European Central Bank Foreign Exchange operations managers group, also held a joint meeting to discuss the workstreams of the individual groups and establish global best practices for operational issues where possible. The operations subgroups also considered regulatory developments in Europe and the United States, focusing on trade reporting and central clearing, and how they may impact FX operations.

International survey results overview

Thirty banks representing the most active participants in the London FX market, including members of the FXJSC, contributed to the fourteenth and fifteenth semi-annual surveys of FX turnover in London in April and October 2011, conducted by the FXJSC. Total turnover continued to rise markedly on the year to October 2011 (+17%), although there was a slight fall between the April and October surveys (Chart 1). Indeed after posting a 21% rise in April 2011, turnover fell 3% in October 2011 from six months earlier. This was the first fall in total turnover since April 2009. Average daily turnover recorded in the October 2011 survey was US\$1,972 billion, having reached a record high of US\$2,042 billion in the April 2011 survey.

Chart 1 Global FX^(a) daily average turnover



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

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

These developments were broadly in line with FX activity in other global centres, with all committees except the New York Foreign Exchange Committee posting a fall in turnover in the six months to October 2011. Australia reported the largest relative decrease in turnover between the April and October 2011 surveys (-23%), followed by Canada (-14%), whereas the United States posted a 14% rise. In the year to October 2011, the United Kingdom, United States and Singapore all posted strong increases in turnover, while turnover in Australia and Canada fell. Japan does not conduct a survey in October,⁽²⁾ but data for April 2011 showed turnover increased by 8% from the April 2010 survey.

⁽¹⁾ The BIS Markets Committee report can be accessed at:

www.bis.org/publ/mktc05.pdf.

⁽²⁾ The Tokyo Foreign Exchange Market Committee publishes annual turnover results.

The broad upward trend in FX spot turnover continued in 2011, despite a fall in overall turnover in the six months to October 2011. In October 2011, average daily spot turnover rose to a record survey high of US\$802 billion, 32% higher than a year earlier and 2% higher than April 2011 (**Chart 2**). The overall fall in turnover from April 2011 was more than accounted for by a 9% fall in FX swap turnover. Most other products were little changed, although currency swaps saw a large relative increase in turnover to new survey highs (+26%).



Source: London Foreign Exchange Joint Standing Committee.

The rise in FX spot turnover was driven by a marked increase in transactions with other financial institutions (OFIs), a category that includes hedge funds, central banks and sovereign wealth funds (**Chart 3**). The proportion of spot transactions accounted for by OFIs rose to 31% in October 2011, from 26% a year earlier. The growth in prime brokered spot transactions has however slowed, accounting for 25% of all spot trades in April and October 2011 (24% in October 2010).



Chart 3 UK average daily spot turnover

Turnover in all major currencies increased since October 2010, although the market share of each currency remained broadly unchanged (Chart 4). Turnover in the Australian dollar continued to grow, rising 47% from a year earlier. Over the same period, turnover in sterling currency pairs rose 14%, slightly below the increases witnessed in euro (+17%), and dollar pairs (+18%). Turnover in most emerging market currencies remained strong across regions, with particularly pronounced growth seen in the Turkish lira, Russian rouble, Singapore dollar and Mexican peso. Turnover concentration for the survey was broadly similar to that seen in October 2010; the top five banks participating in the survey accounted for 51% of overall turnover.

The forthcoming FXJSC survey results for April 2012 will be published in Summer 2012.



Source: London Foreign Exchange Joint Standing Committee

Figure 1 Foreign Exchange Joint Standing Committee: structure



Source: London Foreign Exchange Joint Standing Committee.

Tables of membership at end-2011

Members of the London Foreign Exchange Joint Standing Committee as at December 2011

Name	Firm/organisation
Brian Welch	Association of Corporate Treasurers
Christopher Bae	Bank of America Merrill Lynch
Rob Loewy	Bank of China
Richard Gill	Bank of New York Mellon
Mike Bagguley	Barclays
Eric Auld	BNP Paribas
Andrew Rogan	British Bankers' Association
James Bindler	Citi
Alan Bozian	CLS Bank
Vincent Leclercq	Crédit Agricole CIB
Martin Wiedmann	Credit Suisse
Zar Amrolia	Deutsche Bank
Heather Pilley	Financial Services Authority
Phil Weisberg	FXAll
Nick Burgin	Goldman Sachs
Frederic Boillereau	HSBC
John Nixon	ICAP
Troy Rohrbaugh	JPMorgan Chase
Roger Hawes	Royal Bank of Scotland
James Potter	Tullett Prebon
Alex McDonald	Wholesale Markets Brokers' Association
Graeme Munro	JPMorgan Chase, Chair, operations subgroup
Nick Cox	BlackRock, Chair, FX investor subgroup
Michael Cross (Chair)	Bank of England
Elizabeth Wrigley	Bank of England
Grigoria Christodoulou, Jack Garrett-Jones and Sumita Ghosh (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing

Committee chief dealers' subgroup as at December 2011

Members of the London Foreign Exchange Joint Standing Committee operations subgroup as at December 2011

Name	Firm/organisation
Nigel Brigden	Association of Foreign Banks
Michael Douglas	Bank of America Merrill Lynch
Barry Harrison	Bank of England
Pamela Bald	Bank of New York Mellon
Duncan Lord	Barclays
Andrew Rogan	British Bankers' Association
Leigh Meyer	Citi
Phil Kenworthy	CLS Services
Andreas Gaus	Credit Suisse
Nick Doddy	Deutsche Bank
Catherine Plant	Goldman Sachs
Mike Neale	HSBC
Anna Box	ISDA
Andrew Harvey	Morgan Stanley
Stephen Nankivell	Nomura
Jeremy Hill	Royal Bank of Scotland
Ian Cowell	State Street
Joe Halberstadt	SWIFT
Jane Collins	Thomson Reuters
Daniel Haid	UBS
Graeme Munro (Chair)	JPMorgan Chase
Grigoria Christodoulou, Jack Garrett-Jones, Sumita Ghosh and Richard Hailston (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee legal subgroup as at December 2011

Name	Firm/organisation	Name	Firm/organisation
Ryuichi Takami	Bank of Tokyo-Mitsubishi UFJ	Gaynor Wood	Bank of America
Bob de Groot	BNP Paribas	Richard Haynes	Citi
Bernie Kipping	Commonwealth Bank of America	Simon Goldsworthy	Deutsche Bank
Danny Wise	Credit Suisse	Carl Husselman	Deutsche Bank
Angus Greig	Deutsche Bank	Anne Moore-Williams	Financial Services Authority
Jon Pierce	Goldman Sachs	Dan Parker	Goldman Sachs
Stuart Scott	HSBC	Mehboob Lakhany	HSBC
Richard Usher	JPMorgan Chase	Christian Bettley	HSBC
Ed Monaghan	Royal Bank of Canada	Patrick Palmer	JPMorgan Chase
Roger Hawes	Royal Bank of Scotland	Barra Little	Morgan Stanley
Chris Freeman	State Street	Alex Bouchier	Royal Bank of Scotland
Niall O'Riordan	UBS	Alistair Cleverly	Standard Chartered
Martin Mallett (Chair)	Bank of England	Martin Oakley	Thomson Reuters
James O'Connor	Bank of England	Chris Allen (Chair)	Barclays
		Jacqueline Joyston-Bechal (Secretariat)	Bank of England
Speeches

PROMISE

165

Bank of England speeches

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

Costly capital and the risk of rare disasters

Ben Broadbent, Monetary Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech581.pdf

In a speech delivered at Bloomberg in London, Ben Broadbent argued that investors' fears about downside risks and the possibility of an extreme economic outcome had driven a rise in the premium for risky investment, however it is financed. This will have particularly marked effects on hurdle rates for irreversible, sunk-cost investments that are necessary to improve productivity. Therefore, he suggested that those fears, in turn, have affected the growth of UK activity. However, if those fears of downside risks were to recede, this could have pretty powerful effects on output — potential as well as actual — in a positive direction. He concluded by saying that were the (still unlikely) worst-case risks in the euro area to be realised, then our own monetary policy would again play its part in mitigating the impact. That said, he acknowledged that these interventions have their limits.

Monetary policy and the damaged economy

David Miles, Monetary Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech576.pdf

In this speech, delivered at the Society of Business Economists Annual Conference, Professor Miles explained why he believed there was a case for making monetary policy more expansionary, even when inflation had surprised repeatedly on the upside. He argued that inflation inertia could be explained by two factors: lower (but still substantial) spare capacity in the economy; and a lower impact of spare capacity on inflation. The weakened link between spare capacity and inflation meant that the costs and benefits of bringing inflation back to target faster or slower have changed. On the one side, a lot of spare capacity would be needed to reduce inflation quickly — and this meant that capital would be used less and unemployment would be higher, which would be costly in terms of welfare. On the other side, stimulating demand would put less pressure on inflation. In addition, the economy's capacity risked falling the longer output remained below potential. Professor Miles concluded that these reasons made an exceptionally expansionary monetary policy appropriate.

What is the FPC for?

Alastair Clark, Financial Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech575.pdf

In this speech, Alastair Clark discussed the objectives and instruments of the Financial Policy Committee (FPC). Alastair noted that the objective of the FPC — protecting and enhancing the resilience of the financial system - was meant to help avoid crises, not to manage them: it was a fire prevention officer, not the fire brigade. Delivering this macroprudential objective would be challenging; there was no universally accepted definition of financial stability, still less agreement on how to translate financial stability into a target for policymakers. And there were also possible tensions with other areas of public policy, in particular the objective of trying to promote economic growth. Alastair highlighted that using policy instruments for macroprudential purposes and calibrating their impact was now, and was likely to remain, partly a matter of experiment. There was relatively little empirical evidence on the effect which most potentially useful instruments had on financial stability.

The future of UK banking — challenges ahead for promoting a stable sector

Andrew Bailey, Executive Director, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech574.pdf

In this speech, Andrew Bailey discussed the current conditions facing retail banks from a prudential perspective. Andrew spoke about the pressures on interest margins, and contrasted this with previous recessions where more of the pressure came from loan losses in the context of higher nominal interest rates.

Andrew also spoke about the risks UK banks face from the euro area and the importance of continuing to develop contingency plans in the event of countries leaving the area. UK banks should take actions to maintain adequate capital against foreseeable risks, but it is important that in encouraging such actions, the authorities do not create unnecessary uncertainty.

Andrew ended by arguing that the public should be told what they pay for the services they receive from banks. So-called 'free in-credit banking' creates an illusion which does not match the reality.

Pension funds and quantitative easing

Charlie Bean, Deputy Governor, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech573.pdf

In a speech to the National Association of Pension Funds' Local Authority Conference, Deputy Governor Charlie Bean discussed the impact on pension funds of factors such as the fall in equity prices after the collapse of Lehman Brothers and the fall in long-term interest rates, in part as a result of quantitative easing (QE). Bearing in mind that QE raises the prices of other assets as well as depressing gilt yields, he found that the path of the deficit for a pension fund starting 2007 in balance, would have been broadly the same with and without QE. For a fund that was initially underfunded by 30%, however, QE would have widened the deficit by about 10 percentage points. Consequently the impact of QE depends critically on the initial position of the fund. He also noted that a variety of factors were likely to keep gilt yields low for some time yet.

Articles on the framework for macroprudential policy Paul Tucker, Deputy Governor, March-May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech580.pdf (Co-authored with Andreas Dombret)

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech578.pdf

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech562.pdf

In these three articles (two published in the *Financial Times* and one in the *Eurofi High Level Newsletter*), Paul Tucker set out the need for countries to have a macroprudential policy framework. Though central banks around the world broadly delivered price stability in the run-up to the crisis, the financial system expanded rapidly without check. The consequences have been dreadful.

While international work is under way to strengthen micro-regulatory regimes, any reforms will eventually be overtaken by structural change or by bursts of misplaced exuberance. Policymakers will need a rich macroprudential toolkit, with room temporarily to adjust regulatory requirements to head off future threats to the resilience of the financial system.

Mr Tucker stressed that, within the EU, national flexibility and regional differentiation are important. Credit cycles are not always synchronised. National macroprudential policies could be particularly useful within the euro area, where one setting for monetary policy is not always guaranteed to suit financial conditions everywhere.

Currency in search of confidence

Robert Jenkins, Financial Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech572.pdf

In this article, published in *The Times*, Robert Jenkins highlighted how a lack of confidence in the viability of the eurozone has brought risks associated with cross-border lending to the fore. Robert noted that the creation of the euro area was supposed to eliminate cross-border risk for lending within it, but that current concerns threatened to undermine this principle. While banks can plan for and manage cross-border risks in the long run by growing local deposits to match local loans, Robert noted that in the short run they may instead seek to cut, or at least limit, local loans — and thus exacerbate local deleveraging.

On counterparty risk

Andrew Haldane, Executive Director for Financial Stability, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech571.pdf

In this paper, Andrew Haldane examined the vulnerability of financial structures to counterparty concerns. Sketching a model of financial structure of the unsecured money market, Andrew demonstrated that management of counterparty credit risk was inadequate during the financial crisis. Andrew identified three possible solutions that have been proposed to mitigate such risks in the future: improved network visibility to understand credit chains; the clearing of transactions centrally to improve transparency and reduce intra-financial system debt; and building protection against counterparty default through higher capital and margining requirements. Taken together, there is an enormous amount still to be done before counterparty risk is properly recognised and managed. The good news is that the technological frontier of counterparty risk management is being pushed out by financial firms, central counterparties and systemic risk regulators.

Bank executives: now we have your attention...

Robert Jenkins, Financial Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech570.pdf

In this article, published in *Financial News*, Robert Jenkins called on bank shareholders to direct their protests at bank Boards by calling for the use of risk-adjusted performance metrics that are more closely aligned with shareholder value. The focus on short-term return on equity over recent years

created incentives to increase returns — which many banks managed some of the time — and to reduce equity — which many banks did all of the time; this had resulted in short-term gains for employees at the expense of long-term shareholder value. Robert also noted that the higher cost of capital facing some banks is not necessarily the result of rising capital requirements but more to do with the market's new-found understanding of the risks that banks run and the prospective removal of government subsidies and safety nets.

Basel II proved to be inadequate, so are the new rules really 'too severe'?

Robert Jenkins, Financial Policy Committee member, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech569.pdf

In this article, published in *The Independent*, Robert Jenkins highlighted how the Basel II capital regulations proved inadequate to ensure that banks held enough capital to support a given level of risk. Sovereign debt and senior tranches of collateralised debt obligations are cited as examples of bank exposures that proved to be a lot riskier than implied by the Basel framework. Robert concluded that 'time will tell' whether the strengthening of bank capital regulations under Basel III will prove sufficient and that it is surely prudent to err on the side of caution rather than assuming that bankers or regulators can predict the future with certainty.

Resolution: a progress report

Paul Tucker, Deputy Governor, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech568.pdf

In this speech, Paul Tucker, Chair of the Financial Stability Board's Resolution Steering Group, provided a progress report on global planning for resolution regimes aimed at addressing the problem of 'too big to fail'. Progress in this area was not optional: if risks in banking were not incorporated into the yields of bonds issued by banks, they would end up being reflected in higher sovereign borrowing costs. Specific strategies were needed to resolve complex systemically important financial institutions (SIFIs). If there was enough debt issued by the firm's holding company, one such strategy could be to write off the equity and parts of the debt, converting some of the residual debt into equity. In that case, a SIFI could be recapitalised through 'bail-in' without the complexity of separating its business lines. Some authorities were working on how to operationalise this strategy. In other circumstances, where a giant commercial bank was funded by insured deposits, the resolution strategy might revolve around using the resources of the relevant deposit insurers. In all cases, the necessary tools had to be in

the statutory resolution regime. The forthcoming EU directive was crucial to this.

What we know now: the BoE's past 15 years Charlie Bean, Deputy Governor, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech577.pdf

In this article, Deputy Governor Charlie Bean examined the lessons for monetary policy from the MPC's first fifteen years. First, hitting the inflation target did not guarantee economic stability. The answer, though, was not to jettison the inflation target but rather to utilise regulatory tools of the sort considered by the Bank's new Financial Policy Committee. Second, it was easier than expected to enter uncharted territory. During the first decade of the MPC, there seemed little danger of Bank Rate approaching zero, let alone of the MPC resorting to quantitative easing. The financial crisis changed that. Third, a long period of abnormal monetary policy settings had undesirable distributional side effects and could strain support for a central bank's actions. But the highly stimulatory policy stance should help return the economy to an even keel, which was the best medicine for all.

The 2012 BBC Today Programme Lecture Sir Mervyn King, Governor, May 2012.

Sil Mervyn King, Governor, May 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech567.pdf

In his radio speech, the first by a Bank of England Governor since Montagu Norman in 1939, the Governor reflected on three questions: what went wrong in the run-up to the financial crisis; the lessons learnt; and the reforms needed to prevent future crises.

The Governor began by noting the period of steady growth, and low and stable unemployment and inflation, in the years preceding the crisis. Though overall growth had been sustainable, fragilities had built up in the banking system, an issue the Bank raised repeatedly — though perhaps not forcefully enough — in its publications. Fuelled by an implicit taxpayer guarantee, banks became highly leveraged and too big to fail. The resulting lack of confidence in the banking system prompted significant injections of central bank liquidity and government recapitalisation of two of the United Kingdom's largest banks.

The Governor reflected on the lessons learnt from the crisis. Three areas of reform would be important. First, bank regulation, where the Financial Policy Committee would guard against the big risks to the financial system. Second, enacting a resolution mechanism would ensure that badly run banks failed safely, without causing damage to depositors. Third, restructuring the banking system by enacting the proposals made by the Independent Commission on Banking to separate essential banking services from riskier trading activities. Regulation, resolution and restructuring of the banks were the three Rs of a new approach to make banking, and so the UK economy, safer. They would be central to the work of the Bank of England.

The Governor concluded by emphasising the importance of looking to the future, and to the economic possibilities for the grandchildren of today's generation. To give them the prospect of economic stability, it was vital to reform the three Rs of the financial system. There was a historic opportunity, and a duty, to do that.

Shadow banking: thoughts for a possible policy agenda Paul Tucker, Deputy Governor, April 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech566.pdf

In this speech, Paul Tucker set out a possible ten-point policy agenda to address risks to stability from shadow banking. The objective should not be to curb non-bank finance, but to recognise where intermediation is banking in substance or in the systemic risks it creates. Shadow banking that was sponsored or operated by banks should be consolidated on to banks' balance sheets. Committed credit lines to financial companies should attract a high liquidity charge. Reforms were needed to improve the resilience of money market funds. Other lending businesses that were materially financed by short-term debt should be subject to bank-type regulation. Only banks should be able to use client moneys and unencumbered assets to finance their own business to a material extent. Reforms were needed in securities lending and repo markets. A trade repository could improve transparency. The authorities should also be able to step in and set and vary minimum haircut and margin levels.

Financial arms races

Andrew Haldane, Executive Director for Financial Stability, April 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech565.pdf

In this speech, Andrew Haldane noted that competitive battles for dominance in many fields led to arms races and negative externalities. Andrew discussed three examples of arms races in the financial sector: races for return, races for speed and races for safety. The race for returns on capital led to banks significantly increasing their leverage, leading to a risky equilibrium and sowing the seeds of the financial crisis. The increasing dominance of so-called high-frequency trading was a race for speed and led to a huge increase in order cancellations, order congestion and periods of dramatic disappearance of liquidity. Post-crisis, the race for safety led to a greater proportion of banks' refinancing done on a secured basis, increasing asset encumbrance. At high levels of asset encumbrance the financial system as a whole may be riskier as it is more susceptible to procyclical swings in the underlying value of bank balance sheets. Competitive races can generate unhealthy outcomes for the system as a whole. In finance these tragedies of the commons are, if anything, more likely than in other fields. Macroprudential policy, in the United Kingdom executed via the Financial Policy Committee, has been set up precisely to deal with these systemic phenomena.

Credit conditions for firms: stability and monetary policy Paul Tucker, Deputy Governor, April 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech564.pdf

In this speech, Paul Tucker addressed some issues facing businesses as the economy rebalances and the financial system rebuilds. Bank lending conditions were likely to remain tight for some time. Some larger companies were not heavily reliant on bank finance given access to internal funds and to capital markets. They could support smaller firms through direct lending or by setting up programmes to allow suppliers to borrow against unpaid invoices. The revival of old instruments such as bankers' acceptances, or innovations creating new instruments, could also support bank lending to business. The Monetary Policy Committee would continue to support demand so long as that was consistent with bringing inflation back to the 2% target in the medium term. Underlying growth was probably better than headline numbers would suggest. Inflation was likely to fall back more slowly than had been expected, which was potentially problematic.

Liquidity support from the Bank of England: the Discount Window Facility

Paul Fisher, Executive Director for Markets, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech561.pdf

Since the start of the crisis in 2007, the Bank has reformed and redesigned much of its Sterling Monetary Framework. One of the most significant changes to the Bank's arrangements for the provision of liquidity support was the introduction of a Discount Window Facility (DWF) in 2008. In this speech, Paul Fisher explained the principles underpinning the design of the DWF, as well as recent developments. Those included encouraging banks to 'pre-position' collateral — so that it need not be assessed at short notice in the event of a sudden and unexpected need to borrow. By March 2012, £265 billion had been pre-positioned, giving a drawing capacity of £160 billion.

Paul expected that amount to increase further over time. Paul also described the Bank's new Extended Collateral Term Repo Facility, introduced in December 2011 as a contingent operation, which could provide liquidity against illiquid collateral pre-positioned in the DWF, through a market-wide auction.

Why is their recovery better than ours? (Even though neither is good enough)

Adam Posen, Monetary Policy Committee member, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech560.pdf

In this speech, Dr Posen explained the superior recovery in the United States to that of the United Kingdom from the global financial crisis so far. He noted that the two economies suffered similar shocks and pursued similar monetary responses. The respective responses of net trade and automatic stabilisers only add to the gap in GDP to be explained. Dr Posen pointed to the stronger private investment and consumption recovery in the United States and argued that the former can be explained by lesser availability and greater misallocation of bank credit in the UK economy as well as its greater exposure to the euro area. He put the difference in consumption performance to greater fiscal austerity in the United Kingdom and a greater impact of energy costs on UK households. The relative inflation performance can be explained by one-off price-level shocks in the United Kingdom, so inflation expectations continue to be well anchored in both economies. Most of these differences are likely to diminish, but the relative inefficiency of the United Kingdom's allocation of capital to business remains a concern.

Government debt and unconventional monetary policy David Miles, Monetary Policy Committee member, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech559.pdf

In this speech, David Miles outlined why he feels concerns about the monetisation of government debt by central banks are misplaced. In the United Kingdom, those concerns have become more acute over the past few years as public debt has increased, and as the Bank of England has purchased a significant amount of government debt. Professor Miles argued that the purchases of government bonds were not undertaken to finance the Government's fiscal deficits. Rather, they were undertaken in order to loosen monetary policy and offset recessionary forces that might otherwise have created a lasting depression which could have generated deflation. Other major central banks have carried out similar balance sheet expansions in response to the impact of the financial crisis. Professor Miles noted that the tricky task ahead for those central banks is to know for how long to keep monetary policy exceptionally expansionary; not because of any practical difficulties in unwinding asset purchases, but because of the much more fundamental and timeless challenge of assessing the outlook for the economy and judging the appropriate monetary stance.

Crisis and crash: lessons for regulation

Michael Cohrs, Financial Policy Committee member, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech558.pdf

This speech outlined the lessons for regulators from the financial crisis of 2008, for which Michael Cohrs had a front-row seat, as the (then) co-head of corporate and investment banking at Deutsche Bank. Michael suggested it was clear (in hindsight) that the premise of 'efficient' market behaviour, the structure of the banking industry, and the regulatory framework, were unsuitable prior to 2008. One particular failure of regulation was that there was no single institution mandated with the responsibility, and powers, to monitor the system as a whole, identify potentially destabilising trends, and respond to them with concerted actions. The changes to financial sector regulation in the United Kingdom, proposed in June 2010, gave this responsibility to the Financial Policy Committee (FPC), which was currently in interim form. Michael noted that the prize for the FPC fulfilling its mandate — focusing on protecting and enhancing the resilience of the UK financial system - would be huge, given the sizable and persistent impact of financial crises on real activity.

Rebalancing the supply side of the UK economy: what; how; and issues for monetary policy

Spencer Dale, Executive Director and Chief Economist, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/2012/speech554.pdf

In a speech to mark the centenary of the Department of Economics at the University of Aberystwyth, Spencer Dale discussed the imperative of rebalancing the supply side of the UK economy, and explained two reasons why this process poses significant challenges for UK monetary policy.

The first policy challenge Spencer Dale highlighted was that rebalancing can be associated with a slowing in the growth of the supply capacity of the economy, including via a detachment of the long-term unemployed from the labour market. While Mr Dale was convinced that the substantial loosening of monetary policy over recent years was necessary to prevent an even deeper recession, the second challenge he noted was that this loosening may also serve to blunt some of the incentives driving the rebalancing of the economy. It encourages people to spend more and save less, and delays the reallocation of capital and labour to more productive uses. This leaves monetary policy makers facing a delicate trade-off between short-term support and stifling longer-term change.

Spencer Dale also explained that the Monetary Policy Committee (MPC) has recently begun to use a new forecasting platform to produce inflation projections, consisting of a relatively simple central organising model and a surrounding suite of alternative models. Mr Dale stressed that the introduction of this platform did not, in itself, imply any changes to the MPC's forecasts or how they set policy.

Deleveraging

Ben Broadbent, Monetary Policy Committee member, March 2012.

www.bankofengland.co.uk/publications/Documents/speeches/ 2012/speech553.pdf

In this speech, Ben Broadbent considered what the build-up of debt by UK firms and households prior to the financial crisis can tell us about the prospects for a sustainable recovery, the key risks currently facing the economy, and the implications for policymakers. He argued that non-financial domestic leverage does not need to return to some historical 'norm', because UK firms and households accumulated assets as well as liabilities before the crisis, in response to the decline in real long-term interest rates. Furthermore, there is no empirical evidence that links relative levels of debt to output growth. He suggested that an alternative explanation for the severe credit crunch was the spillover effects from the losses UK banks sustained on non-UK assets. The prospects of a sustainable recovery are therefore more closely tied to developments in the UK banking sector than the domestic non-financial sector. This means that a withdrawal of monetary accommodation could begin even if domestic debt to income ratios remain well above historical averages.

Appendices

PROMISE

Contents of recent Quarterly Bulletins

The articles and speeches that have been published recently in the *Quarterly Bulletin* are listed below. Articles from May 1994 onwards are available on the Bank's website at:

www.bankofengland.co.uk/publications/Pages/ quarterlybulletin/default.aspx.

Articles and speeches

Speeches are indicated by (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

2009 Q3

- Global imbalances and the financial crisis
- Household saving
- Interpreting recent movements in sterling
- What can be said about the rise and fall in oil prices?

- Bank of England Systemic Risk Survey
- Monetary Policy Roundtable

2009 Q4

- The financial position of British households: evidence from the 2009 NMG survey
- Accounting for the stability of the UK terms of trade
- Recent developments in pay settlements

2010 Q1

- Interpreting equity price movements since the start of the financial crisis
- The Bank's balance sheet during the crisis
- Changes in output, employment and wages during recessions in the United Kingdom
- Monetary Policy Roundtable

2010 Q2

- Collateral risk management at the Bank of England
- The impact of the financial crisis on supply
- Public attitudes to inflation and monetary policy
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2009

2010 Q3

- Understanding the price of new lending to households
- Interpreting the world trade collapse
- What can we learn from surveys of business expectations?
- Residential property auction prices
- Chief Economists' Workshop: state-of-the-art modelling for central banks
- Monetary Policy Roundtable

2010 Q4

- The history of the Quarterly Bulletin
- Index of articles 1960–2010
- The UK recession in context what do three centuries of data tell us?
- The Bank's money market framework
- Managing the circulation of banknotes
- Understanding the weakness of bank lending
- Evolution of the UK banking system
- The financial position of British households: evidence from the 2010 NMG Consulting survey
- The foreign exchange and over-the-counter interest rate derivatives markets in the United Kingdom
- Global finance after the crisis

2011 Q1

- Understanding the recent weakness in broad money growth
- Understanding labour force participation in the United Kingdom
- Global imbalances: the perspective of the Bank of England
- China's changing growth pattern
- Monetary Policy Roundtable

2011 Q2

- Assessing the risk to inflation from inflation expectations
- International evidence on inflation expectations during Sustained Off-Target Inflation episodes
- Public attitudes to monetary policy and satisfaction with the Bank
- The use of foreign exchange markets by non-banks
- Housing equity withdrawal since the financial crisis
- Using internet search data as economic indicators
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2010

2011 Q3

- The United Kingdom's quantitative easing policy: design, operation and impact
- Bank resolution and safeguarding the creditors left behind
- Developments in the global securities lending market
- Measuring financial sector output and its contribution to UK GDP
- The Money Market Liaison Group Sterling Money Market Survey
- Monetary Policy Roundtable

2011 Q4

- Understanding recent developments in UK external trade
- The financial position of British households: evidence from the 2011 NMG Consulting survey
- Going public: UK companies' use of capital markets
- Trading models and liquidity provision in OTC derivatives markets

2012 Q1

- What might be driving the need to rebalance in the United Kingdom?
- Agents' Special Surveys since the start of the financial crisis
- What can the oil futures curve tell us about the outlook for oil prices?
- Quantitative easing and other unconventional monetary policies: Bank of England conference summary
- The Bank of England's Special Liquidity Scheme
- Monetary Policy Roundtable

2012 Q2

- How has the risk to inflation from inflation expectations evolved?
- Public attitudes to monetary policy and satisfaction with the Bank
- Using changes in auction maturity sectors to help identify the impact of QE on gilt yields
- UK labour productivity since the onset of the crisis an international and historical perspective
- Considering the continuity of payments for customers in a bank's recovery or resolution
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2011

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/Pages/default.aspx.

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/Pages/workingpapers/ default.aspx

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

No. 440 Time-varying volatility, precautionary saving and monetary policy (October 2011) *Michael Hatcher*

No. 441 An estimated DSGE model: explaining variation in term premia (December 2011) Martin M Andreasen

No. 442 The impact of QE on the UK economy — some supportive monetarist arithmetic (January 2012) *Jonathan Bridges and Ryland Thomas*

No. 443 Assessing the economy-wide effects of quantitative easing (January 2012) George Kapetanios, Haroon Mumtaz, Ibrahim Stevens and Konstantinos Theodoridis

No. 444 Asset purchase policy at the effective lower bound for interest rates (January 2012) *Richard Harrison*

No. 445 Does macropru leak? Evidence from a UK policy experiment (January 2012) Shekhar Aiyar, Charles W Calomiris and Tomasz Wieladek

No. 446 The business cycle implications of banks' maturity transformation (March 2012) Martin M Andreasen, Marcelo Ferman and Pawel Zabczyk

No. 447 Implicit intraday interest rate in the UK unsecured overnight money market (March 2012) *Marius Jurgilas and Filip Žikeš* No. 448 Non-rational expectations and the transmission mechanism (May 2012) *Richard Harrison and Tim Taylor*

No. 449 Misperceptions, heterogeneous expectations and macroeconomic dynamics (May 2012) *Richard Harrison and Tim Taylor*

No. 450 Forecasting UK GDP growth, inflation and interest rates under structural change: a comparison of models with time-varying parameters (May 2012) *Alina Barnett, Haroon Mumtaz and Konstantinos Theodoridis*

No. 453 Neutral technology shocks and employment dynamics: results based on an RBC identification scheme (May 2012) Haroon Mumtaz and Francesco Zanetti

No. 454 Fixed interest rates over finite horizons (May 2012) Andrew P Blake

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/Pages/ externalmpcpapers/default.aspx.

The following papers have been published recently:

No. 34 How flexible can inflation targeting be and still work? (October 2011) Adam Posen and Ken Kuttner

No. 35 Demographics, house prices and mortgage design (March 2012) David Miles

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/Pages/bankstats/ default.aspx.

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/Pages/ms/articles.aspx.

Financial Stability Report

The *Financial Stability Report* is published twice a year under the guidance of the interim Financial Policy Committee (FPC). It covers the Committee's assessment of the outlook for the stability and resilience of the financial sector at the time of preparation of the *Report*, and the policy actions it advises to reduce and mitigate risks to stability. 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/Pages/fsr/default.aspx.

Payment Systems Oversight Report

The *Payment Systems Oversight Report* provides an account of how the Bank is discharging its responsibility for oversight of recognised UK payment systems. Published annually, the *Oversight Report* identifies the most significant payment system risks to financial stability and assesses progress in reducing these risks. Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/Pages/psor/ default.aspx.

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 *Handbook* series also includes '*Technical Handbooks*' which are aimed more at specialist readers and often contain more methodological material than the *Handbooks*, incorporating the experiences and expertise of the author(s) on topics that address the problems encountered by central bankers in their day-to-day work. All the *Handbooks* are available via the Bank's website at:

www.bankofengland.co.uk/education/Pages/ccbs/handbooks/ default.aspx.

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/Documents/money/publications/redbookjune2012.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/Pages/other/beqm/ default.aspx.

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/Pages/about/cba.aspx.

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. Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/Pages/other/ monetary/creditconditions.aspx.

Trends in Lending

This quarterly 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. These data have been supplemented by the results of a new collection, established by the Bank in late 2008, to provide more timely data covering aspects of lending to the UK corporate and household sectors. The report also draws on intelligence gathered by the Bank's network of Agents and from market contacts, as well as the results of other surveys. Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/Pages/other/ monetary/trendsinlending.aspx.

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. The *Quarterly Bulletin* is available at:

www.bankofengland.co.uk/publications/Pages/ quarterlybulletin/default.aspx.

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. The *Inflation Report* is available at:

www.bankofengland.co.uk/publications/Pages/inflationreport/default.aspx.

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 2012 are as follows:

Inflation Report

Quarterly Bulletin

Q1	27 March	February	15 February
Q2	20 June	May	16 May
Q3	13 September	August	8 August
Q4	18 December	November	14 November

Financial Stability Report

```
29 June
29 November
```

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	2012						
	<i>QB, IR</i> and <i>FSR</i> package	QB and IR package	IR and FSR package	QB only	<i>IR</i> only	FSR only	
United Kingdom							
First class/collection ⁽¹⁾	£31.50	£27.00	£13.50	£21.00	£10.50	£5.25	
Students/schools (concessionary rate UK only)	£10.50	£9.00	£4.50	£7.00	£3.50	£1.75	
Academics (concessionary rate UK only)	£21.00	£18.00	£9.00	£14.00	£7.00	£3.50	
Rest of Europe							
Letter service	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50	
Outside Europe							
Surface mail	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50	
Air mail	£50.00	£43.00	£21.50	£34.00	£17.00	£8.50	

(1) Subscribers who wish to collect their copy (copies) of the Bulletin, Inflation Report and/or Financial Stability Report may make arrangements to do so by writing to the address given below. Copies will be available to personal callers at the Bank from 10.30 am on the day of issue and from 8.30 am on the following day.

Readers who wish to become **regular subscribers**, or who wish to purchase single copies, should send to the Bank, at the address given below, the appropriate remittance, payable to the Bank of England, together with full address details, including the name or position of recipients in companies or institutions. If you wish to pay by **Visa**, **MasterCard**, **Maestro** or **Delta**, please telephone +44 (0)20 7601 4030. Existing subscribers will be invited to renew their subscriptions automatically. Copies can also be obtained over the counter at the Bank's front entrance.

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.

These publications are available from Publications Group, Bank of England, Threadneedle Street, London, EC2R 8AH; telephone +44 (0)20 7601 4030; fax +44 (0)20 7601 3298; email mapublications@bankofengland.co.uk or fsr_enquiries@bankofengland.co.uk.

General enquiries about the Bank of England should be made to +44 (0)20 7601 4878. The Bank of England's website is at www.bankofengland.co.uk.

Issued by the Bank of England Publications Group.

© Bank of England 2012 ISSN 0005-5166 Printed by Park Communications Limited



MIX Paper from responsible sources FSC^o C001785