Quarterly Bulletin

2013 Q4 | Volume 53 No. 4

BANK OF ENGLAND

BANK OF ENGLAND

Quarterly Bulletin

2013 Q4 | Volume 53 No. 4

Contents

Topical articles

Recent economic and financial developments

Reports

Summaries of speeches and working papers

Appendices

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.

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

Topical articles

SME forbearance and its implications for monetary and financial stability

By Martin Arrowsmith and Martin Griffiths of the Bank's Prudential Regulation Authority, Jeremy Franklin, Evan Wohlmann and Garry Young of the Bank's Monetary Analysis Directorate and David Gregory of the Bank's Financial Stability Directorate.[1]

- This article presents the results of an investigation into the extent of loan forbearance in the SME sector and its implications for productivity and financial system resilience.
- Around 6% of SME borrowers were estimated to be in receipt of some form of loan forbearance in March 2013. This accounted for around 14% of the major five UK banks' exposure to this sector.
- SME forbearance appears to account for only a small proportion of the weakness in aggregate UK productivity and also seems unlikely to threaten financial system resilience.

Overview

This article sets out the results of a Bank of England investigation into forbearance provided by major UK banks to small and medium-sized enterprises (SMEs), and its implications for monetary and financial stability.

Forbearance by banks is said to occur when, outside of the normal terms of business, a bank seeks to provide support to a borrower struggling to meet its obligations. This may range from ignoring a breach of a loan covenant to providing some form of payment relief.

Forbearance can be helpful in providing assistance to borrowers suffering from temporary problems. This may have helped some viable businesses to survive the financial crisis. But it may also pose risks to monetary and financial stability. Support provided to firms who do not have a realistic chance of recovery may impede the allocation of resources to healthy firms and restrict productivity growth. Or banks may choose to employ forbearance rather than classify loans as non-performing, possibly increasing financial system fragility.

Previous surveys by the regulatory authorities revealed forbearance to be most widespread in the commercial real estate (CRE) sector (see **summary table**). This was a factor in the 2013 FPC recommendation which led the PRA Board to require some UK banks to improve their capital positions. Risks arising from forbearance in the CRE sector, as well as other sectors, continue to be monitored by the FPC and PRA.

Summary table Forbearance by UK lending sector

Sector	Major UK banks' exposure in forbearance
Household secured[a]	5%–8%
Commercial real estate[b]	35%
Leveraged loans[c]	28%
SME (excluding CRE lending)[d]	14%

(a) Survey results as at June 2012.
(b) Survey results as at June 2011.
(c) Survey results as at December 2011.
(d) Survey results as at March 2013.

This study focuses on the SME sector and excludes CRE. It estimates that around 6% of borrowers were in receipt of some form of loan forbearance. This represents around 14% of the five major UK banks' loan exposure to this sector. Forbearance among SMEs also appears to be most significant in the property-related industrial sectors, such as construction and accommodation and food.

Overall, bank forbearance to SMEs appears to account for only a small proportion of the weakness in aggregate UK productivity. Low interest rates are likely to have been more important in explaining higher firm survival rates over recent years, with results from this investigation highlighting vulnerabilities to a rise in interest rates if not accompanied by an improvement in economic conditions. Current provisioning and capital levels of the major UK banks against SME forbearance seem broadly adequate, and therefore the scale of this forbearance seems unlikely to threaten financial system resilience.

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

This article sets out the results of a recent Bank of England investigation into the extent of forbearance provided by the major UK banks to small and medium-sized enterprises (SMEs), defined here as companies with turnover below £50 million, and draws out the implications for monetary stability, financial stability and bank regulation.

Since the financial crisis, the rate of company failure has remained surprisingly low and labour productivity unusually weak, especially among SMEs.(1) SMEs are an important part of the UK economy, contributing around 60% of total private sector employment and 50% of total nominal private sector turnover.(2)

Forbearance by banks has been suggested as one of the factors that might explain both the low rate of company failure and weak productivity growth since 2008. This makes forbearance relevant for both the Monetary Policy Committee and the Financial Policy Committee (FPC). Forbearance is also monitored by the Prudential Regulation Authority (PRA) in its regulatory role.(3) This study supplements previous surveys on forbearance by the regulatory authorities which have covered household secured lending, leveraged loans and commercial real estate (CRE) lending.(4)

The first section of this article outlines what forbearance is and why it can have important implications for the economy and financial system. The following sections set out the key findings on forbearance to the SME sector and discuss the implications of forbearance for productivity and financial system resilience. A short **video** explains some of the key topics covered in this article.(5)

What is forbearance?

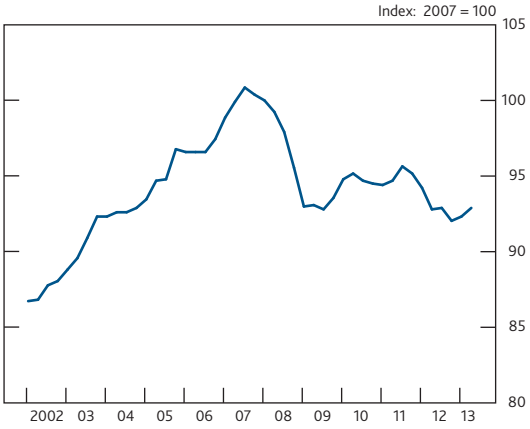
Forbearance by a bank occurs when it seeks to provide a measure of support to a customer struggling to meet its obligations. This may range from ignoring a breach of a loan covenant, to giving the borrower more time to meet its loan obligations, to providing some form of active payment relief. For the purposes of this investigation, bank forbearance is said to occur when, for reasons relating to the actual or apparent financial distress of a borrower, a bank grants a temporary or permanent concession(6) and that concession is made outside of normal market terms.

Forbearance can be a useful practice for banks in managing their loan portfolios. Providing assistance to a customer suffering from a temporary problem can avoid an unnecessary and costly process of default and might, from an individual bank's perspective, be the best way to maximise the recovery value of its assets. Such support may also have allowed some viable businesses to remain in operation through the prolonged period of weak demand following the recession and may allow them to recover fully in time. Indeed, lower insolvencies may also have helped to restrain increases in unemployment, reducing the risk of erosion of the economy's supply potential.

But there are also risks to monetary and financial stability arising from forbearance. Forbearance which is provided to businesses without a realistic chance of being viable in the future, and which supports their survival, may impede the allocation of resources to healthy firms in the economy. Furthermore, fragility could build up in the financial system should banks choose to employ forbearance rather than classifying loans as non-performing.(7)

Indeed, forbearance may be one factor that could help to explain why productivity growth in the United Kingdom has been so weak following the recession. In the second quarter of 2013, private sector output per worker was 8% below its pre-crisis peak and 18% below the level that would be implied by its pre-crisis trend (**Chart 1**).(8) Labour productivity appears to have been particularly weak among SMEs since the financial crisis.(9) Forbearance by banks, as well as other factors including the low level of Bank Rate and forbearance by HM Revenue and Customs (HMRC) (as part of the 'time-to-pay' scheme), may help explain why the number of firms entering insolvency has been lower in the latest recession compared to the 1990s — despite the substantial fall in output.(10) The various channels through which forbearance may affect productivity growth are discussed in the third section of this article.

Chart 1 UK private sector output per worker



Sources: ONS and Bank calculations.

(1) See the discussion on page 31 of the November 2012 *Inflation Report*.
(2) These data are published in *Business Population Estimates 2013*, available at www.gov.uk/government/publications/business-population-estimates-2013.
(3) For an overview of the changes to the UK regulatory landscape that came into force in April 2013, including the creation of the PRA and the FPC, see Murphy and Senior (2013).
(4) See the discussion on page 37 of the June 2013 *Financial Stability Report*.
(5) See www.youtube.com/watch?v=kir33mVT1eI.
(6) For example, a concession could include changing the terms of the loan, such as the interest rate paid or the loan amount.
(7) Note that loans can be non-performing and have forbearance applied. Potential risks would arise where forbearance is used to mask a situation where an asset is non-performing.
(8) The pre-crisis trend is estimated as the linear trend in log private sector productivity per worker between 1997 Q1 and 2006 Q4.
(9) See the discussion on page 31 of the November 2012 *Inflation Report*.
(10) See the discussion on page 27 of the August 2013 *Inflation Report*.

Forbearance is not a UK-specific phenomenon. International evidence points to the survival of unviable firms, or so-called 'zombie' companies, in explaining weak growth in Japan following the financial sector distress of the 1990s.(1) There are, however, some important differences. For example, the outstanding stock of lending to UK private non-financial corporations has fallen by 19% since 2008 Q3; this sits in contrast with the practice of 'evergreening' in Japan, where loans were extended to allow borrowers to make interest payments.(2)

Evidence of bank forbearance provided to SMEs

The Bank carried out an investigation in March 2013 with the five largest commercial banks to estimate the extent of forbearance among a sample of more than 5,000 companies with turnover of less than £50 million. This threshold is higher than some standard definitions of SMEs and includes what many term the 'mid-corporate sector'. For the remainder of this article, however, we refer to these companies simply as SMEs. The sample of companies was identified and constructed by the Bank of England in the first instance and then commercial banks were asked to report on the performance of loans to those companies. Companies in the CRE sector, as well as those in the agriculture, finance and energy sectors, were excluded from this investigation.

Any assessment of the extent of loan forbearance relies on commercial judgement, which makes it difficult to produce robust, comparable results by simply asking banks about the aggregate amount of forbearance on their loan books. Instead, the investigation gathered a range of loan-level information, including whether a loan was judged to be in receipt of forbearance, on a sample of participating banks' business customers. This was accompanied by an assessment from the banks' own relationship managers of the prospects for each company (see the box on page 299 for more detail on the survey methodology).

Around 6% of SME borrowers outside of the CRE sector were estimated to be in receipt of some form of loan forbearance.(3) When aggregated, loans to these borrowers accounted for around 14% of the major UK banks' exposure to the SME sector, suggesting that forbearance was concentrated in larger bank exposures. To provide some context, this headline result is lower than the forbearance in CRE and leveraged loan sectors identified in previous studies by the regulatory authorities (**Table A**).

The investigation revealed relatively few cases of banks providing direct payment relief to struggling companies. The main types of forbearance were waivers granted when loan conditions — such as debt to income covenants — had been breached and extensions to the period over which the loan needed to be repaid, as shown in **Chart 2**.(4)

Banks reported that in many cases, the reasons they felt confident to forbear on loans were that the borrowing company's problems were perceived to be temporary or that the company had undertaken some form of operational restructuring (**Chart 3**).

SME relationship managers also reported that there had been no material changes to their forbearance practices in recent years, but cited the low interest rate environment as an important factor in reducing the opportunity cost of forbearance relative to the early 1990s.

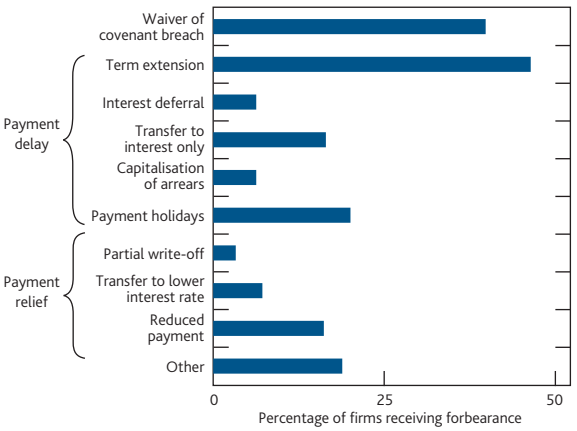
Table A Forbearance by UK lending sector

Sector	Bank exposure in forbearance (per cent)	Stock of bank lending covered by forbearance survey (£ billions)	Current stock of bank lending to sector in question (£ billions)[a]
Household secured[b]	5–8	903	1,043
Commercial real estate[c]	35	153	188
Leveraged loans[d]	28	35	n.a.
SME (excluding CRE lending)[e]	14	81	122

Sources: Bank of England, British Bankers' Association (BBA) and Bank calculations.

(a) As at end-2013 Q3. Household secured data is UK-resident monetary financial institution (MFI) net secured lending. CRE data is UK-resident MFI net lending to real estate and development companies. The Bank of England does not publish data on lending to non-CRE SMEs so the SME figure in the table is indicative only, and estimated by applying the share of non-CRE lending (in total SME lending) derived from BBA data on major UK bank lending to SMEs to Bank of England data on the total stock of outstanding UK-resident MFI lending to SMEs. Sufficient aggregate data on lending to leveraged companies in the United Kingdom is not available.
(b) Survey results as at June 2012.
(c) Survey results as at June 2011.
(d) Survey results as at December 2011.
(e) Survey results as at March 2013. Companies in the agriculture, finance, real estate and energy sectors were excluded.

Chart 2 Types of forbearance[a]



Source: Bank of England investigation into SME forbearance.

(a) Percentages add to more than 100 as a single company can experience more than one type of forbearance.

(1) See, for example, Caballero, Hoshi and Kashyap (2008) and Peek and Rosengren (2005).
(2) The reduction in stock reflects net repayment of loans and write-offs.
(3) This figure was very similar when weighted by the turnover of SME borrowers.
(4) A debt to income covenant could require that the ratio of debt to annual earnings before interest, tax, depreciation and amortisation should not exceed a given threshold.

Methodology

The investigation focused on the performance of individual companies with a borrowing relationship with one of the major UK lenders in order to assess the nature and extent of loan forbearance. The sample of companies was identified by the Bank of England in the first instance and then commercial banks were asked to report on the performance of loans to those companies, including whether they were in receipt of forbearance.

The sample of companies was drawn from the population of all UK companies that were registered at Companies House in 2012. At the start of 2012, there were estimated to be around 4.8 million businesses in the United Kingdom, of which 1.3 million were distinct companies.(1) The survey was targeted at the small and medium-sized enterprises (SME) market and therefore selected only companies with turnover of less than £50 million. This threshold is higher than some standard definitions of SMEs and includes what many term the 'mid-corporate sector'.

The investigation also used registered 'charges' at Companies House to identify bank relationships. Companies provide security to a lender by granting a charge over some or all of their assets — that is, they pledge collateral that the lender can seize in the event of default. A company must generally register a charge — as well as the holder of the charge — at Companies House when it is created. Therefore, where a specific bank is registered as the charge-holder, it is likely that the bank has made a loan to that company.

A stratified sample, based on total asset size and industry, was constructed from companies with a charge registered with at least one of the five of the largest lenders to the SME sector in the United Kingdom. In addition, an anonymised booster sample was incorporated which included companies with low profitability and liquidity ratios. This was done in order to increase the sample size of those firms that were more likely to be in receipt of forbearance such that reliable inferences could be made about the weaker firms in the economy.

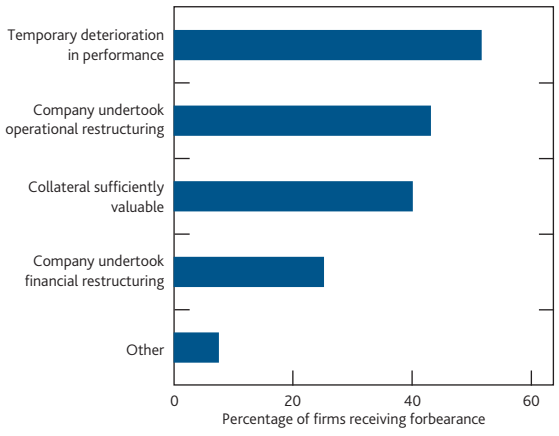
The sample of companies was constructed in two stages. First, the Bank provided an initial sample of companies to each participating bank. The banks then confirmed whether or not they continued to have an active lending relationship with each of these companies. The final stratified sample was then selected from this group of companies. An appropriate set of weights was constructed in order to aggregate the results, such that they were representative of the complete population of SME borrowers at these five banks.

For each company in their sample, banks were then asked to return a qualitative questionnaire, which was completed by individual relationship managers responsible for that company, and to provide quantitative, centrally managed risk and lending metrics.

The final sample covered around 5,300 companies in ten industries. Companies in the agriculture, finance, real estate and energy sectors were excluded from the investigation.

(1) These data are published in *Business Population Estimates 2012*, available at www.gov.uk/government/publications/bis-business-population-estimates.

Chart 3 Why banks feel confident in forbearing(a)



Source: Bank of England investigation into SME forbearance.

(a) Percentages add to more than 100 as respondents could indicate more than one reason for being confident to forbear.

The investigation sought to distinguish between loan forbearance that is likely to support the macroeconomy, by helping productive companies survive temporary problems, and forbearance which has helped to keep alive unproductive firms with more persistent problems. Around two thirds of banks' exposure in forbearance was judged by individual bank relationship managers to be provided to firms that were viewed as having a viable long-term future. And in nearly all cases of forbearance to a firm without a viable future, the bank reported that it was looking to reduce its exposure to the company in question.

Loan forbearance to SMEs varied by both industry and region. Forbearance appears to be most significant in the property-related industrial sectors such as construction and accommodation and food (**Table B**).(1) Forbearance also

(1) The 'accommodation and food' sector, which includes hotels, restaurants and public houses, can be considered to be property-related because a significant share of the sector's borrowing is secured on property.

Table B Forbearance by industry

Industry	Per cent of banks' exposure to each industry receiving forbearance
Manufacturing	12
Construction	27
Wholesale and retail	3
Transport	6
Accommodation and food	28
Information and communication	7
Professional and scientific	6
Administration	14
Other services	9

Source: Bank of England investigation into SME forbearance.

appears to be most prevalent outside of London and the South. And the higher incidence of forbearance in those regions is concentrated in the same property-related sectors.

During the course of the investigation, the banks reported that they thought it likely that the low interest rate environment had been a more significant factor in accounting for the low rate of company failure than loan forbearance.

Bank relationship managers were also asked to estimate how likely each company was to default in the next twelve months in the event of an increase in the interest rate on their debt (**Table C**). They reported that 0.6% of companies had a 50% or more chance of defaulting even without a change in interest rates. But they estimated that 4.7% of companies had a 50% or more chance of defaulting if rates were to rise by 400 basis points. So the low level of interest rates is likely to be an important factor in explaining why company defaults and liquidations in recent years have been low relative to the early 1990s, even though the fall in GDP was much larger in the recent recession (**Chart 4**). **Table C** shows that relationship managers also thought that higher interest rates would have a larger impact on companies currently in receipt of forbearance — although as indicated in our headline results, only 6% of SME borrowers fall into this category. It is important to note, too, that these estimates are likely to be an upper bound since they take current economic conditions as given. Higher interest rates might reasonably be expected to have less effect on company defaults if the rise in rates was due to an improvement in economic conditions.

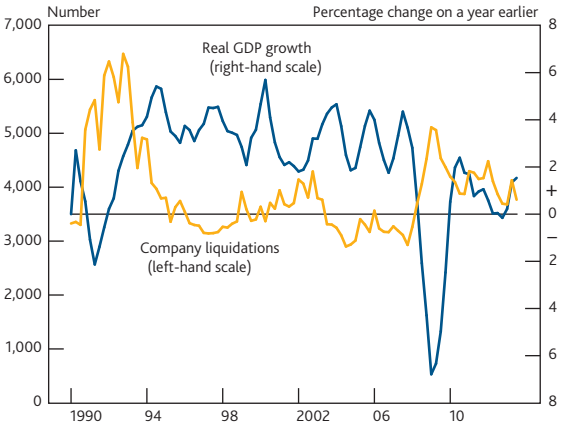
Table C Reported impact of higher interest rates on potential SME bank loan defaults

	Percentage of customers likely to default[a] in the next twelve months		
Interest rate	Currently receiving forbearance	Not receiving forbearance	All
No change	2.7	0.5	0.6
50 basis points	2.9	0.5	0.6
100 basis points	5.9	0.8	1.1
200 basis points	13.7	1.6	2.3
400 basis points	25.5	3.3	4.7

Source: Bank of England investigation into SME forbearance.

(a) Where individual bank relationship managers reported that the probability of a company defaulting was 50% or more.

Chart 4 UK corporate liquidations and real GDP growth[a]



Sources: Bank for International Settlements, ONS, The Insolvency Service and Bank calculations.

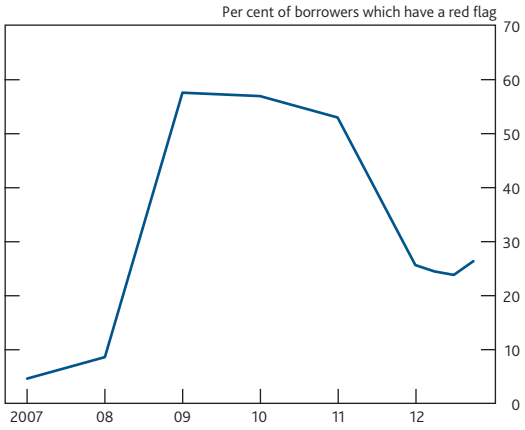
(a) Quarterly sum of compulsory and voluntary liquidations in England and Wales. Changes to legislation, data sources and methods of compilation mean the statistics should not be treated as a continuous and consistent time series. Since the Enterprise Act 2002, a number of administrations have subsequently converted to creditors' voluntary liquidations. These liquidations are excluded from both the headline figures published by The Insolvency Service and the chart.

In order to test the robustness of the results, cross-checks were made by comparing the results across banks, using answers to other survey questions, as well as data from the borrowing companies' financial statements.(1) These checks implied that the proportion of companies in receipt of forbearance was not likely to be sufficiently higher than our headline estimates to make a material difference to our assessment of its implications for monetary and financial stability.

It is likely that forbearance was less extensive at the time of the investigation than it had been in the period immediately following the financial crisis. Various aggregate measures of the financial health of borrowing companies have improved since 2009. The proportion of banks' exposure on 'watch lists'(2) or whose loans were classified as impaired has fallen. And the proportion of companies with a 'red flag', an independent warning indicator, against them halved from around 60% in 2009 to 30% in 2012 (**Chart 5**).(3) In addition, forbearance by HMRC in the form of time-to-pay VAT approvals, which represent cases where companies are granted some form of extension to pay their VAT obligations, has fallen substantially from its peak in 2009.(4)

(1) One example of such a cross-check was to compare the level of forbearance towards companies with those that appeared to be in financial difficulty and had been drawing on an overdraft facility beyond an agreed limit (and beyond the level that might be expected from a company of a particular size and in a particular sector).
(2) All commercial banks maintain a watch list of loans that have exhibited potential signs of distress. These loans are more intensively managed and monitored.
(3) Red Flag Alert put together company warning indicators (red flags) that are triggered through various events, such as when a firm reports a loss, receives a county court judgement or when a director resigns.
(4) HMRC time-to-pay approvals peaked at 118,000 in 2009, representing around 5% of the tax-registered business population. This fell to 20,700 in the first half of 2011.

Chart 5 Company distress indicator[a]



Source: Red Flag Alert.

(a) Proportion of Barclays, HSBC, Lloyds Banking Group, Royal Bank of Scotland and Santander business customers with at least one red flag.

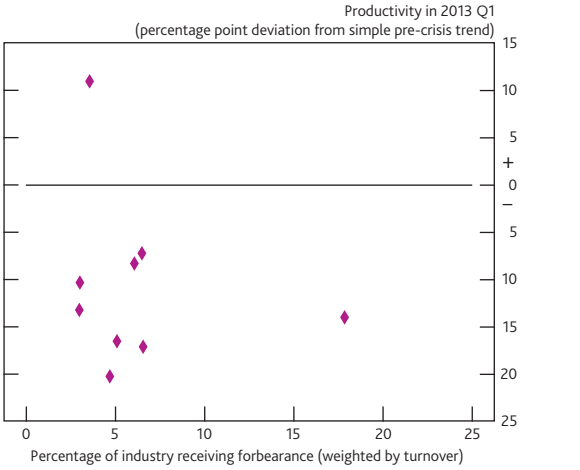
How might SME forbearance have impacted on measured productivity?

Since mid-2010, the strength in private sector employment has contrasted with the weakness in private sector output growth, reflecting unusually weak growth in measured labour productivity. Understanding the reasons behind this weak growth, and the likely response of labour productivity as demand recovers, is important in the setting of monetary policy.

Forbearance can affect productivity growth through three key channels. First, there is the direct 'batting average' effect: if companies in receipt of forbearance have lower productivity than other companies, then their survival will push down on the aggregate level of measured productivity. In support of this, productivity among SMEs is estimated to be 40% lower in companies in receipt of forbearance (controlling for size and sector).(1) But, since forbearance in this sector is estimated to cover only 6% of borrowing companies, the implied effect from this direct channel is to depress aggregate private sector productivity only by around 1 percentage point.(2) This compares to an estimated productivity shortfall in the private sector relative to its pre-crisis trend of around 18%.

Second, loan forbearance could have an indirect effect on the productivity of healthy companies. Forbearance aids the survival of weak companies by lowering their effective borrowing costs. It may therefore have adverse consequences for productivity within particular industries and regions by limiting the competitive pressures through which more efficient businesses would gain market share from their less efficient rivals. While it would be difficult to identify such an effect within industries, it might be expected that productivity would be more depressed in industries with a higher incidence of forbearance, since companies are more likely to compete with other companies in the same industry. However, the negative correlation between productivity and the incidence of SME forbearance across industries is weak (**Chart 6**). This suggests that this channel is unlikely to be material.

Chart 6 Productivity and forbearance by industry[a]



Sources: Bank of England investigation into SME forbearance and ONS.

(a) Productivity is calculated as the percentage point deviation of industry output per head from a log linear trend between 1999 and 2006. The measure of forbearance is weighted by turnover in order to make the comparison with productivity.

It could also be the case, however, that forbearance within one industry has an adverse impact on companies in another industry. For example, if forbearance sustains the demand for commercial space and rents, then this could push up costs in other industries and prevent productive firms from expanding or entering new markets. This would reduce the strength of any correlation between forbearance and productivity observed across industries.

Third, loan forbearance could also have an adverse impact on firm entry. This could occur if forbearance in a particular industry stifles profitability by keeping firms with unprofitable operations afloat, and therefore reduces the incentive for new firms to enter the market. Here the evidence is a bit more supportive of a link from bank forbearance to firm entry, but far from conclusive. Firm entry rates — which are lower on an economy-wide basis compared to 2008 — have fallen most in industries with high levels of forbearance (**Chart 7**).

Forbearance may also indirectly restrict the supply of loans from banks themselves. This may have slowed growth among new companies and companies that might otherwise have

(1) Labour productivity is estimated using financial information from the Bureau van Dijk FAME database which are matched to the SME borrowers in the survey. Productivity is defined as profit before tax plus total remuneration divided by the number of employees, using data from 2012 annual accounts (and where not available, from 2011 accounts). The log of labour productivity is regressed on a dummy variable indicating whether the firm is in receipt of forbearance, controlling for different industries.

(2) Multiplying the estimated reduction in SME company-level productivity (40%) by the proportion of SMEs in forbearance (6%) gives an impact of 2.4% on the productivity of borrowing SMEs. The estimated impact on overall productivity reflects the fact that SMEs account for around half of nominal turnover in the private sector, and only a subset of these SMEs will be borrowers.

Chart 7 Firm entry rates and forbearance by industry[a]

Sources: Bank of England investigation into SME forbearance and ONS Business Demography 2011.

(a) Firm entry rates are calculated as the number of firm births in a given year divided by the total number of businesses in each industry. The measure of forbearance is weighted by bank exposure in order to make the comparison with firm entry.

grown more quickly had they been able to obtain loan finance. This mechanism may have operated in Japan in the 1990s, where forbearance was associated with banks' weak capital positions. Troubled Japanese banks may have allocated credit to weak firms in order to avoid realising losses on their own balance sheets, thereby reducing the amount of credit available to new entrants. The extent of forbearance in the UK economy more broadly may have been a factor in reducing the availability of credit to SMEs across all industries. Ensuring that banks have sufficient capital to lend to the real economy was an important factor in influencing the recommendations by the FPC on UK bank capital adequacy in 2013 (described in the section below).

In summary, while firms in receipt of forbearance appear to be significantly less productive, the measured direct impact on the level of aggregate private sector productivity is estimated to be small compared to the 18% gap relative to its pre-crisis trend. Nonetheless, it could still explain around 1 percentage point of this shortfall. There is also only limited evidence, based on industry-level correlations, to support any secondary effects from industry congestion discouraging firm entry. Therefore, bank forbearance to SMEs does not appear to be on a sufficient scale to account for more than a small proportion of the weakness of UK productivity relative to its pre-crisis trend.

How might SME forbearance impact on financial system resilience?

A key determinant of financial system resilience is capital adequacy — in other words, whether or not banks have enough capital resources to absorb losses.(1) At its meeting in November 2012, the FPC identified a number of factors which suggested that the capital adequacy of the UK banking system could be overstated.(2) This led to an FPC recommendation on capital adequacy which ultimately resulted in a judgement by the PRA Board that the eight major UK banks and building societies had a capital shortfall amounting to around £25 billion at the end of 2012.(3)

An important factor in concerns over capital adequacy was that credit losses could exceed existing provisions in some loan portfolios. CRE lending was identified as one of several portfolios which were particularly vulnerable in this respect, partly as a result of the level of forbearance in that sector.(4)

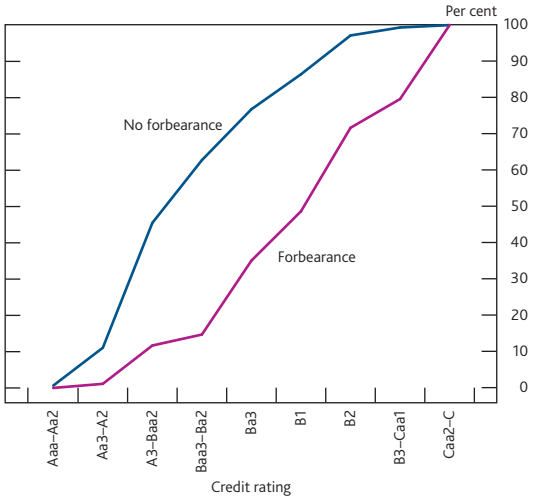
Forbearance against CRE lending has been particularly widespread in the United Kingdom since the crisis. **Table A** shows that in 2011, over one third of UK banks' loans to CRE companies were receiving some form of forbearance. The FPC and PRA continue to monitor risks arising from forbearance in the CRE sector, as well as other sectors.

The results of the investigation into SME forbearance revealed that the current levels of provisions and capital held against SME lending appeared broadly adequate given the prevailing conditions at the time. The significance of SME forbearance in affecting the resilience of the UK financial system is limited by the relative size of that portfolio, which is smaller than for CRE (**Table A**). Internal bank stress-test estimates of potential losses from forborne loans were judged not to be a threat to bank resilience at this time.

Encouragingly, there is evidence that the banking system in aggregate is differentiating between performing loans that are forborne versus those that are non-forborne and setting aside more capital against the former. The investigation showed a link between a bank's internal rating scales — used to determine their regulatory capital requirements — and forbearance. While none of the banks covered by this analysis typically include forbearance as an input to their ratings models for SME exposures, there is, in practice, a relationship given the other factors used by those models. These factors, which might be correlated with forbearance, include financial performance metrics and a bank's own assessment of a company's business model and management. **Chart 8** shows the cumulative distribution of credit grades for all banks, split by whether a loan is forborne or not. It indicates that forborne loans are allocated lower credit grades than loans without forbearance.

(1) For a primer on bank capital, see Farag, Harland and Nixon (2013).
(2) The FPC's primary role is to identify, monitor, and take action to remove or reduce risks that threaten the resilience of the UK financial system as a whole. See Tucker, Hall and Pattani (2013).
(3) This shortfall was assessed relative to a benchmark of capital resources — using an internationally agreed 'Basel III' definition of equity capital — being equivalent to at least 7% of risk-weighted assets. For more details on the recommendation, see www.bankofengland.co.uk/publications/pages/news/2013/013.aspx.
(4) The FPC exercise considered the level of capital and provisions against an estimate of expected losses likely to emerge over a three-year period. For more details on the approach taken, see www.bankofengland.co.uk/financialstability/Documents/fpc/cpmethodology.pdf.

Chart 8 Cumulative distribution of probabilities of default for SME loans in the sample, split by forbearance status[a]



Source: Bank of England investigation into SME forbearance.

(a) This chart is derived from the set of loans on which banks model the probability of default for credit risk capital requirements purposes. These probabilities of default have been mapped to Moody's ratings grades to enable ease of comparability.

Conclusion

This article reports the results of a recent Bank of England investigation into SME forbearance by the major UK banks. Around 6% of SME borrowers, outside of the CRE sector, were estimated to be in receipt of some form of loan forbearance in March 2013. When aggregated, these borrowers accounted for around 14% of the major UK banks' exposure to the SME sector.

Productivity is estimated to be around 40% lower in SMEs receiving bank forbearance. But, given that only a relatively small proportion of SMEs are in receipt of forbearance, this translates into a small direct impact on aggregate productivity. Nonetheless, this could still explain around 1 percentage point of the shortfall in productivity. There is also only limited evidence, based on industry-level correlations, to suggest that loan forbearance to SMEs is having an indirect impact on industry-wide productivity growth or by discouraging firm entry.

Low interest rates, meanwhile, are likely to have been a more important factor in explaining higher firm survival rates over recent years. Results from this investigation suggest that firm default rates could increase in response to a rise in interest rates, especially if not accompanied by an improvement in economic conditions. HMRC time-to-pay, a form of non-bank forbearance, is also likely to have been a significant factor.

The extent of forbearance on CRE lending was one factor leading up to the 2013 FPC recommendation on capital adequacy. But the evidence from the latest investigation into SMEs, excluding CRE, revealed that the current levels of capital and provisioning against SME lending appeared broadly adequate given the prevailing conditions at the time.

References

Caballero, R, Hoshi, T and Kashyap, A (2008), 'Zombie lending and depressed restructuring in Japan', *American Economic Review*, Vol. 98, No. 5, pages 1,943–77.

Farag, M, Harland, D and Nixon, D (2013), 'Bank capital and liquidity', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 201–15.

Murphy, E and Senior, S (2013), 'Changes to the Bank of England', *Bank of England Quarterly Bulletin*, Vol. 53, No. 1, pages 20–28.

Peek, J and Rosengren, E (2005), 'Unnatural selection: perverse incentives and the misallocation of credit in Japan', *American Economic Review*, Vol. 95, No. 4, pages 1,144–66.

Tucker, P, Hall, S and Pattani, A (2013), 'Macroprudential policy at the Bank of England', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 192–200.

Bringing down the Great Wall? Global implications of capital account liberalisation in China

By John Hooley of the Bank's International Finance Division.[1]

- Capital account liberalisation in China and internationalisation of the renminbi would have a large impact on the global financial system. An illustrative thought experiment suggests China's gross international investment position could increase from around 5% to 30% of world GDP by 2025.
- The UK financial system is likely to be particularly affected. The Bank is working with the People's Bank of China to ensure a successful and stable development of renminbi activity in London.

Overview

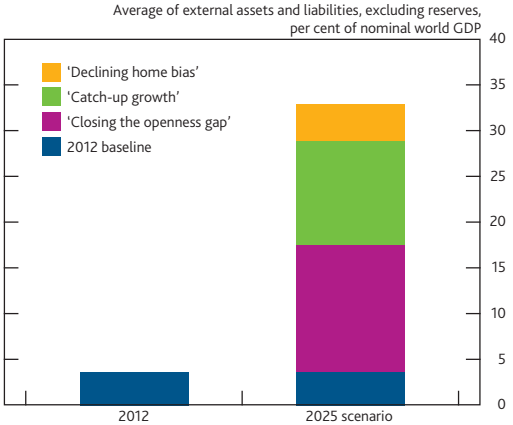
China's financial system is still very closed relative to other economies. But there are increasing signs the authorities are in favour of relaxing capital controls and promoting greater use of the Chinese currency abroad. Timescales are still uncertain, although full liberalisation could potentially occur within a decade.

If China does liberalise, few other events over the next decade are likely to have more impact on the shape of the global financial system. This article sets out a conceptual framework, identifying three separate factors which help explain why the scale of the subsequent movements in capital flows — both into and out of China — could be very large relative to the size of the world economy:

(i) **'Closing the openness gap'**. There is a large gap between China's current level of openness and that of advanced economies. Liberalisation will lead this gap to close, generating large flows in the process.
(ii) **'Catch-up growth'**. China's economic growth is expected to be relatively high over the next decade. So even if China's capital flows do not increase relative to its own economy, they will relative to the world economy.
(iii) **'Declining home bias'**. Prior to the recent crisis, the global financial system became increasingly integrated. A resumption of these trends over coming decades would lead capital flows to increase both in China and globally.

Based on these three factors and some simple but plausible assumptions, the **summary chart** shows a hypothetical scenario for China's global financial integration in 2025. It shows that China's gross international investment position could increase from around 5% to over 30% of world GDP.

Summary chart Potential impact of capital account liberalisation on China's international investment position



Sources: International Monetary Fund, Speller *et al* (2011) and Bank calculations.

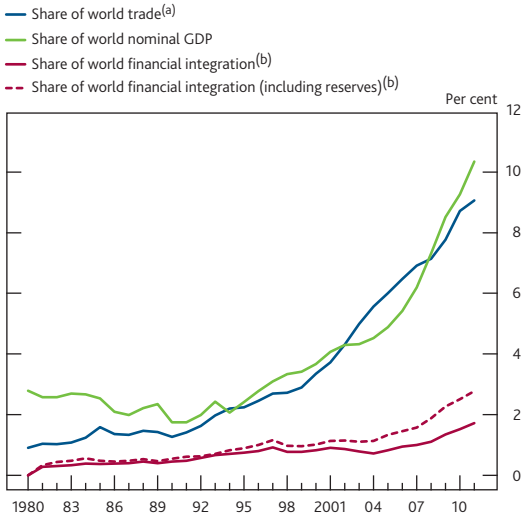
The global financial integration of China has the potential to be a force for economic growth and financial stability not just in China but also globally. The UK economy is likely to be relatively more affected than most due to its large and open financial system and existing strong financial linkages with China. However, the process of liberalisation would also be accompanied by risks which national authorities and international bodies will need to monitor and take appropriate policy actions to mitigate. The Bank is also working with the People's Bank of China to help ensure that renminbi activity in the United Kingdom develops successfully within a stable financial system.

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

China's integration into the global economy over the past 30 years has been remarkable. By the end of 2012, it was the world's second largest economy and its largest exporter, having occupied only the sixth and eighth positions, respectively, at the turn of the century. China's economic rise has impacted on other economies through trade links and through its influence on global commodity prices.

But China's financial system is still very closed to the outside world.(1) Compared with a 10% share of world GDP and a 9% share of world trade in 2011, China had less than a 3% share of global holdings of overseas assets and liabilities, even when China's large holdings of foreign exchange reserves are included (**Chart 1**). The Chinese banking system is the largest in the world by total assets, but is also one of the most domestically focused. And the Chinese currency, the renminbi (RMB), is still little used for transactions outside China.

Chart 1 China's international integration in GDP, trade and finance



Sources: International Monetary Fund *World Economic Outlook* (IMF *WEO*), Lane and Milesi-Ferretti (2007) and Bank calculations.

(a) Ratio of the sum of exports and imports to world trade.
(b) Ratio of the sum of external assets and liabilities to world external assets and liabilities.

This striking discrepancy between China's economic and financial integration with the rest of the world is a result of tight restrictions placed on the flow of funds across its borders, or 'capital controls'. But this discrepancy is unlikely to last. There are increasing signs the Chinese authorities are in favour of greater financial openness, or 'capital account liberalisation' as China switches to a new model of growth. This was an explicit goal of the Chinese government's twelfth five-year plan in 2012, and was reaffirmed during the Third Plenum (a policymaking conference) in November 2013. Although timescales are uncertain, in 2012 the People's Bank of China (PBoC) — China's central bank — indicated that full liberalisation could occur over the next decade.

China's size means that any substantial loosening of its capital controls will matter for the rest of the world. If the process is successful, it could lead to more balanced and sustainable growth in China and help to rebalance global demand. Integration of China in world financial markets could also lead to enhanced risk-sharing and liquidity. But the historical record for other countries suggests that episodes of capital account liberalisation can also be accompanied by risks to domestic economic and financial stability which, should they crystallise in China, would also likely impact the stability of the global financial system. And even if the risks from liberalisation are successfully mitigated, policymakers will still need to be aware of the changes in the structure of global capital flows that are likely to result.

This article discusses these potential developments in more detail. The first section sets out the context, assessing how financially open China is today, and also looks at existing financial links with the United Kingdom. The article then considers the changes in capital flows that might arise if China opens its capital account. The final section looks at the potential implications for China and the rest of the world. A box assesses recent developments in offshore renminbi activity in the United Kingdom.

China's current financial integration

How open is China today to the flow of capital across its borders? This is an important issue to consider, since the more financially closed China is right now, the bigger the potential splash to come.

To help answer this question, it is useful to first define some terminology. Funds flowing across a country's borders generally relate to one of three types of transaction, which are recorded in separate 'accounts' in the balance of payments: the 'current account' records transactions related to the sale or purchase of goods and services (for example, a Chinese firm receiving payment for exporting a computer to a UK firm); the 'reserve account' records the sale and purchase of foreign exchange reserves by central banks (for example, purchases of US Treasury bonds by the PBoC); and the 'capital account' records transactions related to the accumulation of financial assets by residents other than the central bank (for example, the purchase of shares of a FTSE company by a Chinese household).(2)

The definition of 'capital flows' in this article relates to the transactions in the capital account only, while 'capital controls' refers to restrictions on those transactions. Both the purchase and sale of overseas financial assets by Chinese residents and

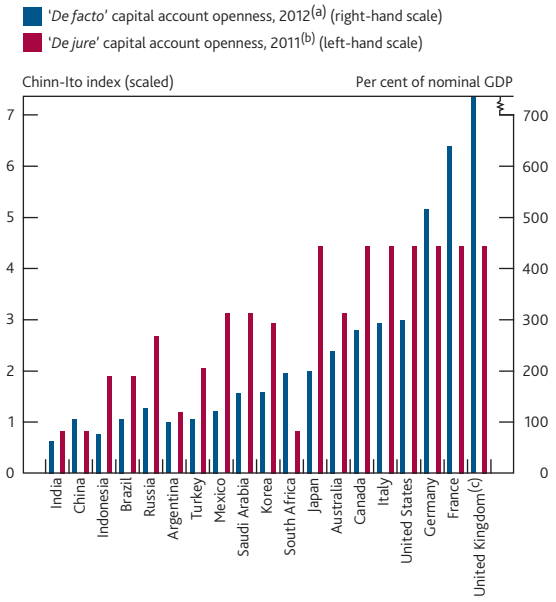
(1) For the purposes of this article, 'China' refers to mainland China, that is, excluding the Special Administrative Region of Hong Kong. Hong Kong is, of course, significantly integrated with the rest of the world financially.
(2) According to the IMF balance of payments definition, the 'capital account' covers only a small set of transactions relating to transfers (for example, debt forgiveness), whereas the accumulation of financial assets by non-monetary authorities is recorded in the 'financial account'. However, the 'capital account' is the more commonly used term in the literature for the latter type of transactions.

the purchase and sale of Chinese assets by foreigners is subject to a myriad of such controls. In contrast, transactions on the current and reserve accounts are not subject to the same degree of control.

Two main methods exist for quantifying the extent of a country's capital controls, although each has shortcomings (Quinn, Schindler and Toyoda (2011)). '*De jure*' measures are based on the number of transaction items within the capital account that are subject to restrictions. '*De facto*' measures proxy effectiveness of capital controls with the actual stock or flow of a country's external assets and liabilities — the idea being that if a country has accumulated a lot of external assets or liabilities, its capital controls are not likely to be very tight.

De jure and *de facto* measures of capital account openness for the G20 economies are shown in **Chart 2**. Although the two measures sometimes give slightly different messages about the openness of a particular country, two broad conclusions can be made. First, China's capital controls appear tighter than every country apart from India.(1) And second, the advanced economies appear several times more open than China. This suggests that full liberalisation of capital controls in China could potentially lead to very large changes in flows.

Chart 2 Measures of capital account openness for G20 economies

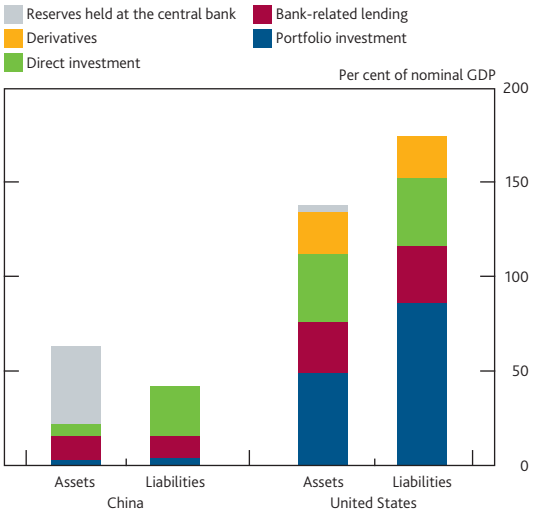


Sources: Chinn and Ito (2008), IMF *International Financial Statistics* (*IFS*) and Bank calculations.

(a) Sum of external assets and liabilities as a share of own GDP.
(b) Chinn-Ito index.
(c) The United Kingdom has a '*de facto*' openness of over 1,300% of GDP, due to its status as an international financial centre.

Within China's overall regime of capital controls, different types of flow are subject to varying degrees of restriction, with the extent of controls differing according to whether they are inflows or outflows, as well as by asset class. To illustrate this, **Chart 3** shows China's gross international investment position (that is, the stock of China's financial assets and liabilities with the rest of the world) in 2012. These stocks represent the accumulation of cross-border capital flows over time, including any valuation changes, and are decomposed into the main categories of cross-border flows: foreign direct investment (FDI), portfolio investment (mainly equity and fixed-income securities) and other investment (mainly bank-related lending) and provides a comparison with the United States.(2)

Chart 3 International investment positions: China and the United States, 2012



Note: The nominal value of the stock of external assets (liabilities) at a particular point in time represents accumulated capital outflows (inflows), including any valuation changes.

Sources: IMF *IFS* and Bank calculations.

Three things in particular stand out from the composition of China's international investment position. First, external liabilities are much larger than external assets (excluding foreign exchange reserves). This is consistent with looser restrictions placed on capital inflows relative to outflows. China's stock of foreign exchange reserves, at over 40% of GDP, is very high but should be excluded from measures of China's financial integration, since the high level of reserve accumulation (much of it into US Treasury securities) by the central bank is partly a reflection of the closed capital account.(3) Second, China's FDI liabilities, at 26% of GDP, are similar to the equivalent share for the United States (36% GDP), whereas all other types of investment are much smaller. This reflects the important role played by inward direct investment in China's growth strategy and its associated favourable regulatory treatment. Third, the biggest difference between the international investment positions of China and the United States is in portfolio investment. The stock of outward portfolio investment is 3% of GDP in China, compared with 49% in the United States and the contrast is

(1) Ma and McCauley (2013) conclude that India is slightly more open than China, however, based on a broader set of openness metrics.
(2) The United States is chosen as a comparator, since it is one of the most open economies but also closest in economic size to China.
(3) China is estimated to hold around 12% of the entire stock of US Treasuries at end-2012.

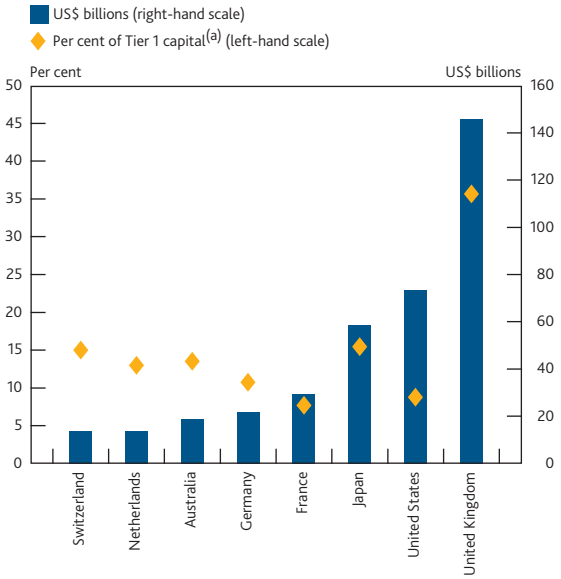
even starker for inward portfolio investment (4% compared with 86% in the United States).

Although China's capital account is still very closed relative to other economies, the situation is starting to change. Since the 2008 global crisis there has been a relaxation of controls in several areas. For example, investment quotas for the existing schemes governing foreign currency portfolio (equity and bond) inflows and outflows have been increased, while new channels for inward RMB portfolio investment have been introduced.(1) Pilot schemes have also been set up, introducing less stringent capital controls in specific locations in China. These include the cross-border scheme between Qianhai and Hong Kong and the Free Trade Zone in Shanghai.

Existing financial links between China and the United Kingdom

Although China's financial opening up will have implications for many economies, the United Kingdom is likely to be relatively more affected, given its large and very open financial system.(2) UK banks' claims on mainland China are larger than any other banking system's, both in absolute terms and relative to capital (**Chart 4**). A large share of these claims are concentrated in HSBC and Standard Chartered, who historically have had a large Asian presence.(3) The United Kingdom's FDI and portfolio linkages with China have also grown rapidly in recent years, albeit from a low base.

Chart 4 Claims on China of major banking systems, 2012



Sources: Bank for International Settlements (BIS) consolidated database, SNL Financial and Bank calculations.

(a) Predominantly common stock and retained earnings.

The City of London is rapidly developing as an offshore centre for the renminbi. A recent survey documented strong growth in renminbi-denominated foreign exchange trading and trade finance in 2012 and estimated the United Kingdom's renminbi deposit base to be around RMB 12 billion (equivalent to £1.2 billion). The five largest Chinese banks all have a presence in the United Kingdom and in October this year it was announced that the Bank's Prudential Regulation Authority (PRA) will be prepared to see Chinese banks open new branches in the United Kingdom, under the PRA's general approach to branches of all non European Economic Area banks. And in June 2013, the Bank and the PBoC established a reciprocal three-year, sterling/renminbi currency swap line which provides a backstop in the unlikely event of a generalised shortage of offshore renminbi liquidity. A box on pages 308–09 describes the development of renminbi activity in the United Kingdom in more detail.

Given these strong financial linkages between China and the United Kingdom, the Bank of England's policymaking committees will need to monitor closely the liberalisation process as it evolves. Although the path of reform is uncertain, it nevertheless seems prudent to consider the issue now, since few events are likely have more impact on the shape of the global financial system over the next decade.

What changes in capital flows might be expected from further openness?

The previous section showed that China's capital account is still significantly closed relative to both advanced and other emerging economies. And although recent relaxation of some controls indicates the direction of travel, there is still the potential for significant further liberalisation.

This section presents some initial considerations of the potential changes in capital flows that might arise from liberalisation. Changes in both the magnitude of capital flows and their composition in terms of asset class and currency denomination are discussed. This is, of course, a hypothetical exercise: in practice, the path of liberalisation and its impact are highly uncertain. The Chinese government has not published an official 'roadmap' for opening the capital account and the desired end-point is also unclear; there is no reason to expect China to become as financially open as economies such as the United Kingdom. The impact of removing restrictions will also depend on the extent to which those restrictions are binding in the first place and on the prevailing macroeconomic conditions, both in China and the rest of the world (Bayoumi and Ohnsorge (2013)).

Magnitude of flows

Even small changes in China's openness might be expected to have a global impact, given the size of China's economy. But if

(1) Schemes governing portfolio investment include the Qualified Foreign Institutional Investor (QFII: inward, FX), Renminbi Qualified Foreign Institutional Investor (RQFII: inward, RMB) and the Qualified Domestic Institutional Investor (QDII: outward, FX).
(2) Non-financial economic links are also important. In 2012 China accounted for 3% of UK exports and 6% of imports. And developments in Chinese demand can impact on the prices of global commodities such as oil, which are important contributors to UK inflation.
(3) According to 2012 published accounts.

Offshore RMB activity in the United Kingdom

One result of China's relaxation of capital controls in the recent past has been increasing use of the Chinese currency, the renminbi (RMB), outside of mainland China.(1) Several international financial centres have seen growing activity in this so-called 'offshore RMB' business and offer a wide range of RMB-denominated financial products and services. Locations with a significant RMB presence currently include Hong Kong, Singapore, Taiwan and London. This box reviews recent developments in RMB activity in the United Kingdom and the Bank of England's role in its past and future development.

Developments in RMB activity in London

London has grown rapidly as a centre for RMB business over the past few years, with activity having expanded across a number of areas. A recent survey of major banks based in London documented strong growth in trade finance and foreign exchange trading in both deliverable and non-deliverable instruments. And more recent data for 2013 suggest that this strong growth is continuing: for instance, in September, the United Kingdom's share of global RMB FX trading activity outside Hong Kong was estimated to be 62%, an increase from 54% in 2012 (SWIFT (2013)). The survey also estimated the United Kingdom's RMB deposit base to be around RMB 12 billion (equivalent to £1.2 billion) at the end of 2012 (**Table 1**). Issuance of the first RMB-denominated bond in London took place in April 2012 by HSBC and there have been a number of others since, including by Chinese banks. In July 2013, the Chinese securities regulator (CSRC) permitted financial institutions based in London to invest directly in China's onshore securities markets through the Renminbi Qualified Foreign Institutional Investor scheme (RQFII) with an initial quota of RMB 80 billion (£8 billion).

Table 1 Renminbi activity in London

RMB billions

	2011	2012
Foreign exchange trading(a)	**10.6**	**16.8**
of which, deliverable	*2.5*	*7.7*
of which, non-deliverable	*8.1*	*9.1*
Bond issuance(b)	**7.0**	**12.4**
Deposits	**15.1**	**11.9**
of which, retail(c)	*0.3*	*0.2*
of which, private banking	*3.6*	*2.8*
of which, corporate	*2.9*	*2.1*
of which, interbank	*8.3*	*6.8*
Trade finance	**8.6**	**24.9**
of which, letters of credit	*0.2*	*1.0*
of which, import financing	*6.8*	*19.2*
of which, export financing	*1.7*	*4.7*

Source: Bourse Consult.

(a) Average daily trading volume.
(b) Annual issuance.
(c) Sum of savings accounts, current accounts and term deposits.

There are a number of possible reasons why London has attracted RMB activity. As a leading international financial centre, most major global financial institutions have operations there. Due to its attractive time zone and established expertise in financial products and services, London provides a convenient base for global financial institutions to manage liquidity across their groups. The United Kingdom also has a strong tradition in foreign exchange business and has the highest share of activity in the world, according to the Bank for International Settlements' triennial foreign exchange survey. London also played a central role in the development of the eurodollar market (US dollar-denominated deposits outside the United States) in the 1960s and 1970s, which some compare to the offshore RMB market today.

Liquidity provision and clearing and settlement

Financial institutions based in London can access RMB liquidity directly from the Mainland through trade-related flows or permitted capital flows. But liquidity can also be sourced indirectly from other offshore RMB centres, since once outside of China there are few restrictions on the use of RMB. In practice, Hong Kong acts as the primary source of liquidity for London, given the depth of its RMB markets and its links with the Mainland's economy and financial system.

In the event of short-term RMB liquidity needs in the offshore market, the Hong Kong Monetary Authority (HKMA) provides a liquidity facility that offers overnight, one-day and one-week collateralised repurchase agreements. These facilities are financed via a swap arrangement with the People's Bank of China (PBoC) which controls the total amount of liquidity that may move between the Mainland and offshore RMB markets. Access to these facilities is limited to participating authorised institutions (AIs). But banks in London can access these facilities either directly, if they have an affiliate in Hong Kong that is an AI, or indirectly, if they have a counterparty relationship with an AI. In the unlikely event that these facilities are insufficient to address RMB offshore liquidity needs, a number of central banks — including the European Central Bank and the Bank of England — can provide RMB liquidity to their own markets by drawing on their RMB swap lines with the PBoC (see below).

For the most part, offshore renminbi markets in London are currently cleared and settled across the HKMA's multi-currency Real-Time Gross Settlement (RTGS) infrastructure, which is linked to the Mainland's onshore payment system. This arrangement effectively meets London's RMB settlement needs, due to the well-established linkages between banks in London and Hong Kong.(2)

There are two initiatives which may change how RMB activity in London is cleared and settled, however. In April 2012 the PBoC announced its intention to establish a new RMB settlement system for both onshore and offshore payments. The system will be called the China International Payments System (CIPS) and will be made available to banks outside of mainland China, therefore allowing banks in London to establish a direct settlement relationship with the PBoC and settle in central bank money. And in October 2013, the Bank announced the possibility of an additional RMB clearing bank being based in London (Carney (2013a)).

Future development of RMB business in London and the role of the Bank of England

The Bank of England is supportive of the development of London as an RMB centre, provided it is consistent with the stability of the UK financial system. The recent development has been market-led and promoted by a number of private sector-led initiatives. These initiatives include the City of London Corporation's work to develop London as a centre of RMB business and the London-Hong Kong Forum of international banks active in RMB. The Bank sits as an observer on both these groups in order to monitor any financial stability implications of the market's development and also to provide technical guidance on the Bank's operational framework and infrastructure.

The existing size of RMB activity in London is very small relative to activity in other foreign currencies (**Table 2**). And so even in the event of any disruption in these markets, they are unlikely to pose any systemic risk to UK financial stability at present.

Table 2 UK financial activity denominated in foreign currency, 2012

£ billions

	All FX	RMB	RMB as a share of all FX, per cent
Bond issuance	149.5	1.2	0.83
Average daily FX turnover[(a)]	2,536.8	15.1	0.59
Interbank deposits[(b)]	1,057.9	0.7	0.06
Non-bank deposits[(b)]	1,414.1	0.5	0.04

Sources: Bank of England, Bourse Consult and Bank calculations.

(a) Data on FX turnover are for 2013 and taken from the Bank of England's triennial foreign exchange and OTC interest rate derivatives survey, which differs in methodology and coverage from the Bourse Consult survey.
(b) Assumes ratio of interbank to non-bank FX deposits from non-residents is the same as for FX deposits from residents.

But that might not last. Given further liberalisation in China, it is likely that offshore activity will grow both in London and other financial centres. And so it is possible that the scale of activity could grow to become of systemic importance in the medium term. The consequences of a shortage of foreign exchange liquidity became all too apparent in 2008, when the dislocation in US dollar interbank markets acutely affected the UK financial system.

The Bank is therefore ensuring that it has the necessary systems and surveillance capacity in place now, so that it will be well prepared to mitigate any risks that might arise in the future from RMB activity in the United Kingdom. And at the same time, it is keen to not inhibit the development of the market through any gaps in its operational and regulatory framework. To achieve these aims, the Bank is working closely with its counterparts at the PBoC and HKMA.

In June 2013, the Bank and the PBoC established a reciprocal three-year, sterling/renminbi currency swap line. In the unlikely event that a generalised shortage of offshore renminbi liquidity emerges that poses a financial stability risk, the Bank will have the capability to draw renminbi up to the value of RMB 200 billion under the swap facility in order to make this available to eligible institutions in the United Kingdom. And in October 2013, the Bank announced it would consider applications from Chinese banks to establish wholesale branches in the United Kingdom (Bailey (2013)). That should help further facilitate growth in RMB liquidity both in the United Kingdom and globally.

As the United Kingdom's trading and financial relationship with China becomes more important over time, development of this market is likely to have beneficial consequences for the growth and stability of the UK economy and financial system. For example, a UK company exporting to China will be able to purchase financial instruments to help manage its foreign exchange risk. And companies receiving payment in RMB will be able to reduce transaction costs by depositing in an RMB account in the United Kingdom. By focusing on maintaining a stable financial system, the Bank of England in turn should create the conditions in which RMB activity can flourish.

(1) Offshore RMB trades on a free-floating basis and is widely denoted as CNH, distinguishing it from its mainland equivalent, CNY, which is subject to the PBoC's daily trading band.
(2) Although the details differ, settlement of RMB via offshore infrastructure in Hong Kong is similar to the way in which other foreign currencies are settled. For example, payments in euro and the US dollar are both cleared overseas.

China undergoes a material liberalisation over the next decade, the increases in gross flows will likely be very large relative to the size of the world economy. This reflects three factors, which relate, in turn, to China's starting level of openness, its expected economic growth over the next decade and the potential for further financial globalisation. For expositional purposes these factors are labelled 'closing the openness gap', 'catch-up growth' and 'declining home bias', respectively:

Factor 1: 'Closing the openness gap'

The measures of capital account openness in **Chart 2** show that there is a large gap between China's current level of openness and that of advanced countries. This gap will close as China liberalises, resulting in a large increase in capital flows both into and out of China. For example, if China were to liberalise tomorrow and immediately reach the same international investment stock position as the United States shown in **Chart 3**, the associated increase in inflows and outflows would represent over 100% of China's GDP. In practice, of course, the adjustment would likely take place over a number of years, given the authorities' stated preference for a gradual and orderly liberalisation. But this figure illustrates the scale of the openness gap.

Factor 2: 'Catch-up growth'

Over the next decade, China is projected to grow more than 1.5 times more quickly than the world economy.(1) As a result it will represent an increasing share of global economic output over time. This, in turn, implies that even if China's capital flows do not increase as a share of its own economy, they would still increase relative to the size of the world economy.

Factor 3: 'Declining home bias'

Over the past few decades, the world became more financially globalised and cross-border asset holdings exhibited an upward trend. Part of that reflected ongoing financial deepening, but a large part also reflected increasing diversification of countries' assets and liabilities, away from home and towards overseas markets. Although financial globalisation has stalled in the wake of the financial crisis, it is reasonable to expect it to pick up again over coming decades, since countries' investment portfolios are still skewed more towards home markets than the optimal split between domestic and foreign asset holdings that would be implied by conventional asset pricing models (French and Poterba (1991), Hau and Rey (2008)). And if this so-called 'home bias' does continue to decline, it will give an extra boost to global capital flows — both in China and other economies — in what Haldane (2011) has called a 'capital flow substitution effect'.

Composition of flows

Asset class

All types of cross-border flow (portfolio investment, FDI, bank lending) would be expected to increase were China to undergo a material liberalisation. But given the discrepancies in international investment positions between China and the United States highlighted in **Chart 3**, there would likely be relatively larger increases in cross-border portfolio and banking flows than FDI flows.

Currency

China's capital flows would also likely be increasingly renminbi-denominated under liberalisation. Cross-border use of the RMB has increased rapidly in recent years, albeit from a low base. Since restrictions on Chinese companies to settle cross-border trade in RMB were eased in 2010, current account-related RMB flows have increased over sixtyfold. But capital flows in RMB have also been increasing. The volume of offshore RMB-denominated bank deposits (CNH deposits) has increased thirteenfold since the beginning of 2010, to over RMB 800 billion. There has also been a large increase in the volume of RMB-denominated ('dim sum') bonds issued offshore. And new schemes for RMB-denominated portfolio and FDI flows have been introduced.

The internationalisation of the RMB is not the same thing as capital account liberalisation, although it is clearly related. Greater use of the Chinese currency outside of China can occur without any loosening of capital controls, for example through current account flows. Likewise, relaxation of capital controls could, in theory, occur without any increase in use of the Chinese currency. But in practice the two processes are likely to go hand in hand, given both the stated desire of the authorities and the practical benefits for companies outside of China with RMB trade invoices to access RMB financial instruments.(2)

Offshore use of the RMB is still small relative to the most widely traded currencies, however, and like capital account liberalisation, there is further to travel. The end-point of RMB internationalisation is even more uncertain than capital account liberalisation. Empirical studies suggest that financial openness is not the only determinant of a currency's international status; the economy's share of global trade and output and the level of domestic financial market development are also important (Chinn and Frankel (2007)). Moreover, the use of existing international currencies can take a long time to be displaced: during the early 20th century, for example, both sterling and the US dollar co-existed as dominant international currencies for some time, despite the fact that the US economy had surpassed the United Kingdom's in terms of size.

(1) According to the Bank of England's long-run world nominal GDP projections. See Speller *et al* (2011) for details.
(2) For example, a UK company that exports goods to China but receives payment in RMB may wish to hedge the foreign exchange risk through an RMB/GBP swap. At present, its hedging options are largely limited to the offshore non-deliverable forward market.

A scenario for Chinese international financial integration in 2025

A small number of academic studies have attempted to model the impact of any future Chinese capital account liberalisation on capital flows (for example, Bayoumi and Ohnsorge (2013) and He *et al* (2012)). They each focus on different types of capital flow and use different methodologies and assumptions, and so are not directly comparable. Nevertheless, they suggest two broad conclusions which are consistent with the above discussion. First, there are likely to be large increases in the stock of both external assets and liabilities. And second, the increase in outflows (and hence China's stock of non-reserve foreign assets) is likely to be greater than the increase in inflows.

By making some simple assumptions, it is also possible to construct a stylised projection for China's international financial integration that incorporates the three factors outlined above. For the 'closing the openness gap' factor, China's capital account is assumed to be fully liberalised by 2025 (that is, broadly in line with the time frame set out by the PBoC in 2012) at which point China's level of openness (that is, its stock of external assets and liabilities relative to nominal GDP) reaches the current level for the United States. The 'catch-up growth' factor is modelled using the Bank of England's long-run GDP projections, based on a cross-country growth convergence model (Speller *et al* (2011)). And to take account of potential increases in financial globalisation (the 'declining home bias' factor), global holdings of external assets and liabilities are assumed to increase at the same average rate as they have done over the past 30 years.

The results of this thought experiment are shown in **Chart 5**. Although this is a necessarily partial exercise, it provides a useful benchmark for thinking about the changes that could arise over the next decade, should the Chinese authorities undergo full and rapid liberalisation. The scenario suggests the stock of China's external assets and liabilities could both increase from less than 5% of world GDP today, to over 30% by 2025 — similar to the US position today. Interestingly, all three factors play an important role in driving this large increase in China's global financial integration. **Chart 6** shows these projections over time and suggests that the potential increase in China's global financial integration would be broadly in line with the US experience from 1995–2007.

The scenario shown in **Charts 5** and **6** suggests that liberalisation will lead to large increases in gross capital flows both into and out of China. The consequences for net flows — which are important for global imbalances — are less clear-cut, however. In theory, net capital flows are pinned down by the balance of payments identity, according to which any domestic savings net of investments ($S - I$) that result in a current account surplus ($CA+$) must be invested abroad through either net capital outflows ($KA-$) or reserve accumulation by the central bank ($FX-$):

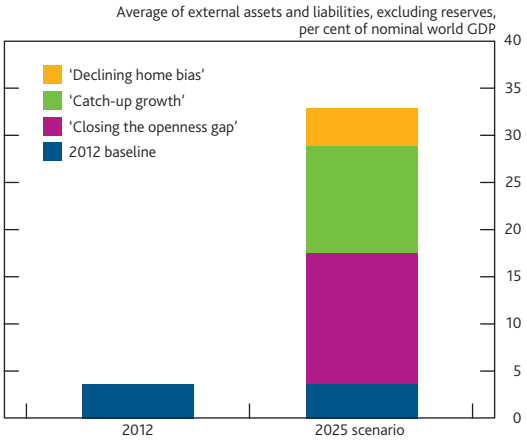
Balance of payments identity*

$$S - I = CA(+) = KA(-) + FX(-)$$

* (+) denotes net inflow and (-) denotes net outflow

At present, China saves more than it invests and therefore runs a current account surplus. But instead of investing this surplus abroad through capital outflows, it actually receives net capital

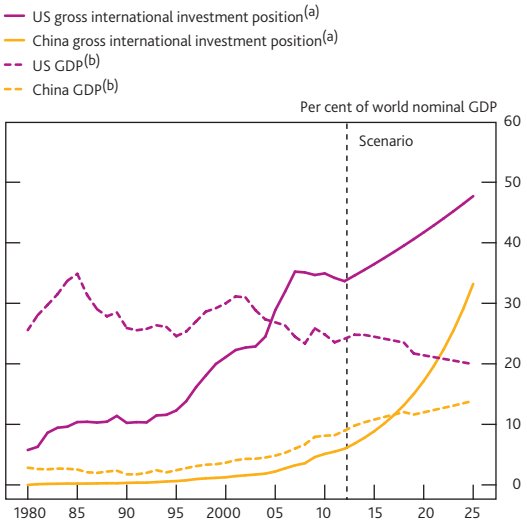
Chart 5 Potential impact of capital account liberalisation on China's gross international investment position



Notes: The 2025 scenario is based on the following three assumptions: (i) China's stock of external assets and liabilities relative to its own GDP reaches the United States' 2012 level (138% and 174% GDP respectively), (ii) the Chinese and world economies grow in line with projections from the cross-country convergence model in Speller *et al* (2011), and (iii) external assets and liabilities of all countries relative to their own economies continue to grow in line with their average of the past 30 years (1.5 percentage points annually). China's holdings of foreign exchange reserves are not shown in the chart. These accounted for 4% of world GDP in 2012 and are projected to account for less than 1% of world GDP in 2025.

Sources: IMF, Speller *et al* (2011) and Bank calculations.

Chart 6 Potential impact of capital account liberalisation on China's gross international investment position

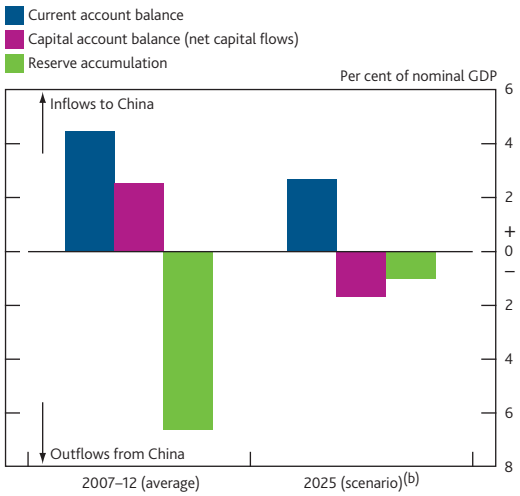


Sources: IMF, Lane and Milesi-Ferretti (2007), Speller *et al* (2011) and Bank calculations.

(a) The ratio of the average of external assets and liabilities to world GDP. See the notes to **Chart 5** for details on scenario to 2025.
(b) Nominal GDP projections from Speller *et al* (2011).

inflows due to its stricter controls on outflows relative to inflows. To square the circle, it therefore has to invest overseas an amount greater than its own savings through reserve accumulation. This is shown for the 2007–12 period by the large negative green bar on the left-hand side of **Chart 7**.

Chart 7 Stylised scenario for China's net capital flows(a)



Sources: IMF *WEO*, OECD and Bank calculations.

(a) The balance of payments identity implies the blue, magenta and green bars must sum to zero. In practice, the equality does not hold exactly due to measurement error, reported as 'net errors and omissions' and transfer payments.
(b) Current account projection for 2025 is taken from the 2013 OECD *Economic Outlook*.

Capital account liberalisation would lead this picture to change dramatically. Although China's saving and investment dynamics over the next decade are projected to lead to continued — albeit declining — current account surpluses (OECD (2013)), these would be invested abroad very differently under an open capital account than they are currently. Since outflows appear to be more restricted than inflows, full liberalisation might lead to sizable swings to net capital outflows. Conversely, reserve accumulation is likely to fall, given that China's stock of reserves is far in excess of both the OECD average and precautionary needs as a defence against external shocks (International Monetary Fund (2011a)). **Chart 7** shows an illustrative scenario of the potential shift from net capital inflows to net outflows. Intuitively, it shows how China's excess domestic savings (blue bars) — which currently leave China through the PBoC's purchases of foreign exchange reserves (green bars) — could, in the future, increasingly leave through capital outflows via banks, businesses and households (magenta bars).

Global implications of Chinese capital account liberalisation

The potential changes in both the magnitude and composition of capital flows outlined in the previous section would dramatically alter the financial landscape both in China and globally. In principle, capital account liberalisation in China could be a powerful force that enables the Chinese and global economies to become both richer and more stable. But on the other hand, it could also pose risks to stability, of which policymakers will need to be mindful.

Implications for China

For China, there are several potential benefits of liberalisation which can all be viewed through the broader lens of contributing to economic rebalancing. The Chinese economy is now starting to transition to a new model of growth, away from reliance on exports and investment as the key sources of demand.(1) The new model of growth will therefore place a greater emphasis on consumption as a source of demand and an increase in the production of services relative to exportable manufactures. This is a challenging task and will require an ambitious agenda of structural reforms. Among these reforms, capital account liberalisation will play a key role.

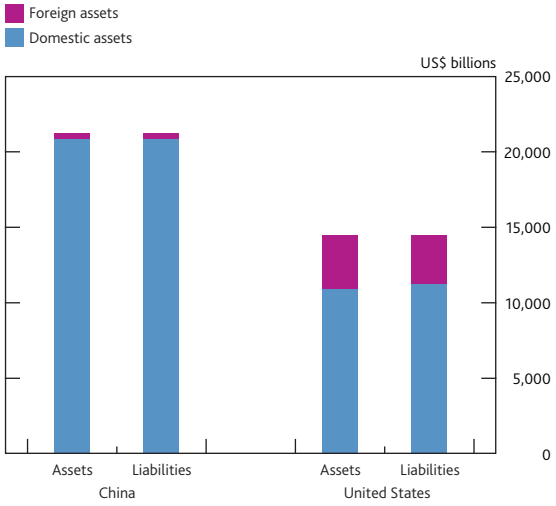
A removal of restrictions on outflows, for example, will allow Chinese companies and households to diversify their large pools of savings by investing in overseas assets. This should help to spread risk, reducing the need for precautionary saving and hence free up income for current spending. And it may also boost household income if returns earned on overseas assets are higher than on domestic assets (which is likely given that real deposit rates in China are currently negative due to regulatory caps).

China has the biggest banking system in the world by total assets but it is very domestically focused (**Chart 8**). If China's banks were to diversify their balance sheets by expanding abroad — either directly through cross-border bank lending, or indirectly through lending to foreign affiliates — they may become more resilient to an adverse shock in their home market and so be better able to maintain lending to domestic companies and households in China.

Allowing more channels for inflows, on the other hand, will help to deepen and diversify China's financial system, providing alternative sources of capital for Chinese borrowers. Should liberalisation also lead to lower reserve accumulation, it could lead to an improvement in China's fiscal balance since the return on its FX reserves is lower than the cost of sterilising those purchases (Rodrik (2006)). And if it were accompanied by a more flexible exchange rate regime (as was suggested by the Third Plenum), it could allow China to operate a more effective monetary policy, increasing its ability to respond to domestic shocks.(2) All of these factors should promote China's rebalancing and its transition towards a new model of growth.

(1) See Dew *et al* (2011).
(2) According to the 'impossible trinity', a country can have at most two of the following simultaneously: independent monetary policy, an open capital account and a fixed exchange rate.

Chart 8 Balance sheet of Chinese and US-resident banking systems, 2012



Sources: BIS locational banking statistics, CEIC, Federal Deposit Insurance Corporation and Bank calculations.

But there are also risks. There are several notable examples where capital account liberalisation has resulted in instability. The most recent, perhaps, was the Eastern European countries where large capital inflows contributed to unsustainably rapid credit growth that ultimately culminated in economic and financial crisis in 2008 (Bakker and Gulde (2010)). Chinese policymakers will need to ensure they have sufficient scope to set policy to offset shocks that could pose risks to economic and financial stability. It will be particularly important to sequence carefully external liberalisation with appropriate domestic macroprudential and microprudential policies to mitigate risks from excessive credit growth and asset price volatility.

One concern is that by opening the financial gates, some banks and, ultimately, borrowers in the Chinese real economy may find themselves faced with a shortage of liquidity. China's banking system is heavily reliant on domestic deposits for its funding, which account for around two thirds of total liabilities. A reallocation overseas of even a small share of these deposits could therefore cause funding difficulties. By enabling higher real returns for Chinese domestic savers, however, domestic interest rate liberalisation could help to reduce these risks.

Another set of risks are related to inflows. In the short run, there could be indigestion in China's asset markets, which are still small relative to potentially large inflows of capital. And over a longer time period, inflows could lead to an unsustainable build-up of maturity and currency mismatches in national balance sheets (for example, long-term domestic investment funded by short-term overseas FX-denominated borrowing). Large mismatches are susceptible to unwind in a disorderly way, as was the case for some Asian economies in 1997–98.(1) Finally, the risks arising from a more flexible — and potentially more volatile — exchange rate would need to be effectively managed.

Which of these outcomes — more sustainable growth or a rise in instability — would dominate will depend on the accompanying policy framework. The empirical evidence on the costs and benefits of financial openness tends to suggest that countries benefit most when certain threshold conditions — such as a well-developed and supervised financial sector and sound institutions and macroeconomic policies — are in place before opening up to large-scale flows of capital (Kose *et al* (2006)). This underscores the importance in China of careful sequencing of capital account liberalisation alongside other domestic reforms such as domestic interest rate liberalisation, development of effective hedging instruments and enhancing the microprudential and macroprudential regimes.

Implications for the rest of the world

From the perspective of policymakers outside of China, it is important to understand how capital account liberalisation might 'spill over' to affect other economies. Four such channels are discussed below, although there are undoubtedly others.

Greater exposure to the Chinese financial system

If liberalisation has a large impact on the Chinese economy or financial system, it is also likely to have a significant impact in other countries as well. Although China's economy is already considered able to generate material spillovers onto other economies (International Monetary Fund (2011b)), the process of capital account liberalisation will likely increase its systemic importance even further, by magnifying existing transmission channels, while also creating new ones. Foreign households, businesses and financial institutions will increase the amount and the number of their claims on China, while those in China will do the same with respect to the outside world, thereby deepening the complex web of financial interconnectedness.

If China does hard-wire itself into the global financial system, it will bring important benefits in terms of risk-sharing. Households that purchase Chinese assets whose returns are not perfectly correlated with their own income would be better able to smooth consumption. And foreign banks that expand in China would diversify their earnings base and potentially enhance their resilience.

The flipside of increased interconnectedness, however, is that the global financial system will be more sensitive to shocks originating in China. Increased holdings of Chinese assets, for example, would imply greater exposure to fluctuations in their price. Greater reliance of global banks on Chinese banks for funding, in turn, would bring about the possibility of a liquidity

(1) For more detail on national balance sheet mismatches see Al-Saffar, Ridinger and Whitaker (2013).

shortage if those banks were to repatriate funds in response to balance sheet pressures back home.(1)

Increase in global liquidity

If China's financial walls are lifted, some of its vast pool of domestic savings will migrate into global capital markets, providing a significant boost to liquidity. The illustrative scenario in **Chart 5** suggests that these flows could amount to a substantial share of world GDP.

A new source of global liquidity from China could lead to several beneficial effects, particularly during a period where the world's financial system is becoming increasingly fragmented and retreating into national borders (Carney (2013b)). As well as providing a new source of finance for borrowers, it could lead to a more diversified and more stable global investor base. At the same time, however, a rapid increase in liquidity from China could lead to absorption pressures in some asset markets in the short run, which could lead to a mispricing of risk with adverse consequences for financial stability.

Increased global role of the renminbi

Greater international use of the renminbi would add another dimension to the global impact of capital account liberalisation. Potential benefits include lower transaction costs and a reduced risk of currency mismatches. But it may also amplify the international transmission of Chinese policy and domestic shocks, of which policymakers around the world will need to take into account.

Take the following hypothetical case: a country purchases a large proportion of its imports from China and its currency depreciates against the renminbi. If the prices of those imports are set and invoiced in the domestic currency of that country, the depreciation would not automatically lead to an increase in their price and hence no response in domestic monetary and fiscal policy would be needed.(2) If, however, the imports were invoiced in RMB, then their price would increase in line with the exchange rate depreciation, leading to domestic inflation. Moreover, a country that had no trade with China but whose imports were set and invoiced in RMB — such that the RMB would be a 'vehicle currency' — would need to respond to macroeconomic or policy fluctuations in China that affect the exchange rate and feed through into domestic prices of that country.

There is a body of literature which finds evidence of these invoicing effects for the US dollar, as the world's most international currency. Goldberg (2010) finds that for non-US economies, large use of the US dollar in reserves and in international transactions is typically associated with greater sensitivity of trade, inflation and asset values to movements in the value of the dollar relative to the domestic currency. However, as discussed above, it would likely take much longer than a decade for the renminbi to take on a similar role to that of the US dollar today.

Global imbalances

The literature on the causes and consequences of global imbalances is as vast as it is inconclusive. According to one influential perspective, the large imbalances in current account positions that accumulated over the past decade partly originated in high net saving rates in developing Asian countries (Bernanke (2005)). If true, capital account liberalisation in China could potentially help to alleviate these imbalances to the extent that it leads to a reduction in China's net savings and correspondingly its current account surplus (although clearly the impact of this on overall imbalances would depend on the corresponding adjustment in other countries). This may occur either because liberalisation lowers the incentives for precautionary saving or because it leads to a more flexible and higher exchange rate.

But even if Chinese capital account liberalisation were to lead to no reduction in global imbalances, it could still help to lessen some of the adverse consequences relating to these imbalances. There is evidence that reserve accumulation by foreign governments can materially depress the risk-free interest rate in the United States (Warnock and Warnock (2009)) which, in turn, may encourage excessive risk-taking behaviour globally. So to the extent that Chinese capital account liberalisation were to result in a switch in the composition of outflows, away from reserve accumulation by the central bank and towards overseas investment in riskier assets by other Chinese residents, this may reduce some of the downward pressure on government bond yields and related rates in the United States and globally. Of course, this would bring other challenges. But in the longer term, it could be beneficial for the stability of the international monetary and financial system as a whole.

Conclusion

If China proceeds to liberalise its capital account over the next decade or so, it has the potential to be a force for growth and stability not just in China but also for the international monetary and financial system. While this process will be accompanied by new and important risks, it falls to national authorities and international bodies to monitor and take appropriate policy actions to mitigate such risks.

This will not be a trivial task. Given that Chinese capital account liberalisation could lead to dramatic changes in the global financial landscape, policymakers will be facing

(1) Hoggarth, Hooley and Korniyenko (2013), for example, document foreign bank repatriation from the United Kingdom during the 2007–09 crisis.
(2) This is, of course, a highly stylised example. In practice, the Chinese exporter may choose to change its pricing behaviour since they would stand to receive less in RMB terms.

uncharted territory. To succeed, policy co-operation between national authorities is likely to be necessary, both to increase understanding of the risks and to develop common policy approaches. The Bank of England is currently working closely with the People's Bank of China regarding the development of offshore renminbi activity in the United Kingdom and will continue to seek other ways to support a successful integration of China into the global financial system.

References

Al-Saffar, Y, Ridinger, W and Whitaker, S (2013), 'The role of external balance sheets in the financial crisis', *Bank of England Financial Stability Paper No. 24*.

Bailey, A (2013), 'Regulating international banks', available at www.bankofengland.co.uk/publications/Documents/speeches/2013/speech687.pdf.

Bakker, B and Gulde, A (2010), 'The credit boom in the EU new member states: bad luck or bad policies?', *IMF Working Paper No. WP/10/130*.

Bayoumi, T and Ohnsorge, F (2013), 'Do inflows or outflows dominate? Global implications of capital account liberalization in China', *IMF Working Paper No. WP/13/189*.

Bernanke, B (2005), 'The global saving glut and the US current account deficit', available at www.federalreserve.gov/boarddocs/speeches/2005/200503102/.

Carney, M (2013a), 'The UK at the heart of a renewed globalisation', available at www.bankofengland.co.uk/publications/Documents/speeches/2013/speech690.pdf.

Carney, M (2013b), Statement of Mark Carney Chairman of the Financial Stability Board to the International Monetary and Financial Committee, Washington DC, available at www.imf.org/External/AM/2013/imfc/statement/eng/FSB.pdf.

Chinn, M and Frankel, J (2007), 'Will the euro eventually surpass the dollar as leading international reserve currency?', in Clarida, R (ed), *G7 current account imbalances: sustainability and adjustment*, University of Chicago Press.

Chinn, M D and Ito, H (2008), 'A new measure of financial openness', *Journal of Comparative Policy Analysis*, Vol. 10, Issue 3 (September), pages 309–22.

Dew, E, Giese, J, Martin, J and Zinna, G (2011), 'China's changing growth pattern', *Bank of England Quarterly Bulletin*, Vol. 51, No. 1, pages 49–56.

French, K and Poterba, J (1991), 'Investor diversification and international equity markets', *American Economic Review*, Vol. 81, pages 222–26.

Goldberg, L (2010), 'Is the international role of the dollar changing?', *Federal Reserve Bank of New York Current Issues in Economics and Finance*, Vol. 16, No. 1.

Haldane, A (2011), 'The big fish small pond problem', available at www.bankofengland.co.uk/publications/Documents/speeches/2011/speech489.pdf.

Hau, H and Rey, H (2008), 'Home bias at the fund level', *American Economic Review*, Vol. 98, No. 2, pages 333–38.

He, D, Cheung, L, Zhang, W and Wu, T (2012), 'How would capital account liberalisation affect China's capital flows and the renminbi real exchange rates?', *Hong Kong Institute for Monetary Research Working Paper No. 09/2012*.

Hoggarth, G, Hooley, J and Korniyenko, Y (2013), 'Which way do foreign branches sway? Evidence from the recent UK domestic credit cycle', *Bank of England Financial Stability Paper No. 22*.

International Monetary Fund (2011a), 'Assessing reserve adequacy', available at www.imf.org/external/np/pp/eng/2011/021411b.pdf.

International Monetary Fund (2011b), 'Consolidated spillover report: implications from the analysis of the systemic-5', available at www.imf.org/external/np/pp/eng/2011/071111.pdf.

Kose, M, Prasad, E, Rogoff, K and Wei, S (2006), 'Financial globalization: a reappraisal', *IMF Working Paper No. WP/06/189*.

Lane, P R and Milesi-Ferretti, G M (2007), 'The external wealth of nations Mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004', *Journal of International Economics*, Vol. 73, No. 2, pages 223–50.

Ma, G and McCauley, R (2013), 'Is China or India more financially open?', *BIS Working Paper No. 410*.

OECD (2013), *Economic Outlook*, Paris, November.

People's Bank of China, Department of Research and Statistics (2012), 'Conditions for China to accelerate capital account liberalisation are basically mature', *China Securities Journal*, 23 February.

Quinn, D P, Schindler, M and Toyoda, A (2011), 'Assessing measures of financial openness and integration', *IMF Economic Review*, Vol. 59, No. 3, pages 488–522.

Rodrik, D (2006), 'The social cost of foreign exchange reserves', *NBER Working Paper No. 11952*.

Speller, W, Thwaites, G and Wright, M (2011), 'The future of international capital flows', *Bank of England Financial Stability Paper No. 12*.

SWIFT (2013), 'RMB now 8th most traded currency in the world', press release, October, available at www.swift.com/assets/swift_com/documents/products_services/RMB_tracker_September2013.pdf.

Warnock, F and Warnock, V (2009), 'International capital flows and US interest rates', *Journal of International Money and Finance*, Vol. 28, No. 6, pages 903–19.

Zhou, X (2013), 'Comprehensively deepen reforms and opening up the financial sector, accelerate the improvement of financial market system', in *Guidance Book of the Third Plenum's Decisions*, Government of China, pages 89–100.

Banknotes, local currencies and central bank objectives

By Mona Naqvi and James Southgate of the Bank's Notes Division.[1]

- A few towns and cities in the United Kingdom have set up local currency schemes to promote local sustainability. The schemes issue paper instruments with some similar design features to banknotes. This article explains how these instruments differ from banknotes.
- The size, structure and backing arrangements of existing schemes mean that local currencies are unlikely to pose a risk to the Bank's monetary and financial stability objectives. Nonetheless, consumers should be aware that local currency instruments do not benefit from the same level of consumer protection as banknotes.

Overview

The Bank of England's issuance of banknotes feeds into its monetary stability objective, which includes maintaining confidence in the physical currency. This requires people to be confident that the banknotes they hold will continue to be widely accepted at face value. The promise by the Bank of England to make good the value of its banknotes for all time, as well as its use of robust security features and a wide-ranging programme of education on how to identify genuine banknotes, helps to ensure that this objective is met.

Banknotes are, however, just one form of payment instrument used alongside other physical media of exchange, such as cheques or retail vouchers. A few UK towns and cities have set up their own local currencies, issuing physical instruments that are akin to vouchers, although some are designed to look similar to banknotes.

Local currency schemes aim to boost spending within the local community and, in particular, among locally owned businesses. In addition, there may be other grounds for companies to participate, such as promotion in the scheme's marketing material. Participation by both businesses and consumers might also reduce environmental footprints as well as signal a commitment to supporting the local community.

The Bank of England takes an interest in schemes that have the potential to impact its monetary and financial stability objectives. A number of mitigants exist which, if implemented by current and future local currency schemes, should mean that they do not pose a material risk to the Bank's objectives, as outlined in the **summary table**.

Summary table Features of local currency schemes that mitigate potential risks to the Bank's objectives

Objective of the Bank	Potential risk to that objective	Feature(s) of local currencies that can reduce that risk
Price stability	Local currency schemes lead to significant and unanticipated impacts on aggregate economic activity.	The schemes are small relative to aggregate spending in the economy.
Confidence in the physical currency	Fears surrounding the authenticity of local currency vouchers spill over to reduce confidence in banknotes.	Design features and marketing material help users to recognise that local currency paper instruments are like vouchers and not banknotes.
Financial stability	The failure of a local currency scheme destabilises the financial system as a whole.	The schemes are small relative to aggregate spending in the economy and the one-for-one backing assets are securely ring-fenced.

Given that the schemes *currently* operating in the United Kingdom are at present small (both individually and in aggregate) relative to aggregate spending in the economy, and are typically backed one-for-one with sterling, they are unlikely to present a risk to the Bank's monetary or financial stability objectives. Nevertheless, a risk could arise if consumers mistakenly associate local currencies with banknotes. Such a perception could generate a spillover effect if, for example, a successful counterfeit attack on a local currency were to reduce confidence in banknotes or, in the event of failure, if consumers were to incorrectly expect recompense from the Bank. Bearers of local currency vouchers do not benefit from the same level of consumer protection as banknotes issued by either the Bank of England or the authorised commercial issuing banks in Scotland and Northern Ireland.

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

Introduction

The Bank of England started issuing banknotes shortly after its incorporation in 1694, and since 1921 has been the monopoly issuer of banknotes in England and Wales. Today the note issue function forms part of the Bank's monetary stability objective, which includes the aim of maintaining confidence in the physical currency.

The United Kingdom is in an almost unique position in that the government also permits certain commercial banks to issue banknotes. There are three such issuers in Scotland and four in Northern Ireland (S&NI). Legislation was introduced in 2009 to ensure that, in the event of a commercial bank becoming insolvent, S&NI noteholders would be able to redeem their notes at face value.

In addition, there are many other physical media of exchange available for transactions. One example is retail vouchers, which have existed for many years but have a more restricted purpose and use than banknotes. More recently, 'local currencies' have been established in a few UK towns and cities. These are in many ways an evolution of previous alternative currency experiments. Although the current UK schemes are small relative to the issuance of banknotes, the Bank takes an interest in the development of local currencies that have the potential to impact its ability to meet its monetary and financial stability objectives.

This article outlines the key differences between banknotes and local currency instruments. The first section reviews the history of and rationale for central banks having a monopoly over banknote issuance. The second section explores the history of alternative currencies and the aims of UK schemes issuing physical instruments today. The third section examines whether current local currency schemes pose a risk to the Bank's monetary and financial stability objectives. Finally, the article considers user protection, and highlights that consumers have no recompense from the Bank of England in the event of a local currency scheme failure. A short **video** explains some of the key topics covered in this article.(1)

Central bank money

This section briefly reviews the origins and rationale behind central bank money. To do this, it is useful to consider the three key functions of money, which are to act as a:

(i) **Medium of exchange** with which to make payments.
(ii) **Store of value** with which to transfer 'purchasing power' (the ability to buy goods and services) from today to some future date.
(iii) **Unit of account** with which to measure the value of any particular item that is for sale.

The evolution of fiat money

In its role as a medium of exchange and a store of value, money can essentially be thought of as a claim (or 'IOU') from one person to another. Historically, societies tended to adopt commodities such as gold and silver as the dominant means of transferring claims from person to person (as a medium of exchange) or from one point in time to a later date (as a store of value).(2) In the 16th century, goldsmiths began to accept gold and silver deposits, in return issuing receipts to acknowledge the debt. Before long, depositors found it easier to simply use the receipts themselves as a means of payment, as they effectively represented a claim on the commodities in the custody of the goldsmiths. Consequently, the enforcement of claims on the reserves became less and less frequent. Goldsmiths were then able to lend out a proportion of their deposits (and earn a profit by charging interest), given that depositors were unlikely to withdraw all of their coins at the same time.(3)

Throughout the 17th century, the British state borrowed from the goldsmiths to fund a series of wars with France. However, the loans came with very high interest rates that led to repeated defaults by the state. The Bank of England was established in 1694 to provide the state with a cheaper source of credit. Like the goldsmiths' receipts, Bank of England notes circulated as a means of exchange since they promised to pay the bearer the sum of the note on demand. That is, anyone holding a banknote could, in principle, have it exchanged at the Bank of England for the designated value of gold.

Over time, the number of banknote issuers declined. The Bank Charter Act 1844 prohibited banks which did not already issue notes from starting to do so. It also prevented existing note-issuing banks in England and Wales (other than the Bank of England) from increasing the value of their note issue. The Bank of England eventually became the monopoly note-issuer in England and Wales after the last private banknotes were issued by the Somerset bank, Fox, Fowler and Co. in 1921. The authorised banks of Scotland and Ireland were, however, still permitted to issue banknotes.(4)

Meanwhile, a period of financial upheaval in the late 18th century drained the Bank's bullion reserves to the point where it was forced to stop paying out gold for its notes until 1821, during what became known as the 'Restriction Period'.(5) The link to gold was broken again with the onset of the First World War and briefly resurfaced in the form of the gold standard (fixing the value of sterling to gold) in the inter-war period. However, following further financial upheaval, the

(1) See www.youtube.com/watch?v=JrlSag_tkLo.
(2) Such commodities were often used because of properties such as their divisibility, homogeneity and portability to facilitate the transfer of claims, rather than because of any strong desire to own the commodities themselves.
(3) See Ryan-Collins *et al* (2011).
(4) See Byatt (1994).
(5) See, for example, the section on 'The original 1797 Gillray cartoon' in Keyworth (2013).

United Kingdom abandoned the gold standard and adopted a fiat currency (that is, money by government decree) in 1931. From this point on, the Bank of England's note issue has been backed by the promise of government-guaranteed assets instead of gold or any other such commodity.(1) The rationale and some of the implications of this are discussed briefly below.

Central bank monopoly on the issuance of banknotes

In the vast majority of countries, the central bank is the monopoly supplier of banknotes. Understanding the unique nature of the demand for banknotes is key to understanding the evolution of states or central banks having a monopoly on their supply. The demand for money is quite different from the demand for other goods and services, owing to its functions as a means of exchange and a store of value. For both of these uses, **there is a benefit to society if users can be confident that any banknote held will be widely accepted by others in the future, and at its face value**.

Users can be most confident in the value of banknotes when there is (and users believe there will continue to be) an asset explicitly 'backing' these notes over the period for which they wish to hold them. In a world of fiat money (which is not exchangeable for a physical asset such as gold), the best way to ensure that notes retain their face value over time is to back them with an asset of the state. Ultimately, fiat money is backed by trust in the state or — more concretely — confidence in the state's willingness and ability to use future taxation to meet all of its obligations.

In addition to arguments in favour of a state-owned monopoly issuer, there are reasons why the central bank, specifically, is best suited to managing banknote issuance. Note issuance requires operational capabilities such as making large-value payments and balance sheet management, which typically form part of a central bank's wholesale government banking function. There is also an operational benefit of co-ordinating liquidity management as a tool of monetary policy with the issuance and return of banknotes.

As banknotes cost less to produce than they are worth, there is an incentive for criminals to counterfeit notes. However, the issuer will only back (and thus provide value for) genuine notes. Users must therefore be able to authenticate banknotes when accepting them. To ensure genuine notes can be distinguished from counterfeits, the issuer must incorporate easy-to-recognise but hard-to-copy security features, as well as provide education to make people aware of how to authenticate them.(2)

As mentioned at the start of this article, the UK government also permits certain commercial banks to issue banknotes in Scotland and Northern Ireland. The boxes on S&NI banknotes and legal tender (pages 320 and 321) provide more information on this.

Alternatives to banknotes

This section looks at alternative currency schemes issuing paper instruments in the context of a central bank monopoly over banknote issuance.(3) The first part explores the historical development of the schemes. The second part assesses the economic rationale for modern-day local currency schemes. Lastly, it outlines the key characteristics of some initiatives currently operating in the United Kingdom.

The history of alternative currency schemes

Throughout history there have been a great number of different schemes offering private media of exchange. The intended purpose of these schemes has varied markedly, ranging from meeting local credit demand and stimulating the economy, to achieving social and political reform. A few examples are outlined below.

In 1832, the social reformer, Robert Owen, concerned about the worsening living conditions of the working class during the Industrial Revolution, implemented two 'national equitable labour exchanges' in London and Birmingham. These introduced a system of 'labour notes' to pay workers in terms of the number of hours they spent to create units of production. The idea was that workers' remuneration would more accurately reflect the value of the product of their labour and hence distribute wealth more equitably to the working class. Despite initial success, the scheme lasted just two years owing to organisational failures.(4)

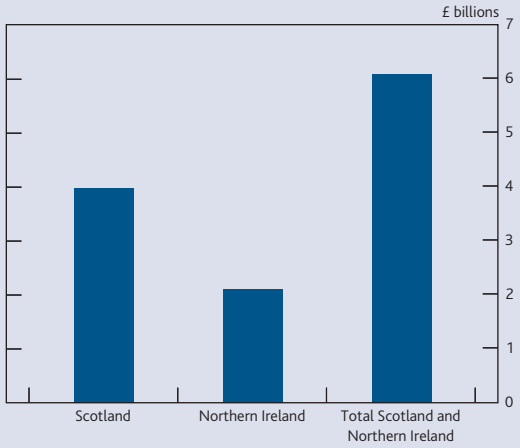
Around 80 years later, the economist Silvio Gesell, influenced by the Argentinian depression of 1890, advanced the idea of using 'accelerated money' to encourage spending and thus boost demand.(5) His idea was to introduce paper instruments that are subject to periodic and scheduled depreciations in monetary value, through a process known as 'demurrage'. To maintain a note's face value, users would have to purchase and affix a stamp costing the equivalent loss in value onto the note. To avoid bearing the cost of the depreciation, Gesell claimed users would be encouraged to spend money rather than hoard it — somewhat akin to a game of monetary 'hot potato'.(6)

(1) Note that there is still some debate as to which came first out of fiat money and commodity money — see, for example, Kiyotaki and Moore (2001) or Ryan-Collins *et al* (2011).
(2) The Bank is always looking for the best new security features to incorporate into its banknotes. For information on current security features and education materials, see www.bankofengland.co.uk/banknotes/Pages/educational.aspx.
(3) The focus of this article is on local currency schemes issuing paper instruments in the United Kingdom. It does not seek to cover e-money or other types of alternative currency such as Bitcoin.
(4) See Blanc (2006).
(5) This rests on Fisher's (1911) Quantity Theory of Money: $MV = PT$; where money (M), multiplied by its velocity of circulation (V), equals the volume of transactions (T) at the prevailing price level (P). This implies that if the velocity of money circulation increases for a fixed money supply and price level, then economic activity should increase by the same amount.
(6) See Gesell (1916).

Scottish and Northern Ireland banknotes

There are three commercial banks authorised to issue banknotes in Scotland and four in Northern Ireland.(1) These banks (or their predecessors) have been regulated with regard to the backing of their banknotes since 1845. **Chart A** shows the value of S&NI banknotes in circulation by region, which is small compared to the £54.2 billion of Bank of England notes in circulation.(2)

Chart A Value of S&NI notes in circulation by location of issuer(a)



(a) As at 28 February 2013.

Historically, commercially issued notes in Scotland and Northern Ireland did not benefit from having explicitly ring-fenced backing assets or guaranteed central bank settlement at all times. In theory, this should prompt holders of these notes to assess the future ability of the issuer to make payment in central bank money (or some other commodity of enduring value) and discount the face value of notes as appropriate.

Part VI of the Banking Act 2009 introduced a requirement for the authorised commercial issuing banks to fully back their note issuance with ring-fenced, risk-free backing assets. The backing assets can take the form of Bank of England banknotes, UK coin, or funds held in ring-fenced accounts at the Bank of England. This gives commercial banknote holders a similar level of credit protection to Bank of England noteholders. The primary objective of the legislation is noteholder protection and the Bank of England is responsible solely for this aspect.

In the event of an authorised bank entering an insolvency process — as defined in the Scottish and Northern Ireland Banknote Regulations 2009 — the backing assets will continue to be ring-fenced for at least one year for the sole purpose of reimbursing noteholders through a Note Exchange Programme.

The Act makes no provision for regulating the design of the authorised banks' banknotes or their robustness against counterfeiting. The Association of Commercial Banknote Issuers offers education on the designs and security features of the seven commercial issuers.(3)

(1) These are: AIB Group (UK), Bank of Ireland (UK), Bank of Scotland, Clydesdale Bank, Northern Bank, The Royal Bank of Scotland and Ulster Bank.
(2) As at 28 February 2013.
(3) See www.acbi.org.uk/current_banknotes.php.

A key example of this form of accelerated money took place in Wörgl, Austria, in 1932. The town's mayor introduced a system of stamped currency called 'labour notes', which depreciated by 1% in nominal value every month unless users affixed stamps to maintain it. The initial effect was an increase in the pace at which the currency exchanged hands (money circulation) before being hoarded or saved for later use.(1) However, the scheme's success was short-lived as the experiment was terminated by the Austrian central bank in 1933.(2)

During the US Great Depression of the 1930s, a number of private currency initiatives issued paper instruments known as 'scrip'. These initiatives were a response to cash shortages following a host of bank runs and failures. Some schemes made use of Gesell's concept of demurrage and required users to affix a two-cent stamp onto the instruments every week to keep the value of the notes current. Although the issuance of scrip was widespread across the United States, the schemes were typically met with limited success due to narrow acceptability of scrip as a means of payment.(3)

The rationale for local currency schemes

Today, most alternative currency schemes that issue paper instruments take the form of local currencies, which may be used to purchase goods and services from participating retailers within a particular area. Local currencies are established to support local sustainability by incentivising spending at, and between, participants of the scheme. The idea is that a greater proportion of consumer spending and retailers' supply chains are kept within the specified geographical area, improving local sustainability. To achieve this, there is typically a charge or restriction on converting the instruments back into sterling. As such, local currency bearers (ultimately local businesses, once the vouchers have been spent by consumers) face a cost akin to an import tax if they purchase supplies in sterling from non-participants rather than using the local currency vouchers they are holding to buy supplies from participants. There are, therefore, financial

(1) Kennedy (1995) estimates that the velocity of circulation increased 22 times compared to the Austrian schilling.
(2) See Blanc (2006).
(3) See Champ (2008).

What is 'legal tender'?

The phrase 'legal tender' is a widely used expression and is a common misnomer. The only banknotes to have legal tender status in England and Wales are those issued by the Bank of England. There are no banknotes issued by commercial banks in Scotland and Northern Ireland that have legal tender status. However, legal tender status has only a very narrow meaning in relation to the settlement of a debt. The term 'legal tender' simply means that if a debtor pays in legal tender the exact amount they owe under the terms of a contract, and the contract does not specify another means of payment, the debtor has a good defence in law if he or she is subsequently sued for non-payment of the debt. In ordinary day-to-day transactions, the term 'legal tender' has very little practical application, as whether or not an instrument (be it a banknote or local currency voucher) is used as a means of payment is subject only to the mutual agreement of the parties to the transaction.(1)

(1) See the Currency and Bank Notes Act 1954 for more information.

incentives to source supplies from (other) local businesses which could create a so-called 'local multiplier' effect.(1)

There could also be costs to participating in local currency schemes, however. Local businesses might be concerned that if they receive a significant quantity of local currency, the restriction on converting it back to sterling limits them to purchasing supplies from (potentially more expensive) local businesses; this may force them to raise prices, making them less competitive relative to non-participants. Indeed, if businesses and consumers used local currency vouchers only to support the existing, economically 'efficient' volume of local trade between suppliers, the schemes' ability to divert trade to within the local economy would be limited.

Local currency schemes often provide businesses with other incentives for participation. For example, participating firms may benefit from inclusion in the marketing material of the scheme, which can help increase demand for their goods and services. Furthermore, both consumers and businesses might also see a benefit to localising consumption and production patterns. This could reduce the energy required for transportation and therefore the economy's overall environmental impact,(2) or generate other potential or perceived social benefits. Indeed, if non-local goods are cheaper because market prices do not fully factor in the additional costs that they impose on society over locally produced goods — for instance, higher carbon emissions as a result of increased transportation — then local currencies may improve welfare.(3) In the language of economic theory, a welfare improvement would arise when the social benefit of reducing the environmental impact (by diverting trade away from non-local products) exceeds any additional private cost from buying potentially more expensive local products.

Participation by businesses and consumers also signals a commitment to spending in the local community. Local currency vouchers may help people satisfy a latent desire to support the local economy and overcome a potential bias towards purchasing non-local goods, perhaps owing to cheaper prices or consumer choice 'stickiness'. Just as voluntary savings schemes like pensions restrict a person's choices today so as to maximise their lifetime utility, it could be that local currency schemes offer an efficient form of pre-commitment to individuals that wish to increase how much they spend at local businesses.(4)

UK local currency schemes

As noted in the section on central bank money, only the Bank of England is permitted to issue banknotes in England and Wales under the Bank Charter Act 1844. The Banking Act 2009 prevented any banks from issuing private banknotes in Scotland and Northern Ireland other than the seven already-established commercial banknote issuers. UK local currency schemes issue paper instruments with a similar legal status to vouchers. Some schemes design the vouchers with some similarities to banknotes (see **Figure 1**), although their design must differ from Bank of England and S&NI banknotes to avoid breaching the Forgery and Counterfeiting Act 1981.

Figure 1 Some current UK local currency vouchers

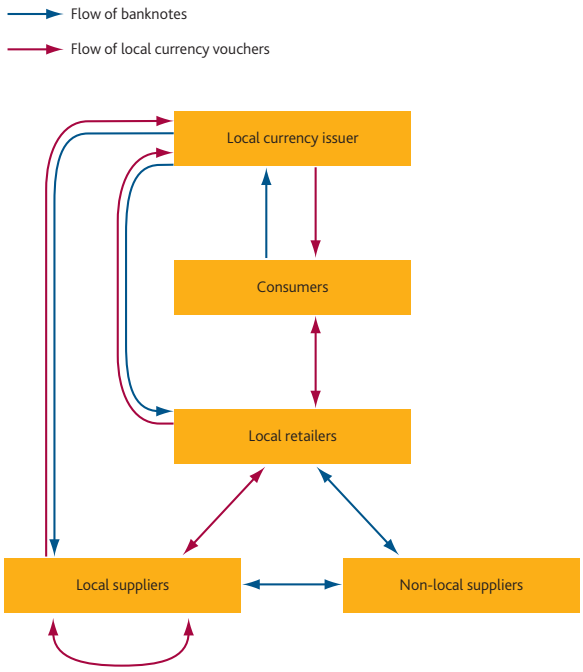
The legal status of a voucher is different from that of a banknote, as vouchers represent a pre-payment for goods or services from a specified supplier (or group of suppliers) and do not legally entitle the holder with the right to redeem the voucher. While the legal status of local currency vouchers is similar to traditional single-retailer vouchers and multi-retailer

(1) See DeMeulenaere (1998) and Krohn and Snyder (2008).
(2) See Sanders (2011).
(3) Excessive carbon emissions are an example of a negative externality, in which the market choices of individuals lead to undesirable societal consequences.
(4) For a more detailed explanation of this type of pre-commitment strategy, see Schelling (1984) and Gul and Pesendorfer (2001).

vouchers, such as book or theatre tokens, local currency vouchers offer a different user proposition. They may be used to purchase any good or service from participating retailers within a particular area, and can be recirculated by the retailer to purchase supplies (or given out as change items). While local currencies may have more functions than a traditional retail voucher, they do not have the full functionality of a banknote.

Figure 2 gives an illustrative example of how local currency vouchers might circulate compared to Bank of England or S&NI banknotes. For simplicity, not all possible flows of banknotes are shown and consumers are assumed to acquire local currency from the scheme issuer in exchange for sterling,(1) while the entitlement to convert local currencies back into sterling is assumed to be limited to participating businesses (retailers and suppliers). As indicated by the red arrows in **Figure 2**, consumers use local currency vouchers to purchase goods and services from local retailers that participate in the scheme. These retailers are then incentivised, through one or more of the features outlined below, to continue to circulate the vouchers either when giving out change to customers or by purchasing resources from local rather than non-local suppliers. Any such substitution in trade towards local businesses should boost the local economy via a local multiplier effect.

Figure 2 Illustrative example of local currency circulation



Current UK schemes typically adopt certain structural features to encourage local spending. For example, a number of schemes issue vouchers that are only redeemable for sterling by retailers (as opposed to consumers) signed up to the scheme, and for a 3% or 5% redemption fee in the case of the Bristol Pound and Stroud Pound schemes, respectively. The Stroud Pound scheme additionally uses Gesell's concept of demurrage to facilitate increased local spending, as the vouchers depreciate in nominal value by 3% every six months. Some schemes also issue vouchers that carry an expiry date, including, for example, both the Lewes Pound and Bristol Pound schemes.

Table A shows the size of some UK local currency schemes compared to both Bank of England and S&NI banknotes. Earlier schemes issued paper vouchers that were typically limited to a small area. However, the Bristol Pound, which was launched in 2012, targets a wider metropolitan area, although the scheme still has a small value in circulation relative to Bank of England notes. The value of UK local currencies in circulation is also small relative to the commercial banknote issuance of Scotland and Northern Ireland, as even the smallest S&NI issuer has over £300 million of banknotes in circulation.

Table A Scale of some UK local currency schemes(a)

Paper instrument	Value in circulation(b)	Population of area(c)
BoE notes	£54.2 billion	63.7 million
S&NI notes	£6 billion	7.1 million
Bristol Pound	£250,000	1 million
Brixton Pound	£100,000	300,000
Lewes Pound	£20,000	17,000
Totnes Pound	£8,000	15,000
Stroud Pound	£7,000	13,000

Sources: Bank of England, local currency scheme websites, ONS and Bank calculations.

(a) Bank of England (labelled 'BoE' above) and S&NI banknotes are included for comparison with local currency schemes.
(b) Latest available figures for local currency scheme issuance; Bank of England and S&NI note issuance as at 28 February 2013.
(c) The top two rows report mid-2012 ONS estimates for the United Kingdom and for Scotland and Northern Ireland combined. For local currencies, figures are based on 2011 ONS estimates for the relevant county/borough/parish, and scheme websites. For the Bristol Pound, the scheme reports usage across the former county of Avon.

Importantly, current schemes in the United Kingdom generally back the local currency vouchers one-for-one with sterling. This helps to mitigate the potential risks that the schemes could otherwise pose to financial stability (see the section on the impact on financial stability below). However, the backing assets for local currencies are not legally ring-fenced, which means that users do not benefit from the equivalent level of consumer protection offered to banknote holders (see the section on the impact on user protection below).

It is also worth noting that some schemes go beyond just issuing paper vouchers. For example, the Bristol Pound offers a facility for electronic payments between designated accounts held at the supporting Bristol Credit Union (BCU)

(1) In practice, this might be done via retailers. Moreover, retailers themselves may exchange cash for vouchers to support the scheme.

using internet or mobile phone technology. The involvement of a financial institution such as the BCU marks a significant step in the organisation of UK local currency schemes, made possible by legislative reform allowing credit unions to accept business members for the first time.(1)

Relevance to the Bank's monetary and financial stability objectives

This section considers the relevance of local currency schemes to the Bank's monetary and financial stability objectives, including the need to maintain confidence in the physical currency. As illustrated by **Table A**, current UK local currency schemes are small (both individually and in aggregate) in relation to the issuance of banknotes. This means that they should not pose any significant risk to the Bank's objective of monetary stability. For financial stability, the small sizes of the schemes and the one-for-one backing with sterling should mitigate the potential risk, insofar as the backing arrangements are recognised by consumers. This section explores the potential channels through which local currency schemes could, however, impact the Bank's monetary or financial stability objectives, should the schemes become significantly larger and/or if the backing arrangements were to change.

Monetary stability

In principle, local currencies could affect the stance of monetary policy if the aggregate amount of spending in the economy, and hence pressure on the price level as captured by the consumer prices index, is affected as a result of the schemes. This could arise, for instance, if the net impact of local multiplier effects were to significantly boost economic activity; or, on the other hand, if the reduced trade with non-local suppliers were to make scheme participants less competitive, resulting in significantly lower levels of economic activity at the macroeconomic level.

In practice, the size of UK schemes relative to aggregate spending in the economy is currently too small to have a significant impact on the price level or the desired path for monetary policy. Moreover, even if the schemes were large enough to affect spending at the macroeconomic level, this would not impede the Bank's Monetary Policy Committee's (MPC's) ability to set monetary policy to meet its inflation target unless these impacts were unanticipated over the MPC's forecast horizon.

Confidence in the currency

In addition to price stability, monetary stability requires that people are confident that the banknotes they hold are worth their face value. The primary risk to this is counterfeit notes. Given that the production costs of banknotes are far below their face value, there is a potential for criminals to attempt to copy and pass counterfeit notes. As counterfeits are worthless, the Bank of England maintains confidence in the physical currency by enabling users to authenticate, and therefore only accept, genuine notes. This is achieved by the use of robust security features and a programme of education on how to identify genuine banknotes.

The risk of counterfeits applies to any paper instrument where the face value exceeds the cost of printing the instrument. One concern is whether a successful counterfeit attack on a local currency voucher scheme might generate a spillover effect that reduces confidence in other physical instruments, like banknotes. To reduce the risk of counterfeits, certain local currency schemes have issued vouchers with a number of security features, together with educational material on how to identify them.(2)

It is difficult to know to what extent (if any) the public perceives any relationship between local currency schemes and central bank note issuance. The banknote-like appearance of some local currency vouchers and their acceptance across many diverse businesses may foster such a perception. However, the currencies' positioning as local initiatives, where possible not describing the vouchers as 'notes', and incorporating features commonly associated with vouchers such as expiry dates, may help to counteract this. The limited scale of current schemes is also a mitigating factor.

Financial stability

If large enough, the failure of a local currency scheme could, in theory, have adverse consequences for the stability of the financial system. For example, if local currencies were to become a significant part of the payments system, scheme failures could lead to a reduction in access to payment services. One possible source of failure would be a 'run' on a scheme, which could arise if the users of a scheme perceived the value of local currency in circulation (the scheme's liabilities) to exceed the value of sterling deposits backing the scheme (the scheme's liquid assets). Since participants of the scheme would be handled on a first-come, first-served basis, a scenario such as this could lead to a large number of users of the local currency to try to redeem the sterling value of their vouchers at the same time. Furthermore, the impact of a scheme failure could bring wider implications for financial stability if the failure of one local currency scheme triggered a run on others, or if the users of a scheme incurred losses that in turn caused them to default on other obligations (such as loan repayments) to the banking sector.

However, the *de facto* one-for-one backing with sterling that is in place for the current local currency schemes mentioned in this article should, in part, mitigate the risk that holders lose

(1) This is detailed in the Industrial and Provident Societies and Credit Unions Order 2011.
(2) See, for example, the Bristol Pound security guide: http://bristolpound.org/library/Download_docs/Security_Guide.pdf.

confidence in a scheme's ability to make payments back into sterling. A scheme that securely ring-fences the backing assets should impart even greater confidence, thus further reducing the likelihood of a run. Local currency denominated deposit accounts held by consumers in a supporting financial institution would be subject to Financial Services Compensation Scheme (FSCS) deposit protection that could further help to reduce the risk of a run, although the paper instruments issued by a scheme would not be subject to this protection.

Impact on user protection

Under Part VI of the Banking Act 2009, the Bank of England is responsible for regulating commercial banknote issuance in Scotland and Northern Ireland. The primary objective of this legislation is to offer noteholders (and therefore consumers) protection in the event of the issuer entering an insolvency process. (See the box on S&NI banknotes on page 320 for more information.)

Local currency schemes are completely independent from the Bank of England. As they are also independent from S&NI banknote issuance, they are not covered by Part VI of the Banking Act 2009. As such, **users do not benefit from the same level of protection as banknote holders**. See **Table B** for a summary of the risks to holders of Bank of England banknotes, S&NI banknotes and local currency vouchers. Indeed, all vouchers, including those issued by a local currency scheme, carry credit risk — that is, the risk that the issuer may fail to repay holders the full face value of their vouchers. The credit risk to holding any voucher is directly linked to the creditworthiness of the issuing scheme. Just as holders of retail vouchers can lose out if the issuing retailer goes into administration (as happened to holders of certain Zavvi vouchers in 2008, for example), holders of local currency vouchers could incur losses if the issuing scheme were to fail.(1)

Given that the current UK schemes generally back the vouchers one-for-one with sterling, holders of existing local currency vouchers should, in theory, be able to get their money back in the event that a scheme fails. However, because the backing assets for local currencies are not legally ring-fenced, these assets could be used to satisfy the claims of other creditors from any other aspects of a scheme's business and not just holders of local currency vouchers in the event of an insolvency process. Therefore, the potential impact on consumer protection is limited insofar as the schemes ensure that the assets are in practice securely ring-fenced.

Although the Bank of England has no remit for local currencies *per se*, one concern is whether the public might believe that it does. It is possible that some local currency users may have an incorrect expectation of recompense from the Bank in the event of a scheme failure. This might arise if a scheme involves a financial institution that is regulated by the Bank's Prudential Regulation Authority. Alternatively, the Bank of England's role under the Banking Act 2009 for commercially issued notes in Scotland and Northern Ireland may lead members of the public to expect the same degree of oversight and protection with regard to the backing of local currency vouchers, particularly if they are incorrectly perceived to be banknotes.

Given that the physical instruments issued by UK local currency schemes are not subject to FSCS protection, any scheme that makes this clear under its terms and conditions may help ease public expectations about recourse (or lack thereof) to the Bank of England, HM Treasury or FSCS. In addition, to help make clear the status of local currencies, the Bank has published on its website a set of frequently asked questions, which states that users will not receive compensation from the Bank in the event of a local currency scheme failure.(2)

Conclusion

The emergence of various local currency schemes over the past few years marks a continuation of private companies and schemes offering alternative media of exchange to meet specific purposes. While there are a number of routes through which local currencies could theoretically impact the Bank's objectives, the limited sizes of the schemes (both individually and in aggregate) relative to aggregate spending in the economy mean that they do not currently present a risk to the Bank's ability to meet its monetary stability objective. This, in addition to the general one-for-one backing with sterling, also reduces the risk to financial stability insofar as the schemes securely ring-fence the backing deposits (at least, in practice). Nevertheless, a risk to the Bank could arise if consumers mistakenly associate local currencies with banknotes. Such a perception could generate a spillover effect if, for example, a successful counterfeit attack on a local currency were to reduce confidence in banknotes more generally, or, in the event of a scheme failing, consumers were to incorrectly expect recompense from the Bank. Schemes adopting specific features and marketing material designed to help users recognise that local currency instruments are like vouchers and not banknotes may help to counteract this risk.

(1) As explained on page 319, Bank of England and S&NI noteholders are protected from credit risk given that the notes are settled across the central bank's balance sheet, or are subject to ring-fenced backing assets and central bank settlement at all times.
(2) See www.bankofengland.co.uk/banknotes/Pages/localcurrencies/default.aspx.

Table B Summary of the status of Bank of England notes, S&NI notes and UK local currencies

Instrument issuer	Bank of England banknotes	S&NI banknotes	Local currencies
Legal status	Legally banknotes — authorised by Bank Charter Act 1844.	Legally banknotes — authorised by Banking Act 2009.	Similar legal status to vouchers or electronic balances.
Legal tender status	Legal tender in England and Wales.	Not legal tender.(a)	Not legal tender.(a)
Value in circulation	£54.2 billion.(b)	£6 billion.(b)	Less than £500,000.
Population of area(c)	Whole of United Kingdom (63.7 million).	Scotland (5.3 million) and Northern Ireland (1.8 million).	A local area or high street — the largest scheme currently targets population area of 1 million.
Risks to holders of the instrument	Instrument is a claim on the central bank hence no exposure to market or credit risk.	Banking Act 2009 introduced the ring-fencing of backing assets and guaranteed central bank settlement at all times; hence level of credit protection comparable to Bank of England note users.	No mandated credit protection for paper-voucher users. While existing schemes have generally issued vouchers that are backed one-for-one with sterling, the funds are not legally ring-fenced.(d)
Anti-counterfeiting measures	Use of robust security features and a programme of education on how to correctly identify genuine banknotes.	Security features (the strength of which is selected by the issuer) and education are often used.	Security features (the strength of which is selected by the issuer) and education are often used.

(a) However, 'legal tender' has a very narrow meaning, as explained in the box on page 321.
(b) Estimated values as at 28 February 2013.
(c) Mid-2012 population estimates from the Office for National Statistics.
(d) For electronic balances, only those held in the accounts of a supporting FSCS-registered financial institution are FSCS protected, subject to the usual limits.

References

Blanc, J (2006), 'Local currencies in European history: an analytical framework', International Scientific Conference, Weimar University, Germany, September.

Byatt, D (1994), *Promises to pay: the first three hundred years of Bank of England notes*, Bank of England.

Champ, B (2008), 'Stamp scrip: money people paid to use', *Federal Reserve Bank of Cleveland Economic Commentary*, January.

DeMeulenaere, S (1998), 'An overview of parallel, local and community currency systems', Complementary Currency Resource Centre.

Fisher, I (1911), *The purchasing power of money*.

Gesell, S (1916), *The natural economic order*. Translated from German by Philip Pye M.A.

Gul, F and Pesendorfer, W (2001), 'Temptation and self-control', *Econometrica*, Vol. 69, No. 6, pages 1,403–35.

Kennedy, M (1995), *Interest and inflation free money: creating an exchange medium that works for everybody and protects the earth*, New Society Publishers.

Keyworth, J (2013), 'The Old Lady of Threadneedle Street', *Bank of England Quarterly Bulletin*, Vol. 53, No. 2, pages 137–46.

Kiyotaki, N and Moore, J (2001), 'Evil is the root of all money', *The American Economic Review*, Vol. 92, No. 2, pages 62–66.

Krohn, G and Snyder, A (2008), 'An economic analysis of contemporary local currencies in the United States', *International Journal of Community Currency Research*, Vol. 12, pages 53–68.

Ryan-Collins, J, Greenham, T, Werner, R and Jackson, A (2011), 'Where does money come from? A guide to the UK monetary and banking system', New Economics Foundation, September.

Sanders, M (2011), 'Local currencies', University of Bristol and CMPO.

Schelling, T (1984), 'Self-command in practice, in policy, and in a theory of rational choice', *The American Economic Review*, Vol. 74, No. 2, pages 1–11.

Banks' disclosure and financial stability

By Rhiannon Sowerbutts and Peter Zimmerman of the Bank's Financial Stability Directorate and Ilknur Zer of the Board of Governors of the Federal Reserve System.[1]

- Inadequate public disclosure by banks contributed to the financial crisis. This is because investors, unable to judge the risks that banks are bearing, withdraw lending in times of systemic stress.
- This article presents quantitative indices which allow for the comparison of disclosure between banks and over time. Internationally, disclosure has improved since 2000, particularly around banks' valuation methods and funding risk.
- However, more information alone is not sufficient to solve the problem. More needs to be done to ensure that the information provided is useful to investors, and that investors are incentivised to use this information. The ongoing reform agenda aims to address this.

Overview

Investors in banks need information about the risks that they are exposed to, in order to be able to assess and price those risks properly. However, during the recent crisis, investors found that they did not have enough information to assess these risks, which led to a dramatic increase in funding costs, intensifying the crisis. During good times, too, disclosure allows debt investors to ensure that banks do not take on too much risk. This mechanism is known as market discipline. If it does not function properly, then the banking system can become more leveraged — and thus more fragile — than is optimal.

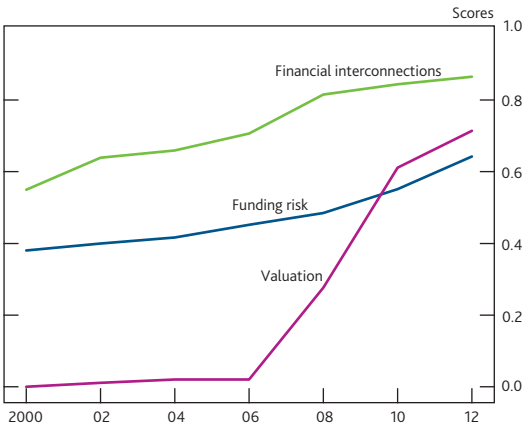
There are four requisites to ensure that the market discipline mechanism functions effectively. Investors must have:

- sufficient information to assess the risks that banks take;
- the ability to process this information;
- powers to be able to discipline banks; and
- incentives to exercise these powers.

This article provides a quantitative assessment of improvements in the first of these criteria. As shown in the **summary chart**, banks from around the world have increased the amount of information they publish, assessed against certain areas which were identified as needing improvement in the Bank's December 2009 *Financial Stability Report*. In particular, disclosure of information relating to asset valuation has improved greatly compared to the period prior to the crisis.

Since the crisis, UK banks have shown particularly strong improvements in the amount of information that they report. Disclosure has been a particular focus of the Bank's Financial Policy Committee. But more information is not by itself sufficient to solve the problem of ineffective market discipline, especially if banks are 'too big to fail'. The international reform agenda is addressing this problem.

Summary chart Average disclosure scores in selected categories



Sources: Banks' reports and Bank calculations.

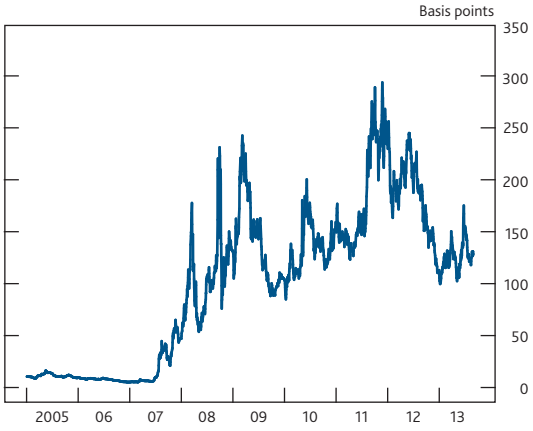
Notes: Based on disclosures by 50 banks from around the world. A score of 1 indicates that banks disclosed information relating to all criteria for that category.

(1) Ilknur Zer worked on this while an intern at the Bank of England. The authors would like to thank Adriana Fernandes for her help in producing this article.

Inadequate disclosure by banks was a contributing factor to the recent global financial crisis.(1) In plain terms, banks did not report enough information about the assets they were holding or the risks that they were exposed to. The advent of the crisis caused investors to focus on risks that they had previously considered to be of relatively minor importance. Inadequate disclosure meant that investors were less able to judge risks to a bank's solvency than bank insiders, such as managers.

This lack of transparency is likely to have intensified the crisis — for example by leading to much higher funding costs, even for relatively healthy banks. This is illustrated by **Chart 1**, which shows that the cost of insurance for lenders to UK banks increased dramatically during the crisis. Increased disclosure can help to alleviate the problem of asymmetric information between banks, who have good information about their own financial resilience, and investors that provide funding to banks, who have less information. This can be likened to the well-known 'lemons' problem described by Akerlof (1970), as explained in the box on page 328.(2)

Chart 1 Cost of default protection for major UK banks(a)



Sources: Markit Group Limited and Bank calculations.

(a) Unweighted average of five-year senior credit default swap premia for Barclays, HBOS, HSBC, Lloyds TSB, Royal Bank of Scotland and Standard Chartered.

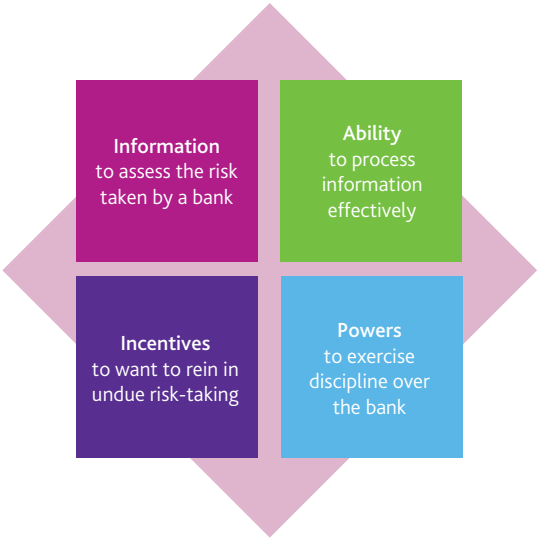
Better disclosure can be beneficial to financial stability in non-crisis times, too. With good information, debt investors are able to price risk more accurately and, if the incentives are right, this can act as a disciplining force on banks. As debt investors become aware of the risks that banks are taking, they are less likely to provide funding to banks that are not providing an attractive trade-off between risks and returns. This can affect the risk-taking decisions of bank managers. This **market discipline** mechanism empowers investors to ensure that managers are acting in their interests, and reduces the likelihood that a bank takes risks that its investors are not aware of. Therefore publishing better information may reduce the probability of future financial crises, as it can make sudden changes in investor sentiment less likely.(3)

But simply publishing a greater quantity of information is not necessarily a solution, particularly if it is 'noisy' or unimportant information. And in some cases greater disclosure might not be in the best interests of financial stability. For example, during periods of stress, disclosure of certain information — such as the temporary use of central bank liquidity insurance facilities — could undermine their effect and exacerbate investor panic (see Bank of England (2012)).

Disclosing information can also have consequences for the structure of banks and the ability of the financial system to absorb shocks. In their seminal 1984 paper, Myers and Majluf show that when managers have more information than outsiders, the cost of issuing equity increases (Myers and Majluf (1984)). Easley and O'Hara (2004) show the same result when some investors have more information than other investors. When equity is more expensive, firms are likely to be more leveraged, which can make the financial system less resilient.

Figure 1 shows four requisites for investors in order for this market discipline to be effective. Debt investors need to have the right information to understand the risks that banks are taking, and they need to be able to process this information. They must also have incentives and powers to discipline banks.

Figure 1 Requisites for investors to exert effective market discipline



Source: Crockett (2001).

This article introduces quantitative indices to assess basic progress on the provision of information. It then assesses each

(1) See, for example, Gorton (2008) or Bank of England (2009).
(2) Dudley (2009) suggests that disclosure of the methodology and results of the Federal Reserve's Supervisory Capital Assessment Program (SCAP) helped increase confidence in US banks and made it easier for them to raise more capital.
(3) The focus of this article is on debt investors. Debt investors, like bank regulators and supervisors, are principally concerned with the risk that the bank is unable to repay its debt and finds itself in financial distress. In contrast, equity investors are likely to be more concerned with the trade-off between bank profitability and greater risk-taking.

Akerlof's lemons

Probably the best-known economic paper on information asymmetry is George Akerlof's 1970 paper 'The market for lemons: quality uncertainty and the market mechanism'. Akerlof jointly received the 2001 Nobel Prize in economics for his research in this area. The paper discusses the problem of information asymmetry, using the market for used cars as an illustration.

Akerlof argues that information asymmetry in the used-car market can lead to 'lemons' — that is, poor-quality cars — being the only goods traded. When considering a used car for sale, the buyer does not know whether it is of good quality or a lemon. But the seller — who has already had experience driving the car — is much more likely to know whether it is a lemon or not. This is an example of an information asymmetry. Since buyers cannot distinguish between good cars and lemons, both types of car will be sold at the same price, which must be somewhere between the 'true' value of good cars and lemons. But that means that good cars would be sold below their true value. Owners of good cars would then be better off by keeping their cars, rather than selling them. Only lemons are left in the market.

How does this relate to disclosure for banks? Seeking to borrow, managers of banks issue debt in the bond markets. If public information is inadequate, investors may not be able to distinguish between banks of good and bad quality. But bank managers have more information about the risks that their bank faces. Therefore there is a problem of asymmetric information. And higher-quality banks would face the same borrowing rates as those of lower quality.

One difference with the used-cars example is that managers of higher-quality banks could try to improve disclosure, in order to reduce the extent of information asymmetry. But there may be reasons why they choose not to do this. For example, banks may be concerned that disclosure could reveal information that is useful to the banks' competitors. And it may be expensive to upgrade internal systems to improve the quality of reported information, in which case banks may choose to disclose less information than is optimal. Regulatory requirements to improve disclosure can help to overcome these frictions. Bank of England (2012) describes how policy action can help to overcome market failures in disclosure.

of the other three criteria in turn. The article also discusses UK and international policy initiatives on disclosure.

Availability of information

The Bank of England, in its December 2009 *Financial Stability Report*, discussed banks' disclosure practices and said that 'better information would have constrained excessive risk-taking behaviour in the run-up to the crisis'. And it suggested that UK banks were behind their international peers in this regard.

The *Report* identified five areas where significant improvements in reporting information would be desirable: **funding risk**; **group structure**; **valuation methods**; **intra-annual information**; and **financial interconnections**.[1] These are important to financial stability because:

- **Funding risk** relates to the possibility the bank may not be able to raise new funding or repay its existing creditors. A decomposition of funding sources helps creditors to understand the risks that could lead to non-payment.

- Many banks have a complex structure, so information on the banking **group structure** helps investors to understand the risks and to assess the likelihood that a failing bank can be resolved efficiently by the authorities, minimising bankruptcy costs.

- Information about the methods used for **valuation** of the bank's assets allows creditors to assess the reliability of those valuations, and thus the probability of accounting losses. And **intra-annual information** — that is, balance sheet data relating to positions between reporting dates — allows creditors a broader view of risks than is available merely from a snapshot of the balance sheet on the annual reporting date.

- Finally, an understanding of **financial interconnections** can help creditors to assess the 'network risk' of adverse feedback loops within the financial system, and the risk of explicit or implicit exposures to off balance sheet entities, which may not have been properly addressed in the accounting or regulatory frameworks.

These areas were all highlighted at an international level in the report of the Enhanced Disclosure Task Force (EDTF).[2] It contains specific recommendations and principles on the disclosure of these categories (aside from group structure) and many others.

(1) The *Financial Stability Report* had six areas, but we combine 'frequency' and 'intra-period information' into a single category entitled 'intra-annual information'.
(2) The EDTF was formed at the initiative of the Financial Stability Board (FSB). It is a private sector initiative bringing together senior officials from financial institutions, investors and audit firms. The FSB published its recommendations in October 2012, and a progress report in August 2013. The EDTF recommendations go much further than it is possible to do with quantitative indices, and include proposals in a range of other areas, such as disclosure of risk management procedures. See Enhanced Disclosure Task Force (2012).

Construction of indices for bank disclosures

We introduce quantitative indices to measure progress on disclosure in the five areas mentioned above and apply it to a sample of 50 major banks from around the world. These indices are focused only on information that is expected to be relevant to debt investors, and to financial stability. The indices are composed of fourteen indicators, which measure disclosure in those five areas. **Table A** lists these indicators.

Table A The disclosure indices

Funding risk
- Breakdown by funding type.
- Breakdown by funding maturity.
- Breakdown by funding currency.
- Funding stress.
- Asset encumbrance.

Group structure
- Risk positions of main group subsidiaries, branches or business lines.
- Balance sheet information of main group subsidiaries, branches or business lines.

Valuation methods
- Financial assets and liabilities classified by valuation method.
- Sensitivity of the valuation to different assumptions.

Intra-annual information
- Frequency of comprehensive reporting.
- Average balance sheet between reporting dates.

Financial interconnections
- Interbank exposures.
- Off balance sheet exposures.
- Implicit support to off balance sheet entities.

A bank scores between 0 and 1 for each indicator, depending on whether the necessary information was disclosed in its annual public report. The box on page 330 describes the methodology in greater detail. We only look at information which is currently over and above that required by international standards; compliance with these standards is compulsory and, as such, all banks should receive perfect scores in this regard. In some cases, national standards may require all banks in a country to disclose information over and above international standards.

The indices are constructed by a simple assessment of whether the relevant information is disclosed or not. There are no value judgements made on the quality of that disclosure. Some disclosure on each of the indicators in **Table A** is likely to be useful to investors and beneficial to financial stability, but it is difficult and subjective to evaluate how much is required for investors to make a full assessment.

The indices aim to measure disclosure, to the extent that this disclosure is likely to be beneficial to financial stability. This means that it may be more valuable to capture high-level — rather than specific — information. For example, disclosure of asset encumbrance can help unsecured debt investors to assess the risk of not being repaid in the event that the bank fails, but detailed disclosure could have unintended negative consequences.(1) In addition, the indices focus on those areas identified previously as requiring improvement, rather than providing a comprehensive assessment of all aspects of a bank's publicly reported information.

For each of these banks and for each point in time, we can construct a score for each of the five areas identified earlier, by taking a simple average of the indicators in that category. For example, the funding risk score is calculated as the average of the five funding risk indicators, to give a number between 0 and 1, and so if a bank discloses all five indicators then it scores 1 for funding risk.

How have banks' disclosures changed over time?

On a global level, there has been a broad improvement in disclosures over time. **Charts 2a, 2b** and **2c** show the average disclosure scores for the funding risk, valuation and financial interconnections categories over the period 2000–12. Each line shows the average for the group of banks in that jurisdiction. There is an upward trend in all three categories. Most marked is the improvement in information about valuation methodologies from 2008. The charts suggest that UK banks were, relative to their international peers, fairly poor at disclosing information prior to the crisis, but have improved since then.

The post-2008 improvements could be a result of action by national authorities, or investor demand, or a combination of the two.(2) For example, the increase in the financial interconnections scores (**Chart 2c**) is mainly driven by better disclosure of off balance sheet entities. Support to off balance sheet entities was a key driver of bank distress in 2007 and 2008, so it may be that investors have begun to demand better disclosure of this risk as a result. Alternatively, this improvement may be driven by anticipation of changes to regulatory requirements, which were weak prior to the crisis.(3)

There are fewer signs of improvement in the group structure and intra-period information categories (charts for these categories are not shown). For example, there is no change at all in the group structure score between 2000 and 2012 for more than half of the banks in the sample. This has two possible implications. It may be that a bank's local supervisor

(1) European Systemic Risk Board (2012) contains guidance that the disclosure of asset encumbrance should not reveal the use of central bank liquidity insurance facilities, which may stigmatise a bank. Consistent with this, our indicator only captures whether or not total encumbrance is disclosed and not, for example, the reason for encumbrance.
(2) Improvements in national standards would lead to an upward shift in the graph of a particular country. And improvements in international standards would set floors to the graphs, shifting many upwards.
(3) Basel II — the global capital regime for internationally active banks — was augmented by an amendment in 2009 which, among other things, required banks to improve disclosure on interlinkages with entities outside of their balance sheets. These had not been fully implemented in all countries by 2012. See Basel Committee on Banking Supervision (2009).

The construction of the indices

The sample of 50 banks was chosen from a list of the largest credit institutions in the world in terms of total value of assets as of December 2006: these are from the United States (9 banks), United Kingdom (8 banks), Canada (5 banks), Australia (4 banks), and the rest of Europe (24 banks). Data are gathered from annual reports for these banks, for even-numbered years between 2000 and 2012. **Table 1** gives the full list.

Table 1 List of banks in the sample

Abbey/Santander UK	Credit Suisse	Morgan Stanley
ABN Amro	Danske Bank	National Australia Bank
ANZ	DEPFA	National Westminster
Banco Santander	Deutsche Bank	Nordea
Bank of America	Dexia	Rabobank
Bank of Montreal	Dresdner Bank	Royal Bank of Canada
Bank of Nova Scotia	DZ Bank	Royal Bank of Scotland
Barclays	Goldman Sachs	SEB
BBVA	Handelsbanken	Société Générale
BNP Paribas	HBOS	Standard Chartered
BPCE	HSBC	Toronto-Dominion
CIBC	ING Bank	UBS
Citigroup	JPMorgan Chase	UniCredit
Commerzbank	KBC	Wachovia
Commonwealth Bank of Australia	Lehman Brothers	Wells Fargo
Crédit Agricole	Lloyds	WestLB
	Merrill Lynch	Westpac

Some of these banks fail or merge during our time period of 2000–12. Excluding these banks from the overall sample does not substantively change the patterns over time seen in **Charts 2a, 2b and 2c**.

Table 2 shows how scores are assigned for each indicator. Banks achieve a score of 1 if the minimum required information is clearly presented in a public report. If not, the score is 0. The exception is 'frequency of comprehensive reporting'; here a bank scores 0 if it produces comprehensive reports only annually; 0.5 if it produces two comprehensive reports a year; and 1 if its comprehensive reports are more frequent than this.

The methodology has been chosen to be as simple as possible, in order to reduce the degree of subjectivity in the assignment of scores.(1) Only data from annual reports — rather than separate regulatory reporting or other sources — has been used, in order to ensure a focus on the main source of information for investors.

Table 2 The disclosure indices

Description	Minimum requirement
Funding risk	
Breakdown by funding type	Distinguish between retail and wholesale funding.
Breakdown by term	Distinguish between short and long-term funding.
Breakdown by currency	Decompose funding into at least two currencies.
Funding stress	Disclose any kind of quantitative liquidity ratio that helps investors assess the bank's ability to withstand funding stress.
Encumbrance	Disclose the overall level of encumbered assets.
Group structure	
Risk positions	Disclose risk ratios of the main group subsidiaries, branches or business lines (such as capital, liquidity or loan loss reserves).
Balance sheet information	Disclose balance sheet information of the main group subsidiaries, branches or affiliates.
Valuation	
Valuation method	Classification of financial assets and liabilities by valuation method.
Sensitivity to assumptions	Disclose the sensitivity of asset valuations under various assumptions, such as changes in interest rates.
Intra-annual information	
Frequency of comprehensive reporting	Score 0 for annual, 0.5 for semi-annual, 1 for quarterly or more often.
Average balance sheet	Disclose information about the average level of balance sheet items between reporting dates.
Financial interconnections	
Interbank exposures	Disclose amount of outstanding loans extended to, and funding received from, other banks.
Off balance sheet exposures	Breakdown of contingent liabilities or financial guarantees.
Implicit support to off balance sheet entities	Disclose the extent of use of special purpose entities to issue securitisation bonds.

(1) This is, by its nature, a judgement-based process, so care has been taken to ensure consistency across the sample.

Chart 2a Funding risk category scores

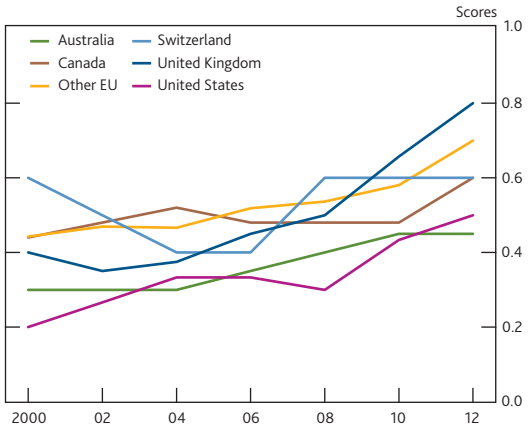


Chart 2b Valuation category scores

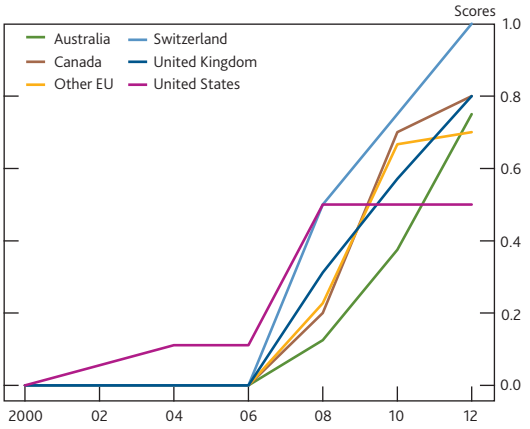
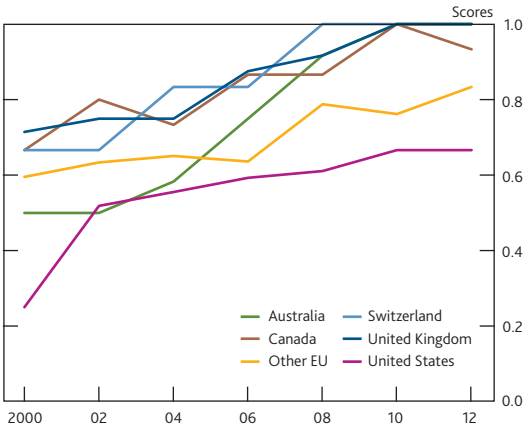


Chart 2c Financial interconnections category scores



Sources: Banks' comprehensive reports and Bank calculations.

— or market practice — requires it to disclose the information. In that case, all the banks in that jurisdiction would score 1 for that indicator.

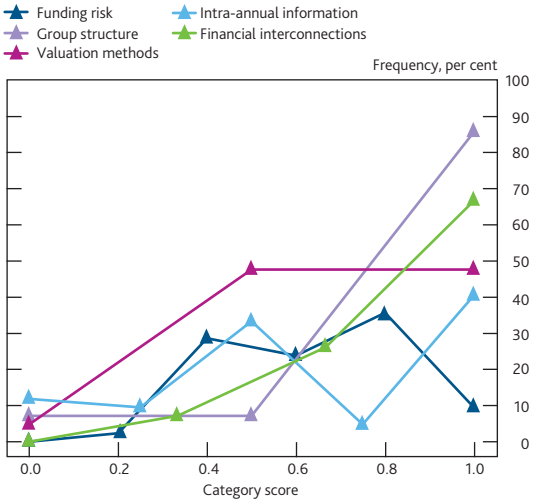
Alternatively, it may be that the value of this information to investors is low and that the cost of collecting and providing this information to the bank outweighs the benefits. If so, one might expect most scores to be 0 at all times. In the case of frequency of comprehensive reporting, we find that the indicator score is well-predicted by the jurisdiction (that is, banks within a given country tend to have similar scores), so it seems that all banks simply accord with either minimum requirements or market practice.

Why do banks' disclosures differ?

As discussed, at the market-wide level, changes in regulatory requirements and investor demand can lead to changes in bank disclosure. However, it is also useful to identify what factors lead different individual banks (within the same jurisdiction, say) to disclose different amounts of information. One point to note here is that accounting standards vary between countries and are often principles-based. Management must use its judgement in providing reliable and relevant information, and this could lead to substantial variation between banks.

This is illustrated in **Chart 3** which shows the frequency distribution of banks' 2012 scores in each of the five categories. For an individual bank, the category score is the mean of all indicator scores within that category (as shown in **Table A**). There is a wide range of variation between different banks, and for most metrics the scores span the full range between 0 and 1.

Chart 3 Frequency of 2012 category scores(a)(b)(c)



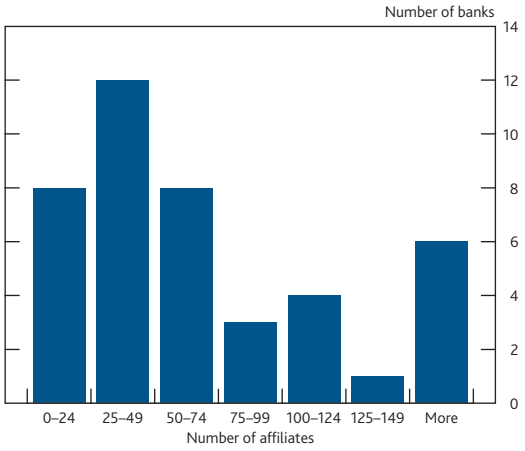
Sources: Banks' comprehensive reports and Bank calculations.

(a) The chart shows, for each score, the proportion of the banks in the sample whose category score takes the value on the horizontal axis. For example, 48% of the banks in 2012 had a valuation methods score of 1.
(b) Triangles mark feasible values of the category scores — for example, it is only possible to achieve a score of 0, 0.5 or 1 on valuation methods because there are only two components to the indicator, each scoring 0 or 1.
(c) Eight of the banks in our full sample had either failed or been taken over by 2012, and so are not used here. This chart is based on the scores of the remaining 42 banks.

Our sample includes a wide variety of banks with different business models, and for some of the banks certain information may not be as relevant as it is for others. To illustrate this, **Chart 4** shows the distribution of the number of 'significant affiliates' for the institutions in the sample in 2012, calculated by counting the subsidiaries or affiliates in each bank's organogram. Most banks in the sample have over

50 different significant affiliates, with over a quarter of the banks having more than 100. Although this partly reflects regulatory and tax reasons, it also reflects the number of businesses and products that these institutions undertake and thus, to some extent, significant affiliates can be used as a proxy for the complexity of a bank's business.

Chart 4 The number of 'significant affiliates' for the banks in the sample in 2012[a]



Sources: Moody's and Bank calculations.

(a) Some banks have been removed from the sample following mergers or resolution.

This suggests that, while many banks in our sample are very complex financial institutions, others have much simpler structures. For these banks, certain information may be less relevant to assessing their risk, and so might not be demanded by investors.

In addition, disclosures may be 'path-dependent' in the sense that investors and counterparties expect reported information to be provided on an ongoing basis once it has been instigated. Ceasing to disclose an item could increase uncertainty for investors or stigmatise the bank. This would suggest an upward trend in the 'path' for bank disclosure, consistent with the increase that can be observed in the indices.

Other requisites for effective market discipline

As **Figure 1** suggests, while greater disclosure is a necessary ingredient for effective market discipline, it may not be sufficient. Other factors need to be present to ensure that there are the desired benefits for financial stability. These are examined in turn.

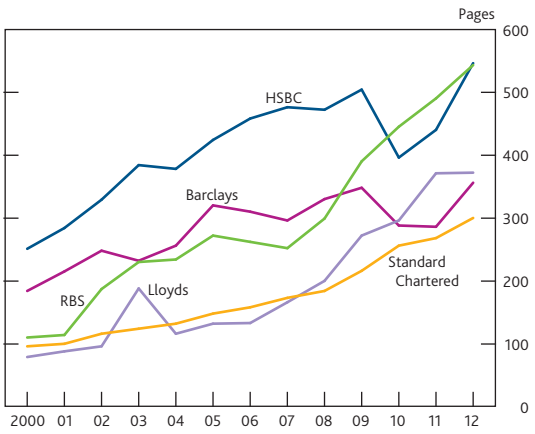
Investors' ability to process information

As well as having information available, investors must have the ability to process this information. Simply disclosing more information is not always helpful to investors. Large amounts of 'noisy' data that are not key to understanding the risks banks are taking may make it more difficult for investors to extract the key information. Producing a lot of noisy public data could cause investors to pay less attention to their own, private information (Morris and Shin (2002)).

Investors may find it easier to analyse the riskiness of a bank if the information it discloses is consistent and easily comparable to that of its peers. This allows investors to benchmark institutions more easily, lowering the cost of monitoring. Although not captured by our indices, the US 10-Q and 10-K reports provide standardised templates for financial reporting, potentially making it easier for investors to evaluate US banks. However, it may be challenging to devise a template that is suitable for a diverse set of banks over an extended period of time.

As **Chart 5** shows, banks' annual reports have increased considerably in length since 2000. The average length of major UK banks' annual reports is currently over 300 pages: this is over three times the average length of UK companies' annual reports (Deloitte (2011)). This can make it difficult to extract the indicators above, which are typically scattered around each report rather than collected conveniently together. The length of the reports could be driven by various factors, such as increased regulatory demands or business complexity. Pillar 3 of Basel II allows regulators to require banks to publish additional information, which may complement annual reports.[1]

Chart 5 Lengths of selected UK banks' annual reports



Source: Banks' comprehensive reports.

It is difficult to judge whether investors find this additional information useful. While it could be a natural consequence of banks' business models becoming more complex, it does nonetheless suggest that it may have become more difficult for investors to read and analyse a typical bank's annual report over time.

(1) Pillar 3 disclosures supplement annual reports and contain disclosures on capital, risk exposure and capital adequacy.

If risk assessment becomes too difficult for investors, they may prefer to delegate it to external analysts, such as credit rating agencies. But this can create the risk of herding behaviour, since a decision by a rating agency to upgrade or downgrade a bank could lead to a large group of investors changing their holdings of the downgraded institution's debt. This could have negative implications for financial stability if these trades lead to large and unexpected movements in asset prices, especially during periods where markets are relatively illiquid.

Investors' incentives to rein in undue risk-taking

Debt investors only price in the risks that they actually face. If these differ substantially from the risks that the bank is taking, then this could undermine the market discipline mechanism. The financial crisis showed that the consequences of allowing certain banks to fail would have imposed unacceptably high economic costs; in other words, these banks were 'too big to fail'. As a result, holders of certain banks' debt were shielded from losses as governments intervened to support these banks. Anticipation of this government support means that a debt investor may be more concerned with the solvency of the government than the bank.

This expectation of government support can be considerable, especially for the banks in our sample, which comprise 50 of the largest banks in the world by total assets. Without reforms to address this 'too big to fail' problem, their size alone means that many of the banks in the sample used for this article would be very costly to let fail.(1) This support means that investors assess bank debt as being less risky than their balance sheets would suggest, leading to a reduction in banks' funding costs.

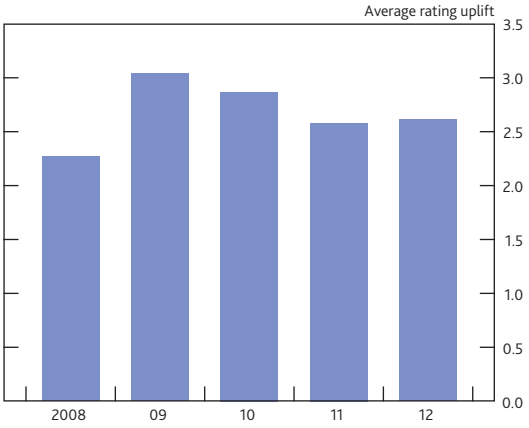
One way to gauge the expected level of government support is to inspect banks' credit ratings. Credit rating agencies often issue two credit ratings for a bank: a 'stand-alone' rating, and a (higher) 'support' rating.(2) Both the stand-alone and support rating reflect an external assessment of the probability of a bank defaulting on its debt, but only the latter includes the possibility of a bank receiving government support. **Chart 6** plots the average difference between the stand-alone and support ratings for the banks in our sample. For example, in 2012 banks' support ratings were, on average, nearly three notches higher than their stand-alone ratings.

This support from sovereigns to banks means that investors may choose to focus on sovereign risk rather than bank risk. In turn, this could mean that all banks in a jurisdiction may face funding stress simultaneously, since they are all driven by the sovereign's ability to repay.

Investors' powers to exercise discipline

Finally, for market discipline to be effective, investors need to be able to influence managers' actions, either directly or indirectly (**Figure 1**). Typically, only equity holders have

Chart 6 Average difference between 'stand-alone' and 'support' ratings for the banks in our sample(a)(b)(c)



Sources: Moody's and Bank calculations.

(a) Some banks have been excluded due to the lack of a suitable rating, or due to mergers or resolution.
(b) Ratings uplift is defined as the number of rating notches by which the support rating exceeds that of the stand-alone. In some cases, where separate data were not available, this includes support from within the group.
(c) Moody's has since removed all uplift from US government support in the ratings for bank holding company debt.

control rights that can influence managers' actions directly, such as by voting against their actions in shareholder meetings, electing the board or engaging in negotiations with management. Debt holders are unable to influence management actions in the same way.

But relying on equity holders to discipline management may not be sufficient: debt and equity holders often have different and *conflicting* interests when it comes to the risk that a firm takes. For equity holders, option value theory would suggest that the value of their stake typically increases with risk, all else equal, since there is no theoretical upper limit to returns. Their worst outcome is that they lose their stake — this is known as 'limited liability' (Haldane (2011)). In contrast, for debt holders, the value of their stake decreases as the bank takes more risk, because the default probability of the bank increases while the returns are fixed.

Debt holders are able to restrict management actions at the point of issuance of loans and bonds, by insisting on covenants. But it can be difficult to monitor a bank's actions or to write sufficiently complete covenants to cover all the ways in which a bank might increase its risk.

There is a greater ability for debt holders to influence management action *indirectly*. If debt holders respond to the risk that managers are taking — by demanding a higher return to hold bank debt — then this increased price of taking risk should restrain managers from taking excessive risk.

(1) Of these banks, 22 were designated as global systemically important banks by the Financial Stability Board in November 2013. See Financial Stability Board (2013). These are banks whose distress or disorderly failure would cause significant disruption, which tends to require public solvency support.
(2) See Noss and Sowerbutts (2012).

The position of debt investors relative to other investors in the bank's capital structure can be important. For example, investors in subordinated debt are more exposed to the risks of the bank's actions than senior debtors, so they should react more strongly to new information. This reaction provides additional information for other investors who may be less able to monitor the bank, so that a bank which has issued a lot of subordinated debt should be more constrained by market discipline. Conversely, investors in secured debt or government-insured retail deposits may respond more weakly to the risks that the bank is taking, and as such exert little discipline on management.

Policy developments

A number of policy developments, in the United Kingdom and internationally, are likely to lead to further improvements in the requisites for market discipline. The Bank of England's Financial Policy Committee (FPC) — which works to protect and enhance the resilience of the UK financial system — has issued a number of recommendations relating to public disclosure, as summarised in **Table B**.(1)

Table B FPC recommendations relating to disclosure

2011 Q2	Improved disclosure of exposures by major UK banks.
2011 Q4	Disclosure of leverage ratios.
2012 Q2	Work towards consistent and comparable Pillar 3 disclosures.(a)
2013 Q2	Implement EDTF recommendations.

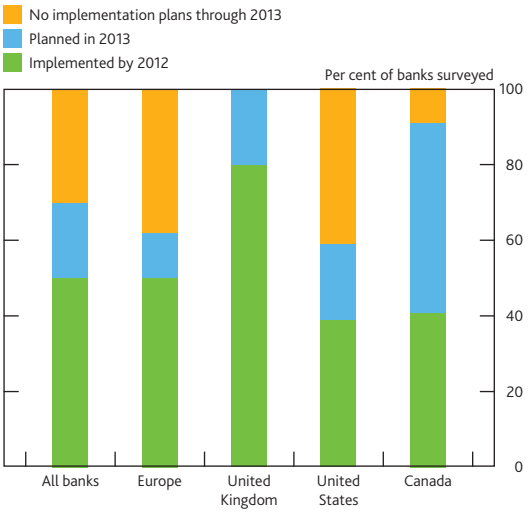
(a) This recommendation was restated by the FPC in 2013 Q2.

In June 2013, the FPC recommended that all major UK banks and building societies should comply fully with the EDTF recommendations in their 2013 annual reports. And it restated a recommendation to improve the comparability and consistency of the Pillar 3 disclosures of the major UK banks and building societies. These will further improve the information available to investors, and make it easier for them to process information about banks' risk-taking, enhancing their ability to exert market discipline.

These recommendations build on earlier work that the Financial Services Authority had done to improve banks' disclosures; in particular by co-ordinating with the British Bankers' Association (BBA) in implementing the BBA Code to ensure banks' financial statements provide useful, high-quality information. Since April 2013, the Prudential Regulation Authority within the Bank of England has continued the ongoing engagement with the BBA, its members and their auditors on the implementation of the Code.

At the international level a number of bodies are working to improve banks' disclosures. The Basel Committee on Banking Supervision considers disclosure in a number of its working groups. It is also reviewing Pillar 3 reporting; this latter review builds on work undertaken by the European Banking Authority. And the G20 Finance Ministers and Central Bank Governors have welcomed the October 2012 recommendations of the EDTF, with some national authorities actively encouraging banks to adopt it. The first progress report of the EDTF was issued in July 2013 and found that its recommendations are already beginning to make a positive impact on the reporting practices of global banks. Further improvement is expected in 2013, although as **Chart 7** shows there is considerable variation across regions.(2) The report notes that the high uptake of the EDTF recommendations in the United Kingdom and Canada is partly due to expectations set by domestic regulators.

Chart 7 Planned implementation of EDTF recommendations by region(a)



Source: Enhanced Disclosure Task Force (2013).

(a) The EDTF sample is slightly different to that used in this article. The EDTF sample comprises 31 institutions, including two responses from Asian banks.

Measures to address the 'too important to fail' problem should increase incentives for investors to exercise market discipline. For example, effective and credible resolution regimes should reduce the perceived likelihood of government support, thus weakening the link between sovereigns and banks.(3)

Conclusion

The academic literature suggests that firms' disclosure can be effective in reducing information asymmetries and incentivising firms to manage their risks more effectively. This may lead to a less leveraged and more resilient financial system.

(1) For more information on the FPC see Tucker, Hall and Pattani (2013).
(2) See Enhanced Disclosure Task Force (2013).
(3) See Bank of England (2013), in particular Table 3.D, which summarises reforms to address risks from systemically important institutions, and Section 5 which contains the FPC's recommendations.

The indices presented in this article provide a simple way of summarising and assessing the extent of disclosure by banks. It appears that disclosure has increased in several of the areas identified in the December 2009 *Financial Stability Report* as needing improvement: namely funding risk, valuation techniques and financial interconnections. UK banks have, on average, improved relative to their international peers, although there is still room for further improvement.

With hindsight it is relatively simple to identify areas of inadequate disclosure; the challenge is to future-proof disclosure in an innovative industry and where the incentive structure encourages the build-up of new types of risks which may not be covered by existing rules and guidance. Policymakers therefore need to build disclosure frameworks that keep up to speed with the current evolution of bank business models and emerging risks.

Policy developments should mean not only that disclosure continues to improve, but also that investors have stronger abilities and incentives to exercise market discipline. This should help reduce excessive risk-taking by banks, leading to positive outcomes for financial stability.

References

Akerlof, G (1970), 'The market for lemons: quality uncertainty and the market mechanism', *Quarterly Journal of Economics*, Vol. 84, No. 3, pages 488–500.

Bank of England (2009), *Financial Stability Report*, December, available at www.bankofengland.co.uk/publications/Documents/fsr/2009/fsrfull0912.pdf.

Bank of England (2012), *Financial Stability Report*, June, available at www.bankofengland.co.uk/publications/Documents/fsr/2012/fsrfull1206.pdf.

Bank of England (2013), *Financial Stability Report*, June, available at www.bankofengland.co.uk/publications/Documents/fsr/2013/fsrfull1306.pdf.

Basel Committee on Banking Supervision (2009), 'Enhancements to the Basel II framework', available at www.bis.org/publ/bcbs157.pdf.

Crockett, A (2001), 'Market discipline and financial stability', Bank for International Settlements, available at www.bis.org/speeches/sp010523.htm.

Deloitte (2011), 'Gems and jetsam: surveying annual reports', available at www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Services/Audit/uk-audit-gems-and-jetsam.pdf.

Dudley, W C (2009), 'Lessons learned from the financial crisis', available at www.newyorkfed.org/newsevents/speeches/2009/dud090702.html.

Easley, D and O'Hara, M (2004), 'Information and the cost of capital', *Journal of Finance*, Vol. 59, No. 4, pages 1,553–83.

Enhanced Disclosure Task Force (2012), 'Enhancing the risk disclosures of banks', available at www.financialstabilityboard.org/publications/r_121029.pdf.

Enhanced Disclosure Task Force (2013), 'Progress report on implementation of disclosure recommendations', available at www.financialstabilityboard.org/publications/r_130821a.pdf.

European Systemic Risk Board (2012), 'Recommendation on funding of credit institutions', available at www.esrb.europa.eu/pub/pdf/recommendations/2012/ESRB_2012_2.en.pdf?450fcc2699c80249b41dc34db431e4cb.

Financial Stability Board (2013), '2013 update of group of global systemically important banks', available at www.financialstabilityboard.org/publications/r_131111.pdf.

Gorton, G (2008), 'The panic of 2007', papers and proceedings for the Federal Reserve Bank of Kansas City, Jackson Hole Conference.

Haldane, A G (2011), 'Control rights (and wrongs)', available at www.bankofengland.co.uk/publications/Documents/speeches/2011/speech525.pdf.

Morris, S and Shin, H S (2002), 'Social value of public information', *The American Economic Review*, Vol. 92, No. 5, pages 1,521–34.

Myers, S C and Majluf, N S (1984), 'Corporate financing and investment decisions when firms have information that investors do not have', *Journal of Financial Economics*, Vol. 13, No. 2, pages 187–221.

Noss, J and Sowerbutts, R (2012), 'The implicit subsidy of banks', *Bank of England Financial Stability Paper No. 15*, available at www.bankofengland.co.uk/research/Documents/fspapers/fs_paper15.pdf.

Tucker, P, Hall, S and Pattani, A (2013), 'Macroprudential policy at the Bank of England', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 192–200.

Understanding the MPC's forecast performance since mid-2010

By Christopher Hackworth, Amar Radia and Nyssa Roberts of the Bank's Monetary Analysis Directorate.

- Macroeconomic performance in the United Kingdom has been disappointing in recent years: for most of the post-crisis period, GDP growth has been unexpectedly weak, and inflation unexpectedly strong.
- That unexpected weakness in GDP reflects a combination of weaker growth in the United Kingdom's trading partners, tighter domestic credit conditions and slower dissipation of uncertainty.
- Unanticipated rises in energy and other imported costs can broadly account for the surprising strength in inflation since mid-2010.
- Weak effective supply is likely to have counteracted the impact of weak demand on inflation.

Overview

The Monetary Policy Committee's (MPC's) macroeconomic forecasts play an important role in the setting of monetary policy. They are underpinned by a number of key judgements and conditioning assumptions. Among other things, these key judgements are informed by the MPC's understanding of its past forecast performance.

In mid-2010, the MPC's central expectation was for sustained recovery both domestically and abroad as the effects of the 2007–09 financial crisis, and of external price pressures, faded. GDP growth was expected to pick up to a little above historical average rates, and inflation was expected to fall to the target within two years.

But since mid-2010, growth has been closer to 1% on average, leaving the level of GDP in 2013 Q2 almost 7% below the central expectation in the August 2010 *Inflation Report*. A key reason for that weakness was that the effects of the financial crisis did not fade as anticipated. In particular, world trade, credit conditions and uncertainty dragged on growth by more than anticipated.

Despite unexpectedly weak GDP, inflation did not fall back towards the 2% target as expected, but picked up sharply, reaching around 5% in 2011 Q3. Unexpected increases in energy and other imported costs can broadly account for the strength in inflation relative to mid-2010 expectations. However, had the MPC correctly anticipated the weakness in GDP, it would have probably lowered its inflation projection. This suggests that other factors — in particular, the weakness of effective supply — have counteracted the impact of weak demand on inflation in recent years.

The key judgements underpinning the latest set of projections reflect the experience of the past few years. In particular, the consequences of the financial crisis have proved more severe and longer lasting than expected. In its November 2013 projections, the MPC's central expectation was for GDP to grow at around its average historical rate over the forecast period; in contrast, in August 2010, the recovery was assumed to involve a period of above-trend growth, in line with the experience of previous cyclical upswings.

The Monetary Policy Committee's (MPC's) macroeconomic forecasts, communicated through the *Inflation Report* each quarter, are a key input to the setting of monetary policy. The MPC regularly assesses macroeconomic developments against the judgements underpinning those forecasts. In this way, the MPC improves its understanding of the influences driving the economy, which should result in improved forecasts. As part of that process, this article explores the reasons why GDP and inflation have evolved differently from the MPC's forecasts since mid-2010.(1)

Since the start of the financial crisis, GDP growth and CPI inflation have repeatedly disappointed relative to the MPC's central expectation. Following the sharp falls in output in 2008–09, the MPC's central expectation had been for growth to pick up to above historical average rates, and for inflation to fall to the 2% target within two years. But four-quarter GDP growth has averaged around 1% since 2010 Q1, and inflation has remained above target. As discussed in the box on page 338, the MPC's forecast performance since the crisis has been similar to that of many external forecasters.

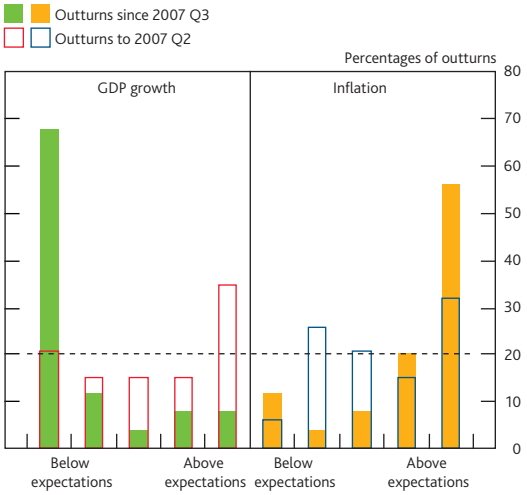
The article begins by providing some historical context, comparing GDP and inflation outturns since the crisis to the MPC's forecast distributions, as illustrated by the fan charts. The rest of the article focuses on the MPC's forecasting performance since the nascent recovery faltered from mid-2010. It has been over this period that the MPC has learned the most, and is still learning, about the repercussions of the financial crisis. Specifically, this article compares outturns between 2010 Q2 and 2013 Q2 with the projections in the August 2010 *Inflation Report*, which were typical of others around that time. The article quantifies, using Bank staff models, the importance of different developments in explaining why GDP growth and inflation outturns have been different from MPC projections. As part of that quantification, the article uses internal Bank staff projections for a range of variables that were broadly consistent with the MPC's published projections and underlying judgements.(2)

GDP and inflation outturns relative to the MPC's fan charts

The MPC's forecasts are always presented as a distribution of outturns, conveying a range of possible outcomes and their likelihood. This approach is intended to reflect the inherent uncertainty about the future evolution of the economy.

One way to assess the MPC's forecasts is to examine the dispersion of outturns across the probability distributions. **Chart 1** shows, for four-quarter GDP growth on the left and annual CPI inflation on the right, the proportion of outturns in each quintile of the probability distributions at the one-year horizon. If the fan charts accurately described the uncertainty faced by the MPC and the sample were sufficiently large, then outturns would be expected to lie evenly across the fan chart distributions; 20% of outturns would be expected to lie within each quintile of the distribution — illustrated by the black dashed line.

Chart 1 Dispersion of GDP growth and inflation outturns, one year ahead, across the quintiles of the fan chart distributions(a)(b)



(a) Calculated for the fan charts based on market interest rate expectations published from February 1998 to August 2012. The outturns for GDP growth and inflation are allocated to one of five buckets representing the quintiles of the fan chart from a year earlier.
(b) The modes of the fan chart distributions for GDP growth up to the August 2011 forecasts have been adjusted up by 0.3 percentage points, to reflect the effects of methodological changes implemented in the 2011 edition of the *Blue Book*. Inflation fan charts refer to RPIX inflation up to November 2003 and CPI inflation thereafter.

Prior to the onset of the financial crisis in 2007 Q3, GDP growth and inflation outturns were fairly evenly distributed across the five quintiles (shown by the hollow red and blue bars in **Chart 1**), although growth had tended to be a little stronger than expected. Since then, however, the MPC's forecasts have tended to overpredict growth and underpredict inflation. Four fifths of GDP growth outturns since 2007 Q3 have been in the bottom half of the forecast distribution (shown by the solid green bars in **Chart 1**). In contrast, four fifths of inflation outturns have been in the top half of the distribution over the same period (shown by the solid orange bars in **Chart 1**). A similar pattern is seen for two year ahead GDP and inflation outturns.

(1) An enhanced forecast evaluation exercise is one aspect of the Bank's response to the 'Review of the Monetary Policy Committee's forecasting capability' by David Stockton; see Stockton (2012).
(2) Key findings from this analysis were set out in a box on pages 47–49 of the November 2013 *Inflation Report*.

How does the MPC's forecasting performance compare with external forecasters?

One way to assess the MPC's forecasting performance is to compare it with equivalent projections made by external forecasters. In the 'Review of the Monetary Policy Committee's forecasting capability', David Stockton, formerly of the US Federal Reserve, noted that 'since the crisis commenced, the MPC have made somewhat larger forecast errors for growth than the average errors of external forecasters, though the differences are not striking'.(1)

This box examines how the MPC's forecasting performance compares with that of external forecasters for four-quarter GDP growth and inflation outturns since the start of the financial crisis in 2007 Q3. If external forecasters' expectations were closer to outturns than those of the MPC, that could indicate that the MPC was too cautious in incorporating all the available information into its forecasts. The results in this box suggest that differences between the MPC's mean forecasts and outturns were similar to those of the average external forecaster on both GDP growth and inflation.

This box draws on the quarterly survey of external forecasters conducted by the Bank. Every three months, in preparation for the *Inflation Report*, the Bank asks a sample of external forecasters, including commercial banks and economic consultancies, for their economic projections, with around 20 to 25 institutions responding each quarter. The analysis in this box only includes forecasters that have both been in the sample and responded to at least two thirds of the surveys since the August 2006 *Inflation Report*.

GDP

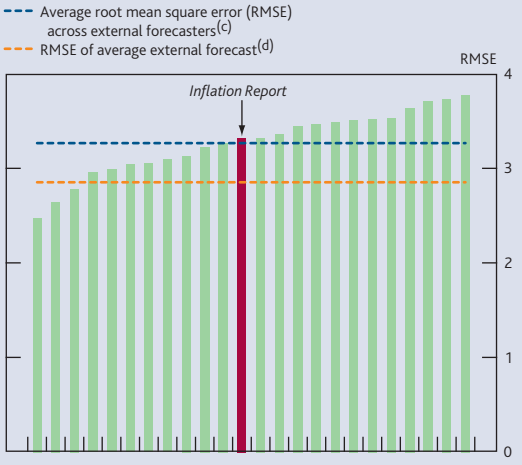
The MPC's GDP growth forecasting performance has been similar to that of many external forecasters since 2007 Q3 (**Chart A**). Some external forecasts had a smaller root mean square error (RMSE), but the average of individual RMSEs across all external forecasters was the same as the MPC.

For GDP, taking the RMSE of the average across external forecasts is somewhat lower than the RMSE of the MPC and of most individual external forecasters. This consensus forecast would be expected to perform better than any individual forecast. For example, if one forecaster consistently overpredicted growth, and a second consistently underpredicted growth by the same amount, the average of their forecasts would be an accurate forecast, even though the individual forecasts would not. Only three external forecasters have had a smaller RMSE than this consensus forecast since late 2007.

Inflation

MPC inflation forecasts have differed from outturns by a similar amount to external forecasts (**Chart B**). The RMSE of the MPC's one year ahead inflation forecasts has been the same as the average RMSE across external forecasters. Unlike forecasts for GDP, the RMSE of the consensus external forecast is very similar to that of the MPC, and most external forecasters. This reflects less dispersion across individual external forecasts for inflation than for GDP.

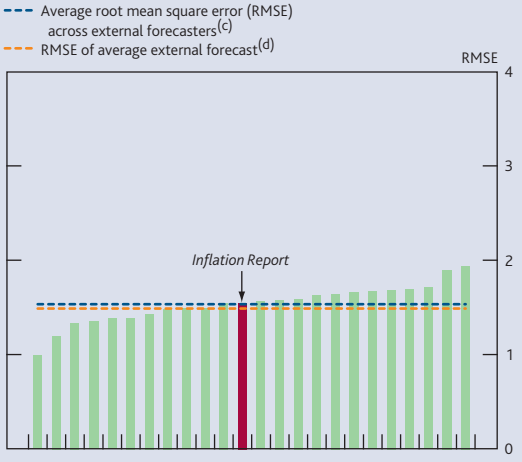
Chart A One year ahead GDP growth forecast RMSEs(a)(b)



Sources: Projections of outside forecasters provided for *Inflation Reports* between August 2006 and August 2012 and Bank calculations.

(a) This chart covers outturns from 2007 Q3 to 2013 Q3 for four-quarter growth in GDP.
(b) Each green bar shows the root mean square error of an external forecaster, based on their responses to the Bank's survey of external forecasters.
(c) This is the average RMSE across forecasters in the sample.
(d) This is the RMSE of the average external forecaster's projection for GDP growth.

Chart B One year ahead inflation forecast RMSEs(a)(b)



Sources: Projections of outside forecasters provided for *Inflation Reports* between August 2006 and August 2012 and Bank calculations.

(a) This chart covers outturns from 2007 Q3 to 2013 Q3 for annual CPI inflation.
(b) Each green bar shows the root mean square error of an external forecaster, based on their responses to the Bank's survey of external forecasters.
(c) This is the average RMSE across forecasters in the sample.
(d) This is the RMSE of the average external forecaster's projection for inflation.

(1) See page 17 of Stockton (2012).

How the economy has evolved relative to the MPC's central expectations in August 2010

At the time of the August 2010 *Inflation Report*, the MPC's central expectation was for the economy to continue to recover from the 2008/09 recession as the effects of the financial crisis and external price pressures faded. That central view rested upon a number of key judgements:

- UK trade was expected to benefit from a global recovery and improved competitiveness following the large depreciation of sterling in 2007–08, such that the UK export share would rise;
- an easing in credit conditions and uncertainty was thought likely to support domestic demand;
- a temporary boost to inflation from import and energy prices was expected to wane;
- rising demand was expected to be associated with rising labour productivity; and
- an increase in unemployment was expected to weigh on wages and prices.

Based on those judgements, the MPC's central view was for four-quarter GDP growth to recover to a little above its pre-crisis average, and for inflation to fall back to below the 2% target by 2012.

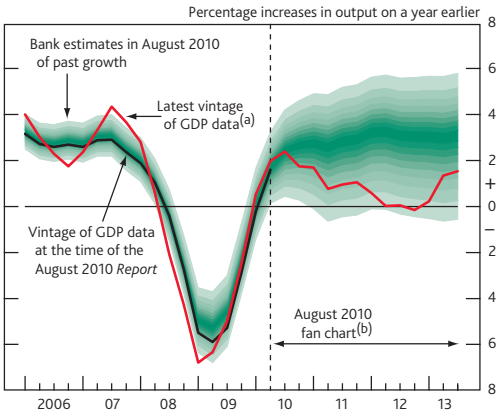
But, according to ONS estimates, growth has been closer to 1% on average (**Chart 2**), leaving the level of GDP in 2013 Q2 almost 7% weaker than the central expectation in the August 2010 *Inflation Report*. That unexpected weakness was disproportionately accounted for by exports and business investment, with consumption also playing a role (**Chart 3**). There was a partial offset from lower imports.

Despite weaker GDP, inflation did not, as expected, fall back towards the target, but picked up sharply, reaching around 5% in 2011 Q3 (**Chart 4**). Compared with the August 2010 projection, annual inflation has been, on average, around 1½ percentage points higher than expected.

The unexpected weakness in GDP and strength in inflation reflected underlying drivers of the economy evolving differently to the key judgements underpinning the August 2010 *Inflation Report* (**Table A**). In particular, global activity was weaker than expected — especially in the euro area — and UK exporters did not gain market share as anticipated. Credit conditions remained tight, and uncertainty dissipated more slowly than expected. Import and energy prices continued to rise. And labour productivity fell. Other unexpected developments include stronger labour supply and rises in tuition fees.

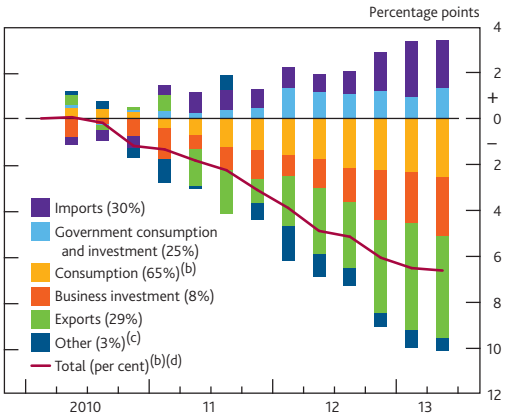
In response to the deteriorating outlook, the MPC provided more stimulus by increasing its stock of asset purchases by

Chart 2 GDP outturns and projection in the August 2010 *Inflation Report*



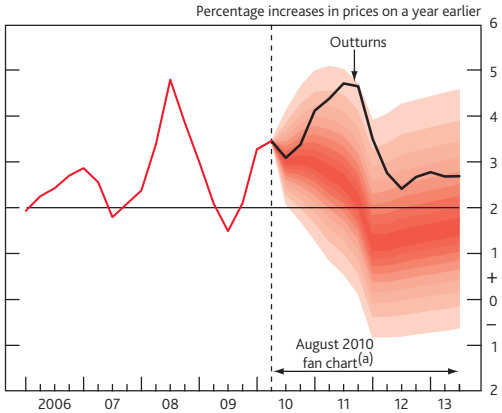
(a) Revisions, including methodological changes, account for the gap between the red and black lines prior to the vertical dashed line.
(b) Based on market interest rate expectations and the assumption that the stock of purchased assets remained at £200 billion throughout the forecast period. See footnote to Chart 5.1 in the August 2010 *Inflation Report* for information on how to interpret the fan chart. No adjustment has been made to the fan chart to reflect the effects of methodological changes implemented in the 2011 edition of the *Blue Book*.

Chart 3 Contributions to the news in the level of real GDP since the August 2010 *Inflation Report*(a)



(a) Chained-volume measures. News calculated between 2010 Q1 and 2013 Q2 based on Bank staff projections made in August 2010 that were broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts. Those forecasts have been adjusted to be at 2010 prices. Figures in parentheses show 2009 weights in real GDP, which sum to more than 100% because imports detract from GDP.
(b) August 2010 projection adjusted to reflect the effects of methodological changes implemented in the 2011 edition of the *Blue Book*.
(c) Includes housing investment, stockbuilding, statistical adjustments and news from unexpected revisions to GDP.
(d) News in the MPC's GDP backcast at the time of the November 2013 *Inflation Report* relative to the August 2010 modal GDP projection.

Chart 4 CPI inflation outturns and projection in the August 2010 *Inflation Report*



(a) Based on market interest rate expectations and the assumption that the stock of purchased assets remained at £200 billion throughout the forecast period. See footnote to Chart 5.6 in the August 2010 *Inflation Report* for information on how to interpret the fan chart.

Table A Assessing key judgements in the August 2010 *Inflation Report*

August 2010 key judgements	Indicators of key judgements	Cumulative changes from 2010 Q1 to 2013 Q2 (per cent unless otherwise stated)	
		Aug. 2010 projections[a]	Nov. 2013 estimate
Consequences of the financial crisis gradually fade			
Sustained recovery in world demand growth.	UK-weighted world trade[b]	24.1	14.6
Uncertainty expected to dissipate and credit conditions to ease gradually.	Weighted average of household and corporate lending and deposit rates relative to reference rates (basis points)[c]	-175	-20
Limited further imported inflationary pressure			
Import prices expected to be fairly stable.	Import prices (excluding fuels)	0.2	3.9
Energy prices expected to move in line with futures curves.	Sterling oil prices[d]	13	36
Rising productivity			
Labour productivity expected to rise.	Whole-economy output per hour[e]	10.4	-1.2

Sources: Bank of England, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey, IMF *World Economic Outlook* (*WEO*) October 2013, ONS, Thomson Reuters Datastream and Bank calculations.

(a) Bank staff projections made in August 2010 that were broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts.
(b) World trade is constructed using data for import volumes of 143 countries weighted according to their shares in UK exports.
(c) For a full description of this measure see Burgess *et al* (2013), pages 84–86.
(d) Brent forward prices for delivery in 10–21 days' time converted into sterling.
(e) Calculated using the MPC's GDP backcast instead of published ONS GDP data.

£175 billion. In addition, Bank Rate remained at 0.5% compared with the rise to 2% implied by the market curve at the time. Were it not for that more stimulative policy stance, it is likely that GDP and inflation would have been markedly weaker.

Unexpected price pressures and demand headwinds

This section uses the Bank's suite of economic models to assess how far the MPC's forecast performance since mid-2010 can be explained by the key factors highlighted above, focusing on price pressures (energy and non-energy import costs and tuition fees) and demand headwinds (global demand for UK exports, credit conditions and uncertainty). The role of other factors, including supply, is discussed in the penultimate section.

Quantifying the precise impact of economic developments is not straightforward. There is no single model that accurately captures the impact of all the various factors affecting the economy. The MPC therefore uses a range of models and judgements to produce its forecasts. In that spirit, the estimates presented in the remainder of this article are based on a range of approaches, including the Bank's central forecasting model COMPASS, its wider suite of economic models and other staff analysis.[1] All of those estimates are uncertain and necessarily specific to the models used.

Impact on inflation

In August 2010, the MPC's central expectation was for upwards pressure on inflation from imported costs to fade. Instead, rises in these costs continued to boost inflation, as did an unanticipated increase in tuition fees that occurred in late 2012. **Overall, the direct impact of unanticipated rises in energy costs, non-energy import costs and tuition fees can broadly account for the news in inflation from mid-2010 to mid-2013.**

Energy prices

Just over a third of the 1½ percentage points a year news in inflation can, on average, be accounted for by the direct effect of unexpected rises in energy costs.

CPI inflation has been boosted since mid-2010 by unexpectedly large rises in energy costs, reflecting both higher oil and gas prices, and increases in other costs faced by energy suppliers, such as the amounts that they have had to pay towards the maintenance of distribution networks.

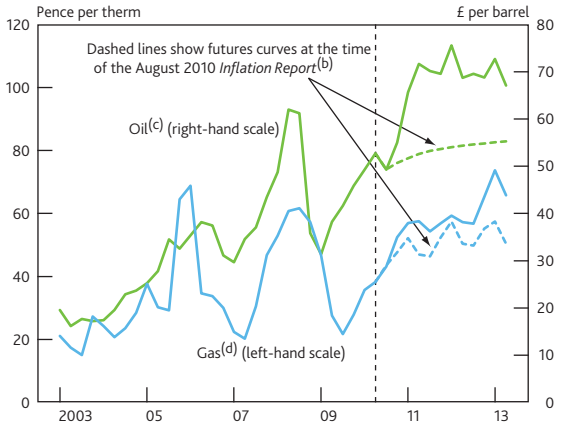
MPC forecasts are conditioned on futures curves for oil and wholesale gas prices, expressed in sterling terms, which at the time of the August 2010 *Inflation Report* implied only a small rise in oil prices and some increase in gas prices (**Chart 5**).[2] But oil prices rose sharply through the latter part of 2010 and first half of 2011, such that they were around 25% higher on average than assumed between 2010 Q2 and 2013 Q2, while gas prices were on average 15% higher than assumed.

Higher energy prices reflected both demand and supply factors. Despite unexpectedly weak growth in the United Kingdom's trading partners, especially in the euro area, world oil demand has been stronger than expected, in part reflecting strong demand from emerging economies. Supply disruptions, such as those associated with geopolitical tensions in the Middle East, also raised the price of oil.

Rising wholesale energy prices typically affect inflation directly through petrol prices and domestic energy bills. The direct effect of unexpected rises in energy costs on inflation has averaged half a percentage point a year since mid-2010. Higher energy costs are also likely to have had indirect effects on consumer prices, in particular through higher costs of production for non-energy goods and services, such as manufacturing and distribution costs. These indirect effects are difficult to quantify. Based on the energy content of production, indirect effects could double the contribution of higher energy costs to inflation. But in time they are likely to

(1) For more on economic models at the Bank of England, see Burgess *et al* (2013).
(2) Nixon and Smith (2012) discuss how the MPC's assumptions about the evolution of oil prices relate to its forecasts.

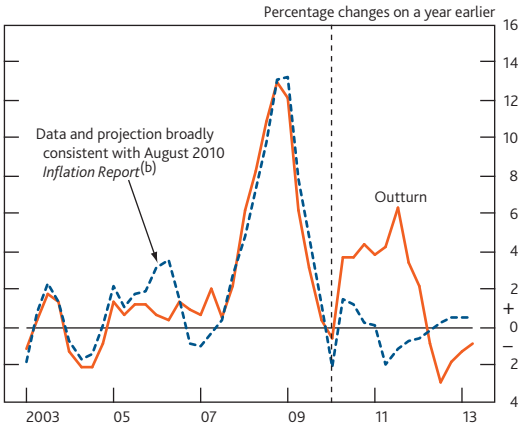
Chart 5 Sterling oil and wholesale gas prices[a]



Sources: Bank of England, Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) Data are quarterly averages. Vertical dashed line is at 2010 Q2, the last full quarter of oil and gas price data available at the time of the August 2010 *Inflation Report*.
(b) The futures prices shown are averages during the fifteen working days to 4 August 2010. The sterling oil futures curve was calculated by assuming that the sterling-dollar exchange rate remained at its average level during that fifteen-day period.
(c) Brent forward prices for delivery in 10–21 days' time converted into sterling.
(d) One-day forward price of UK natural gas.

Chart 6 UK non-energy import prices[a]



Sources: ONS and Bank calculations.

(a) Goods and services import price deflator excluding fuels and the impact of missing trader intra-community (MTIC) fraud. Revisions account for the gap between the dashed and solid lines prior to the vertical dashed line. Vertical dashed line is at 2010 Q1, the last full quarter of non-energy import price data available at the time of the August 2010 *Inflation Report*.
(b) Bank staff projection made in August 2010 that was broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts.

be largely offset by lower domestic costs — as discussed below, higher energy costs will squeeze household real incomes, reducing demand for other goods and services.(1)(2)

Import prices (excluding energy)

Import prices have risen by more than expected. And the impact on inflation from a given rise in import prices is now estimated to have been larger than previously assumed. **Taking these influences together, import prices can account for around three quarters of a percentage point per year of the news in inflation since mid-2010.**

Between 2010 Q1 and 2013 Q2, non-energy UK import prices increased by 4%, rather than remaining broadly unchanged as assumed in the August 2010 *Inflation Report* (**Chart 6**). These increases partly reflected strong demand from commodity-intensive emerging economies. Supply disruptions also raised the prices of some non-energy commodities. For example, wholesale agricultural prices were boosted by adverse weather conditions in Australia, Brazil and Russia in late 2010.

The impact of higher import prices on CPI inflation depends on three factors: the import intensity of consumer prices; the extent to which companies adjust to higher import costs by raising prices or reducing other costs; and how long that adjustment takes. Bank staff currently assume that import intensity is close to 30% and that higher import prices will eventually be fully passed through into higher consumer prices.(3) The timing of that pass-through is, however, uncertain. One way to judge how long it takes for higher import prices to be passed through to consumer prices is to look at the contribution to inflation of the import-intensive CPI components relative to those components that are less import-intensive.(4) Overall, Bank staff estimate that unexpected rises in import prices since mid-2010 can account for around half a percentage point per year of the news in inflation, on average.

In addition to the impact of unexpected rises in import prices *since* mid-2010, Bank staff estimate that CPI inflation since then has been unexpectedly boosted by rises in import prices *prior* to mid-2010. These previous rises in import prices, following the large depreciation of sterling in 2007–08, were known about at the time of the August 2010 *Inflation Report* (**Chart 6**). But the assumed impact of those rises has been revised upwards, as Bank staff have revised up their estimates of both import intensity and the degree of pass-through. Those two changes in judgement, applied to the rises in import prices prior to mid-2010, can account for a further third of a percentage point per year of the news in inflation, on average.

Tuition fees

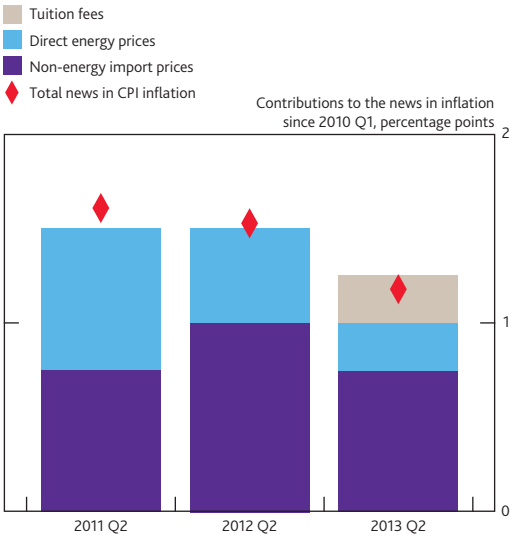
Unanticipated rises in tuition fees are likely to have raised inflation since late 2012, contributing around a quarter of a percentage point to the news in inflation since then. From 1 September 2012, the government cap on undergraduate fees charged by universities increased to £9,000 from £3,375. The subsequent increase in fees is estimated to have increased annual CPI inflation by around a quarter of a percentage point, relative to historical average rates.

Chart 7 summarises the direct impact of unanticipated rises in energy costs, non-energy import costs and tuition fees on

(1) This is based on a simulation using a version of COMPASS that incorporates energy as a complement to the production process. See section 5.2.1 on pages 40–41 of Burgess *et al* (2013).
(2) For a detailed discussion of how higher energy prices transmit through the economy, see Barwell, Thomas and Turnbull (2007).
(3) Bank staff estimate import intensity using ONS Supply and Use tables.
(4) See Section 4 of the November 2013 *Inflation Report* for more information.

CPI inflation from mid-2010 to mid-2013. As can be seen from Chart 7, these factors can broadly account for the unexpected strength in inflation over that period.

Chart 7 Contributions to the news in CPI inflation since the August 2010 *Inflation Report*(a)



(a) The news in inflation is defined as ONS estimates of CPI twelve-month inflation relative to the modal inflation projection in the August 2010 *Inflation Report*. That news is decomposed into the contributions from various factors, using the Bank staff estimates detailed in this article.

Impact on GDP

Using Bank staff models, the squeeze on real income from higher imported and energy costs, together with unexpectedly weak world demand, a falling export share, tighter credit conditions, and elevated uncertainty can broadly account for the weakness in GDP.(1)

Demand impact from price pressures

As well as raising inflation, external price pressures are likely to have weighed on demand by squeezing households' real incomes. Between mid-2010 and mid-2013, unexpectedly strong inflation, driven by higher energy and import costs, was not accompanied by a commensurate rise in households' money wages, meaning that households' real incomes were squeezed. Indeed, over that period, annual money wage growth was around 1 percentage point weaker than anticipated, on average. In principle, households could have responded to the real income squeeze in one of three ways: by running down saving in order to maintain the amount of goods and services that they consume; by switching their spending towards goods and services that are less energy and import-intensive, thus mitigating the income squeeze; or by reducing their overall spending. Since the increases in energy and import costs were persistent, and because close substitutes for energy and non-energy imports are not readily available, households are likely to have responded to the real income squeeze by reducing their spending on a range of goods and services. So the unexpected strength in energy and import costs is therefore likely to have been associated with weaker growth in overall demand.

Overall, unanticipated external price pressures have been an important factor contributing to weak GDP, accounting for around a third of the shortfall in GDP by 2013 Q2.

In addition to the drag on GDP from unanticipated external price pressures, a number of headwinds to demand proved greater, or more persistent, than was anticipated in August 2010. **Together, unexpectedly weak global demand, a falling export share, tight credit conditions and elevated uncertainty have weighed significantly on UK demand since mid-2010, accounting for around two thirds of the shortfall in GDP.**

Global demand and UK export performance

A significant increase in exports was a key judgement underlying the MPC's August 2010 GDP projection. Sustained growth in world trade was expected as the global economy continued to recover and, following a long period of decline, the UK export share was expected to rise. Instead, world demand growth turned out weaker than expected, while the UK export share continued to decline. **The unexpected weakness in UK exports can account for around half of the almost 7% shortfall in GDP, with broadly equal contributions from unexpectedly weak world trade and the failure of UK companies to increase their trade share.**

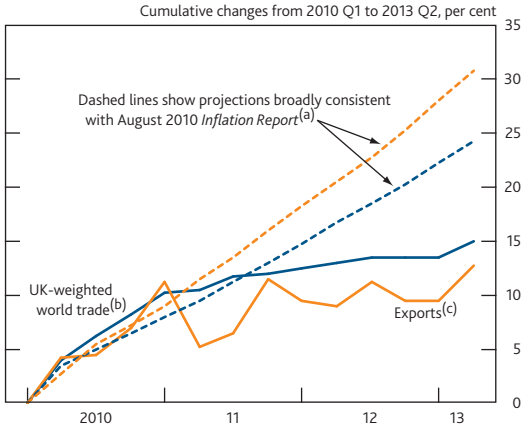
The August 2010 GDP projection assumed a sustained global recovery: UK-weighted world trade was expected to increase by around 25%, but it actually increased by just 15% (**Chart 8**). Around two thirds of that news in world trade can be directly attributed to renewed weakness in euro-area growth from mid-2011 following an intensification of sovereign debt concerns and banking sector strains.

Exports grew by only 13% between 2010 Q1 and 2013 Q2, compared with an expectation of around 30%. Based on the Bank's central forecasting model, COMPASS, unexpectedly weak world trade can account for around half of the news in exports.(2) The remaining half of the news in exports is likely to reflect the unexpected fall in the share of world trade captured by UK companies since mid-2010.

Prior to the financial crisis, the UK export share had been declining since 1996, reflecting, at least in part, greater competition from lower-cost emerging economies, as well as the sharp appreciation of sterling in the mid-to-late 1990s.(3) In August 2010, the MPC expected that secular decline to be arrested, as exporters benefited from the large depreciation of sterling in 2007–08, leading to a rise in the UK export share.

(1) These estimated impacts include some offset from lower imports.
(2) In COMPASS, changes in UK-weighted world trade result in a broadly one-for-one change in exports, within one to two quarters. See pages 19–20 of Burgess *et al* (2013) for a fuller discussion of the interaction between the United Kingdom and the rest of the world in COMPASS.
(3) For a discussion of the sources of the decline in the United Kingdom's share of world demand, see Buisán, Learmonth and Sebastiá-Barriel (2006).

Chart 8 News in UK-weighted world trade and UK exports since mid-2010



Sources: IMF *WEO* October 2013, OECD, ONS, Thomson Reuters Datastream and Bank calculations.

(a) Bank staff projections made in August 2010 that were broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts.
(b) Constructed using data for import volumes of 143 countries weighted according to their shares in UK exports. The observation for 2013 Q2 is an estimate. For those countries where national accounts data for 2013 Q2 were not available, data were assumed to be consistent with projections in the IMF *WEO* October 2013.
(c) Excluding the impact of MTIC fraud. Official MTIC-adjusted data are not available for exports, so the headline exports data have been adjusted by Bank staff for MTIC fraud by an amount equal to the ONS import adjustment.

The extent of that anticipated improvement was informed by past experience of large movements in sterling. But it did not materialise: the export share continued to decline, driven by unexpected weakness in services exports, in particular. As discussed in past *Inflation Reports*, this is likely to have reflected, to some extent, both weaker demand for, and lower supply of, UK financial services.(1)

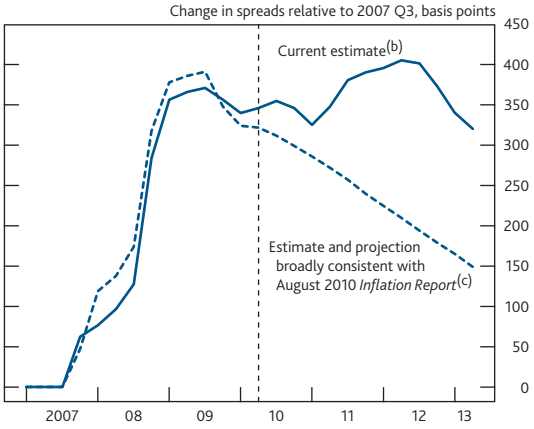
Credit conditions

The MPC had expected credit conditions to ease as the banking sector recovered from the financial crisis. But, partly reflecting the intensification of the euro-area crisis, that did not materialise. **Bank staff models suggest that the lack of improvement in credit conditions can account for nearly 1 percentage point of the almost 7% news in GDP. But it is likely that these models underestimate the effects of credit conditions on the wider economy.**

In mid-2010, with the economy recovering and bank balance sheets improving, the MPC's central expectation was for substantial improvements in credit conditions, supporting household and business spending. In fact, the intensification of the euro-area crisis led to a renewed tightening in credit conditions in 2011 as banks faced higher funding costs. Credit spreads have fallen back more recently following international policy initiatives that reduced pressure on bank funding costs, including the European Central Bank's announcement of Outright Monetary Transactions and the Bank's Funding for Lending Scheme.

One indicator of credit conditions is the difference between the interest rate on a new loan and an appropriate risk-free rate — a 'credit spread'.(2) **Chart 9** shows one measure of credit spreads derived from a weighted average of household and corporate deposit and loan rates.(3) Based on this measure, credit conditions tightened sharply in 2007 and 2008 as financial market participants reassessed the health of the banking sector and banks themselves reassessed the riskiness of new lending. By the time of the August 2010 *Inflation Report*, credit conditions had improved a little and were expected to improve further (**Chart 9**). But, instead, credit conditions tightened again. Overall, credit spreads fell by just 20 basis points between 2010 Q1 and 2013 Q2, around 150 basis points less than expected.

Chart 9 Weighted average of household and corporate lending and deposit rates relative to reference rates(a)



Sources: Bank of England, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey and Bank calculations.

(a) Vertical dashed line is at 2010 Q2, the last full quarter of interest rate data available at the time of the August 2010 *Inflation Report*.
(b) Methodological improvements to the way the measure is calculated account for the gap between the dashed and solid lines prior to the vertical dashed line. For a full description of this measure see Burgess *et al* (2013).
(c) Bank staff projection made in August 2010 that was broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts.

The impact of credit conditions on the economy is highly uncertain. As noted by Burgess *et al* (2013), there is no canonical model in the academic literature articulating all of the effects of the financial sector on the wider economy. Bank staff have, therefore, adopted a range of approaches to quantify the effects of credit conditions. The central estimate used in this article assumes that higher interest rates facing households and companies that stem from banking sector impairment have a similar impact to increases in Bank Rate, but without an effect on the exchange rate.(4) Under that assumption, unexpectedly tight credit conditions are likely to have reduced the level of GDP by almost 1% by 2013 Q2.

(1) For more information, see the box on pages 24–25 of the February 2013 *Inflation Report*.
(2) Lenders are also likely to vary the supply of credit by changing terms other than the spread between the price of a loan and the relevant risk-free rate. For example, they may adjust the number or type of borrowers that they are willing to grant a loan to. Credit spreads are therefore an imperfect proxy for credit supply conditions.
(3) This indicator aggregates the marginal interest rate facing different groups of households and corporates using population shares. For a full description of this measure see Burgess *et al* (2013), pages 84–86. Bank staff projections of this measure of credit conditions inform the MPC's central forecast.
(4) A full discussion of the transmission mechanism for changes in Bank Rate is contained in Bank of England (1999).

Alternative estimates of the impact of the news in credit conditions on GDP can be obtained using the Bank's suite of economic models.(1) Barnett and Thomas (2013) estimate a structural vector autoregression model that identifies credit supply shocks as those that reduce loan volumes and increase credit spreads.(2) They find that credit supply shocks appear to have a much larger impact on lending than an equivalent change in monetary policy, perhaps because credit supply shocks have additional effects on loan volumes via non-price terms beyond those operating via loan rates. Using that model, news in credit conditions since mid-2010 can account for around 2% of the GDP news by 2013 Q2.

Another model in the Bank's suite is a version of the Gertler-Karadi model (Gertler and Karadi (2011)) estimated for the United Kingdom by Villa and Yang (2011). This model assumes that banks face financial frictions, which result in higher interest rates on new lending for non-financial companies. The model suggests a smaller peak impact on GDP of around half a percentage point. One reason for that smaller impact is that the model only captures the effects of credit spreads facing companies, and does not include any channels through which tighter credit conditions affect households.

The estimates from these three alternative models illustrate the uncertainty surrounding the impact of credit conditions on the real economy. But, overall, there are reasons to believe that the estimates presented here underestimate the impact of credit conditions. In particular, the models capture only some of the channels through which tight credit conditions are likely to affect demand and supply.

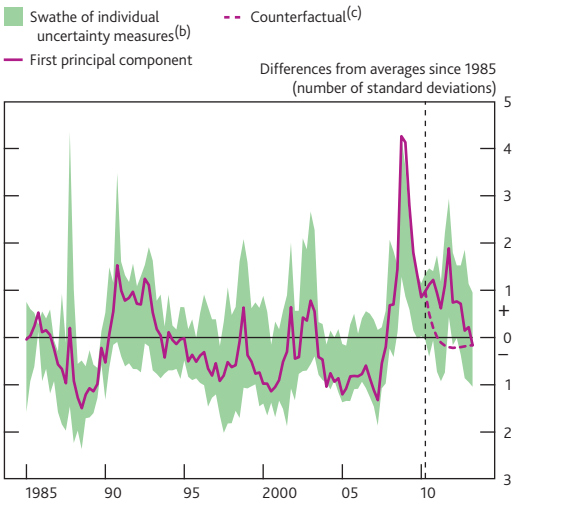
Uncertainty

The intensification of the euro-area crisis, and weakness in global growth more generally, is likely to have made households and companies more uncertain about future income, adversely affecting spending. **Bank staff models suggest that news in uncertainty has reduced GDP by at least half a percentage point, but the impact of uncertainty on the economy is hard to quantify and could be larger.**

During the financial crisis, measures of economic uncertainty, including those derived from financial markets and from surveys, increased significantly (**Chart 10**).(3) That greater uncertainty is likely to have weighed on households' and companies' spending. In August 2010, the MPC expected uncertainty to dissipate, supporting demand growth. But uncertainty remained elevated and increased again as the euro-area crisis intensified.

The impact of uncertainty on the economy is difficult to quantify. Economic uncertainty itself is not directly observable and can only be imperfectly proxied. It is also challenging to disentangle the effects of uncertainty from other demand headwinds. For example, heightened uncertainty is likely to have contributed to weaker world growth, while weaker world growth is likely to have made UK companies more uncertain about future demand for their products.

Chart 10 Measures of economic uncertainty(a)



Sources: British Bankers' Association, CBI, CBI/PwC, Consensus Economics, GfK, Institutional Brokers' Estimate System, London Stock Exchange, New York Stock Exchange/London International Financial Futures and Options Exchange (NYSE Liffe), Nexis, ONS, Times Newspapers and Bank calculations.

(a) Vertical dashed line is at 2010 Q2, the last full quarter of data available at the time of the August 2010 *Inflation Report*.
(b) For a full description of the series used in this swathe see Table B on page 103 of Haddow *et al* (2013).
(c) The dashed counterfactual line is constructed using the VAR model in Haddow *et al* (2013), assuming that there were no unexpected developments after 2010 Q2. For more details on this model see footnote (4) below.

Bank staff have attempted to estimate the impact of uncertainty using a vector autoregression (VAR) model, in which uncertainty is proxied using the first principal component shown in **Chart 10**.(4)(5) This measure suggests that uncertainty spiked during the financial crisis, before beginning to fall back. The VAR model implies that, in the absence of other unexpected developments after 2010 Q2, and given the historical relationship between the variables in the model, uncertainty would have fallen relatively sharply as shown by the dashed magenta line in **Chart 10**. That path is broadly consistent with the MPC's judgement in the August 2010 *Inflation Report* that uncertainty would continue to fall back towards more normal levels. Taking that line as a counterfactual, the news in uncertainty can account for around half a percentage point of the 7% shortfall in GDP by 2013 Q2, with a peak impact of nearly 1% in mid-2012.

(1) Both of the models discussed here, and how they can be used to mimic the effects of financial frictions in COMPASS, are discussed in detail on pages 87–95 of Burgess *et al* (2013).
(2) This model uses corporate bond spreads as a measure of credit spreads, because a longer back-run of these data are available than for the household and business loan rate series used to construct the measure shown in **Chart 9**.
(3) See Haddow *et al* (2013) for a discussion of macroeconomic uncertainty and how to measure it.
(4) As well as an uncertainty indicator, the model includes GDP, employment (measured in hours worked), CPI, Bank Rate and a measure of credit conditions to control to some extent for the interdependencies between credit and uncertainty. The model does not control for world demand. See Haddow *et al* (2013) for more details.
(5) Principal components analysis is a statistical technique combining individual measures into a single summary uncertainty index. The method involves extracting from a set of related variables a smaller number of new variables, called principal components, which explain most of the variation in the original set. The first principal component accounts for the greatest amount of variation in the original set of variables.

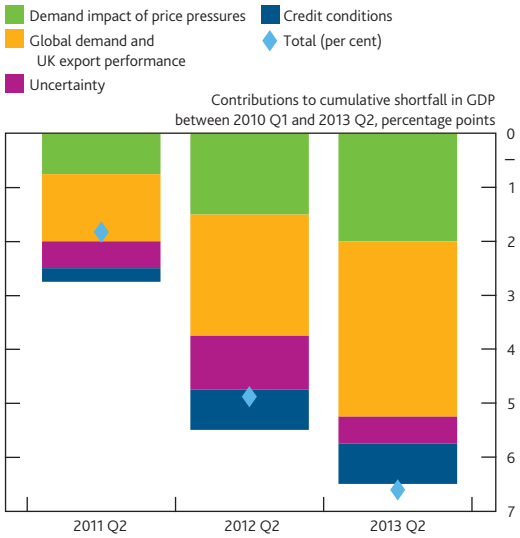
There are reasons to believe, however, that this approach underestimates the full impact of uncertainty. Higher uncertainty is narrowly defined in the VAR as increasing the range of likely outcomes faced by a household or business. The model does not capture the effects of an increased probability of very unlikely but very bad outcomes. It also does not capture the possibility that higher uncertainty amplifies the impact of other developments such as tight credit conditions.

Fiscal policy

The fiscal consolidation has been broadly in line with plans announced in 2010. The MPC's projections are conditioned on the Government's tax and spending plans. These have remained broadly unchanged since the time of the August 2010 *Inflation Report* — in particular, the increase in VAT was announced before that *Inflation Report*.

Taken together, the impacts from unexpected developments in price pressures and headwinds to demand — global demand for UK exports, credit conditions and uncertainty — can broadly account for the unexpected weakness in GDP from mid-2010 to mid-2013. Chart 11 summarises the estimated impacts of these factors on GDP over that period.

Chart 11 Contributions to the news in the level of real GDP since the August 2010 *Inflation Report*(a)



(a) The news in GDP is defined as the MPC's backcast, as published in the November 2013 *Inflation Report*, relative to the modal GDP projection in the August 2010 *Inflation Report*. That news is decomposed into the contributions from various factors, using the Bank staff estimates detailed in this article.

Other unexpected developments affecting GDP and inflation since mid-2010

The MPC reacted as the outlook worsened by providing more stimulus: the stock of asset purchases was increased by £175 billion. In addition, Bank Rate remained at 0.5%. That stance of monetary policy contrasts with the conditioning assumptions underlying the August 2010 projections: the market curve implied a rise in Bank Rate to around 2% by 2013 Q2; and the stock of asset purchases was assumed to remain at £200 billion. The sterling effective exchange rate has also been, on average, a little below that assumed in August 2010. A more stimulative stance of monetary policy has prevented GDP and inflation from being markedly weaker: Bank staff analysis suggests that the level of GDP would have been around 2% weaker, and inflation 1% lower, in 2013 Q2 had monetary conditions followed the path assumed in the August 2010 *Inflation Report*.(1)

Despite this additional stimulus, the shortfall in the level of GDP can be broadly accounted for by the unexpected price pressures and headwinds to demand as discussed in the previous section. And the unexpected strength in inflation can be largely accounted for by developments in imported and energy costs. That suggests that other developments have both weighed on demand, and counteracted the impact of weak demand on inflation in recent years. An obvious candidate, although not the only one, is unexpectedly weak effective supply.

Effective supply

The effective supply capacity of the economy has been boosted by unanticipated rises in labour supply, but that has been more than offset by weak labour productivity since mid-2010. Unexpectedly weak effective supply can explain the resilience of inflation in the face of weak demand.

Labour productivity

Productivity — output produced per hour worked — is a key indicator of the economy's effective supply capacity. Measured labour productivity has fallen since 2010 Q1, whereas in August 2010 it was expected to rise by around 10% by 2013 Q2 (**Chart 12**). That has reflected unusual resilience in employment over a period of weak GDP growth. In addition, surveys have pointed to relatively little spare capacity within companies during the post-crisis period despite the weakness in activity (**Chart 13**). Together with the weakness in measured productivity, that suggests that the effective supply capacity of the economy has been weaker than anticipated, offsetting some of the impact of weak demand on inflation.

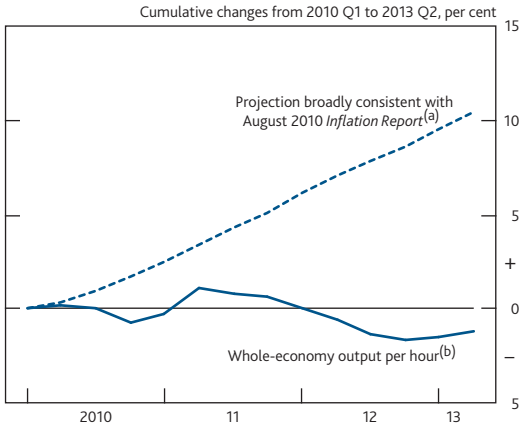
The source of the unanticipated weakness in productivity is not clear.(2) Some of the weakness in productivity has probably been directly related to the general weakness in demand, so that weak demand has not been associated with much additional downward pressure on inflation. Factors such

(1) The impacts of Bank Rate and the exchange rate on GDP and inflation are estimated using COMPASS, the Bank's central forecasting model, and are discussed in more detail on pages 34–35 of Burgess *et al* (2013). The impact of asset purchases is based on the estimates discussed in Joyce, Tong and Woods (2011) — see Table C on page 210. That paper includes a range of estimates for the impact of asset purchases, and the uncertainty around them.

(2) For a discussion of the possible drivers of weak productivity since the financial crisis see Section 3 of the November 2013 *Inflation Report*.

as tight credit conditions and elevated uncertainty have probably also weighed on both demand and supply growth. For example, tight credit conditions are likely to have reduced the effective supply capacity of the economy by impeding the reallocation of resources from less productive businesses towards more productive ones.(1) Weak productivity may also have augmented the adverse demand impact of factors such as tight credit conditions: if companies and households expect the weakness in incomes associated with weak productivity to persist for longer than they did prior to mid-2010, then that may have weighed on spending.

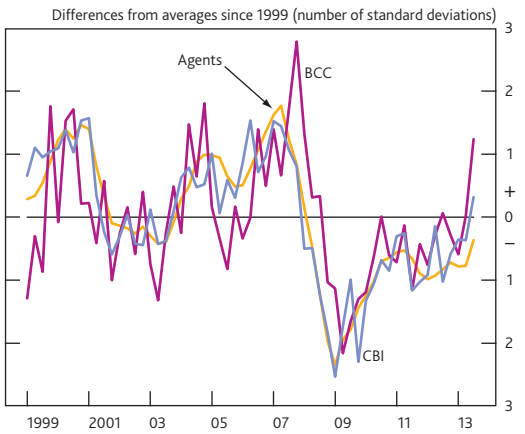
Chart 12 News in labour productivity since mid-2010



Sources: ONS and Bank calculations.

(a) Bank staff projection made in August 2010 that was broadly consistent with the key judgements underlying the MPC's GDP and inflation forecasts.
(b) Calculated using the MPC's GDP backcast published in the November 2013 *Inflation Report*.

Chart 13 Survey indicators of capacity utilisation(a)



Sources: Bank of England, BCC, CBI, CBI/PwC and Bank calculations.

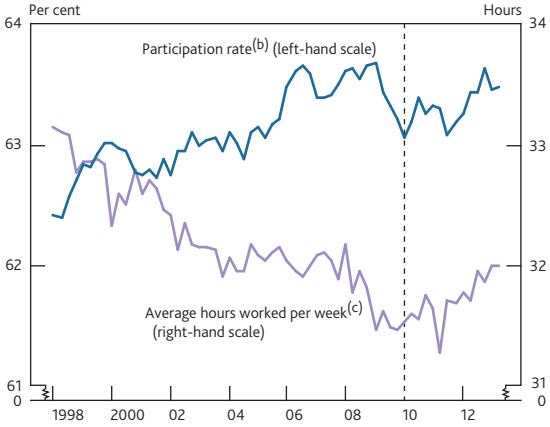
(a) These measures are produced by weighting together survey results from the Bank's Agents (manufacturing and services), the BCC (non-services and services) and the CBI (manufacturing, financial services, business/consumer services and distributive trades) using nominal shares in value added. The BCC data are non seasonally adjusted.

Labour supply

While unanticipated weakness in productivity has reduced the economy's effective supply capacity relative to expectations in August 2010, Bank staff believe that a greater willingness to work, and to work longer hours, has partially offset that weaker productivity.

In August 2010, the labour force participation rate — the proportion of the adult population in work, or actively looking for a job — was expected to decline further, as a rising proportion of the population approached normal retirement age. Instead, the participation rate has risen (**Chart 14**). That is likely to have been a response to the recent squeeze on household incomes; to lower expected future labour and pension income following the financial crisis; and to changes in government benefits in recent years.(2) In addition to greater labour market participation, employees have been working more hours per week than expected. Average weekly hours worked were expected to remain broadly flat, but since mid-2010 have increased by 1.5% (**Chart 14**). A willingness to work longer hours is likely to have been a response to similar factors as those raising participation.

Chart 14 Participation rate and average hours worked per week(a)



Source: ONS (including the Labour Force Survey).

(a) Vertical dashed line is at 2010 Q1, the last full quarter of labour market quantities data available at the time of the August 2010 *Inflation Report*.
(b) Percentage of the 16+ population. Three-month moving average.
(c) Average weekly hours in main job and second job for all workers.

That increase in supply should eventually lead to a proportionate increase in output, but it is not clear how long that will take. For example, businesses may need to invest in additional buildings or equipment before taking on additional workers or offering extra hours. During the adjustment period, the presence of those additional jobseekers, and workers wanting to work more hours, puts downward pressure on labour costs, and inflation. Overall, Bank staff analysis suggests that unexpectedly strong labour supply has raised GDP and reduced inflation since mid-2010. However, the impact of stronger labour supply is likely to have been more than offset by weaker productivity.

(1) Chari, Kehoe and McGrattan (2007) show that in a model where companies have to borrow in advance to pay for some of their inputs, and some firms face difficulties accessing credit, those difficulties can be thought of as equivalent to shocks to total factor productivity. As they note: 'an outside observer who attempted to fit the data generated by the detailed economy with input-financing frictions to the prototype economy would identify the fluctuations in relative distortions [ie credit frictions] with fluctuations in technology… In particular, periods in which the relative distortions increase would be misinterpreted as periods of technological regress'.
(2) Developments in the participation rate since the 2008/09 recession are discussed in more detail in the box on page 27 of the May 2013 *Inflation Report*.

Inflation persistence

As well as unexpected weakness in productivity, it is possible that greater inflation persistence could have partially offset the disinflationary implications of weak demand growth. For example, successive rises in inflation through 2010 and 2011 may have led some households and companies to expect inflation to remain high, despite those rises being largely driven by temporary rises in imported costs. As a result, inflation may have remained persistently higher. One to three-year inflation expectations did rise through 2011, but then fell back, however, and the MPC's current assessment is that medium-term inflation expectations remain sufficiently well anchored.(1)

Conclusions and implications for the MPC's forecasts

This article has discussed the MPC's forecasting performance from mid-2010 to mid-2013. Relative to the MPC's central expectation in August 2010, GDP has been weaker than anticipated and inflation higher. That primarily reflects: unexpectedly weak global activity; the impact of unexpectedly tight credit conditions and heightened uncertainty; and unexpected rises in import and energy costs. Other factors — in particular unexpectedly weak effective supply — are also likely to have played a role in offsetting the impact of unexpectedly weak demand growth on inflation.

The key judgements underpinning the MPC's recent *Inflation Report* projections reflect the experience of the past few years. For example, in the November 2013 *Inflation Report*, global growth was projected to strengthen further, but only gradually. And the share of global demand growth captured by UK exporters was no longer projected to rise. The domestic recovery was seen as increasingly entrenched; nevertheless, GDP was only expected to grow at around its historical average rate over the forecast period, and the associated recovery in productivity growth was expected to occur only gradually. In contrast, GDP and productivity were both expected to grow at above-average rates in August 2010.

(1) For a discussion of the indicators that the MPC uses to monitor developments in inflation expectations, see the box on pages 34–35 of the November 2013 *Inflation Report*.

References

Bank of England (1999), 'The transmission mechanism of monetary policy', paper by the Monetary Policy Committee, April.

Barnett, A and Thomas, R (2013), 'Has weak lending and activity in the United Kingdom been driven by credit supply shocks?', *Bank of England Working Paper No. 482*.

Barwell, R, Thomas, R and Turnbull, K (2007), 'The macroeconomic impact of higher energy prices on the UK economy', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 522–32.

Broadbent, B (2013), 'Forecast errors', available at www.bankofengland.co.uk/publications/Documents/speeches/2013/speech653.pdf.

Buisán, A, Learmonth, D and Sebastiá-Barriel, M (2006), 'UK export performance by industry', *Bank of England Quarterly Bulletin*, Vol. 46, No. 3, pages 308–16.

Burgess, S, Fernandez-Corugedo, E, Groth, C, Harrison, R, Monti, F, Theodoridis, K and Waldron, M (2013), 'The Bank of England's forecasting platform: COMPASS, MAPS, EASE and the suite of models', *Bank of England Working Paper No. 471*.

Chari, V V, Kehoe, P J and McGrattan, E R (2007), 'Business cycle accounting', *Econometrica*, Vol. 75, No. 3, pages 781–836.

Elder, R, Kapetanios, G, Taylor, T and Yates, T (2005), 'Assessing the MPC's fan charts', *Bank of England Quarterly Bulletin*, Vol. 45, No. 3, pages 326–48.

Gertler, M and Karadi, P (2011), 'A model of unconventional monetary policy', *Journal of Monetary Economics*, Vol. 58, pages 17–34.

Haddow, A, Hare, C, Hooley, J and Shakir, T (2013), 'Macroeconomic uncertainty: what is it, how can we measure it and why does it matter?', *Bank of England Quarterly Bulletin*, Vol. 53, No. 2, pages 100–09.

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.

Nixon, D and Smith, T (2012), 'What can the oil futures curve tell us about the outlook for oil prices?', *Bank of England Quarterly Bulletin*, Vol. 52, No. 1, pages 39–47.

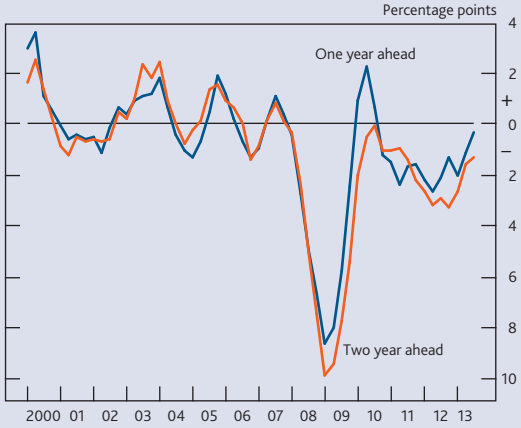
Stockton, D (2012), 'A review of the Monetary Policy Committee's forecasting capability'. Report by David Stockton presented to the Court of the Bank of England, October 2012, available at www.bankofengland.co.uk/publications/Documents/news/2012/cr3stockton.pdf.

Villa, S and Yang, J (2011), 'Financial intermediaries in an estimated DSGE model for the United Kingdom', *Bank of England Working Paper No. 431*.

Statistical properties of the MPC's forecasts

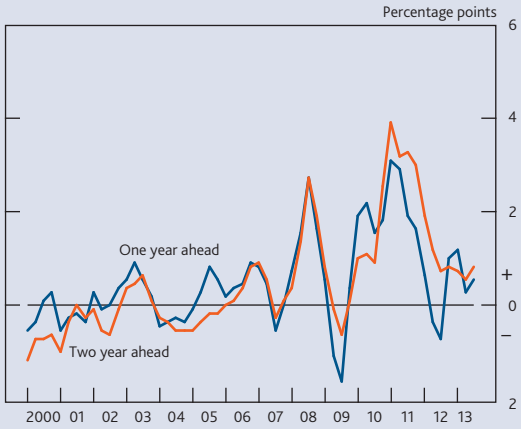
Since the start of the financial crisis, outturns have differed from the MPC's central forecasts by more than was the case pre-crisis. Relative to the MPC's mean forecasts, since 2007 outturns for four-quarter GDP growth have been disproportionately below expectations (**Chart A**), and inflation outturns above expectations (**Chart B**). This contrasts with the pre-crisis period when growth and inflation outturns were closer to expectations.

Chart A Four-quarter GDP growth forecast, outturn less MPC's mean forecast(a)



(a) Calculated for the market rate fan charts published since February 1998. The means of the fan chart distributions have been adjusted by 0.3 percentage points where applicable, to reflect the effects of methodological changes implemented in the 2011 edition of the *Blue Book*.

Chart B Inflation forecast, outturn less MPC's mean forecast(a)



(a) Calculated for the market rate fan charts published since February 1998. Inflation fan charts refer to RPIX inflation up to November 2003 and CPI inflation thereafter.

This box considers whether the MPC has systematically over or underpredicted GDP growth and inflation since the Bank received operational independence for monetary policy in 1997. It draws heavily on previous Bank work.(1) As discussed in a recent speech by Ben Broadbent (an external member of the MPC), this sample may be too small to draw strong conclusions from, given economic uncertainty.(2) But if there is evidence of outturns differing systematically from the MPC's forecasts, that could suggest that judgements underpinning those forecasts have been repeatedly too optimistic or pessimistic.

This box considers forecasts at both one quarter and longer horizons. One quarter ahead forecasts are informed by leading GDP and inflation indicators. Forecasts at longer horizons depend far more on MPC judgements about how the economy is likely to develop.(3)

Assessing the mean projection

This section assesses one quarter and one year ahead MPC forecasts for GDP and inflation against outturns. GDP outturns are defined as the first time a quarter is released in the Quarterly National Accounts.(4) Forecasting performance is evaluated using the following, well-established criteria:(5)

(a) The forecast should be in line with outturns, on average (implying no bias).
(b) It should not be possible to improve the accuracy of the forecasts by rescaling them (called 'weak efficiency').
(c) Nor should it be possible systematically to use other information, available to the forecaster at the time, to improve forecast accuracy (called 'strong efficiency').

MPC forecasts can be assessed against these criteria by estimating various regression equations. Y_t is defined as the variable being forecast and Y_t^{t-i} represents the mean projection of that variable, i quarters ahead of time t. We define the difference between an i quarter ahead forecast and outturn as $e_t^{t-i} = Y_t - Y_t^{t-i}$, and u_t is a zero-mean error term.

To test for bias, (a), we estimate the regression:

$$e_t^{t-i} = \alpha + u_t \quad (1)$$

unbiasedness requires $\alpha = 0$.

For (b), a joint test of bias and weak efficiency we estimate:

$$Y_t = \alpha + \beta Y_t^{t-i} + u_t \quad (2)$$

unbiasedness requires $\alpha = 0$ and weak efficiency requires $\beta = 1$.

For a joint test of bias and strong efficiency, (c), we estimate:

$$Y_t = \alpha + \beta Y_t^{t-i} + \gamma Z_t + u_t \quad (3)$$

where Z_t is a single additional indicator available to the forecaster at time t. Strong efficiency implies that $\alpha = 0$, $\beta = 1$ and $\gamma = 0$.

One quarter ahead mean projections

In forming its policy decision, the MPC places most weight on forecasts for medium-term growth and inflation. But the one

quarter ahead forecast is important for helping the MPC assess the shocks affecting the economy. If data outturns for a given quarter differ starkly from the MPC's expectations one quarter earlier, this could change how the MPC thinks about its medium-term projections. And if data outturns are repeatedly higher or repeatedly lower than forecast — that is, appear serially correlated — that could imply that the MPC has not altered the way it forms forecast judgements sufficiently quickly.

The results of these tests, using the 64 independent one quarter ahead forecasts published by the MPC, are reported in **Table 1**. The probability of not rejecting the tested hypothesis is reported in parentheses. A higher probability is associated with there being less statistically significant evidence to reject the hypothesis. Figures are presented in bold if we find no statistically significant evidence, at the 5% level, for bias or forecasts being weakly or strongly inefficient.

Table 1 Regression results on one quarter ahead projections[(a)(b)(c)]

	Hypothesis	Inflation	Quarterly GDP growth[(d)]
Bias	$\alpha = 0$	**0.0 (0.58)**	**-0.1 (0.13)**
Weak efficiency	$\alpha = 0$	0.2 (0.01)	**-0.1 (0.12)**
	$\beta = 1$	0.9 (0.01)	**1.0 (0.52)**
Strong efficiency[(e)]	$\gamma = 0$		
(i) Previous outturn less expectation		**-0.1 (0.26)**	0.4 (0.00)
(ii) Previous outturn		**0.0 (0.94)**	-0.2 (0.04)
(iii) Change in exchange rate		**0.0 (0.30)**	**0.0 (0.26)**
(iv) CIPS business activity index			1.2 (0.00)
(v) Import prices		**0.0 (0.41)**	

(a) For mean projection based on market expectations for interest rates. RPIX forecasts made between August 1997 and November 2003, CPI forecasts made between February 2004 and May 2013. GDP forecasts made between August 1997 and May 2013.
(b) Figures are in bold if the p-value associated with each test (in parentheses) is greater than 0.05, or in other words if at the 95% confidence level, there is no significant evidence that projections are biased or inefficient.
(c) Each indicator is included in a separate regression. We do not report the constant and coefficient on expectations in this table, for brevity. Where the indicator shows evidence for statistical significance, the significance of the estimates for α and β are the same as for weak efficiency.
(d) Using real-time GDP data, including the Bank's estimates for past growth since November 2007, as these most closely relate to forecasts made at that time.
(e) Using real-time data for previous outturn, forecast and import price inflation, as these were available at the time the forecast was made.

These results provide evidence that the one quarter ahead inflation forecasts have been weakly inefficient. This has become more apparent since the start of the crisis, based on an F-test for a structural break.[(6)] This could reflect the especially large movements in oil and utility prices since 2007, which have tended to be reflected in consumer prices quickly.

The tests for bias in quarterly GDP growth one quarter ahead do not show statistically significant evidence for bias or weak inefficiency. There is evidence that including the previous quarter's information on outturns, or placing greater weight on the business output survey, would have improved the accuracy of the forecasts. An F-test does not show significant evidence of a deterioration in the one quarter ahead forecast since the start of the crisis period.

One year ahead mean projections

Forecasts at longer horizons are underpinned by sets of forecast judgements. Where outturns differ from the forecast at these longer horizons it could reflect either one or more of these judgements evolving differently to expected.

When testing for the bias and efficiency of medium-term forecasts, it is important to control for serial correlation. This is because a difference in any given quarter will affect four consecutive quarters of one year ahead forecasts: individual forecasts are not independent. In order to control for this, lagged differences between expectations and outturns for the previous three quarters are included in regressions **(1)**, **(2)** and **(3)**.

As with the one quarter ahead forecasts, there is statistically significant evidence for bias and weak inefficiency in the one year ahead inflation forecasts. But this is not the case for the GDP forecasts. The evidence does not suggest that including business activity index outturns for the exchange rate or import price inflation at the time of making the forecasts would have improved forecasting performance. Therefore, these results do not suggest that the one year ahead forecasts are strongly inefficient.

Table 2 Regression results on one year ahead projections[(a)(b)(c)]

	Hypothesis	Inflation	GDP growth[(d)]
Bias	$\alpha = 0$	**0.2 (0.06)**	**-0.2 (0.09)**
Weak efficiency	$\alpha = 0$	1.6 (0.00)	**0.6 (0.21)**
	$\beta = 1$	0.3 (0.0)	**0.7 (0.08)**
Strong efficiency[(e)]	$\gamma = 0$		
(i) Change in exchange rate		**0.0 (0.91)**	**0.0 (0.93)**
(ii) CIPS business activity index			**0.62 (0.44)**
(iii) Import prices		**0.0 (0.19)**	

(a) For mean projection based on market expectations for interest rates. RPIX forecasts made between August 1997 and November 2003, CPI forecasts made between February 2004 and May 2012. GDP forecasts made between August 1997 and May 2012.
(b)–(e) See footnotes (b) to (e) of **Table 1**.

One reason why outturns may differ repeatedly from expectations is if the MPC is uncertain about the nature of a shock: in this case it may adjust its forecasts only gradually in response to changes in economic indicators. After the series of shocks affecting the economy, and their impact, are fully appreciated, central forecasts may appear consistently too optimistic or pessimistic. But, *ex ante*, based on a small number of data outturns, to revise dramatically key judgements might have been too reactive.

Assessing forecast revisions

An alternative approach to test for the efficiency of a forecast is to examine the revision properties of GDP growth and inflation forecasts. Forecast revisions are changes made to the forecast for a given quarter, so unlike differences between

outturns and forecast, should not be susceptible to serial correlation.

The information on forecast revisions is used to test for efficiency in two ways. First, we test whether, for a given quarter, previous revisions to the MPC forecast for that quarter can be used to predict subsequent revisions. Intuitively, if the final revision to a forecast is predictable, it could be argued that the MPC could have improved its forecast for that quarter sooner.

To test whether earlier revisions to a projection for a given quarter contain information about the final revision, we estimate:

$$Y_t^{t-1} - Y_t^{t-2} = \alpha + \sum_{i=1}^{6} \beta_i \left(Y_t^{t-i} - Y_t^{t-i-1}\right) + \varepsilon_t \qquad (4)$$

There is little significant evidence of predictability in the revisions for a given quarter's inflation or GDP forecast (**Table 3**). As an example, for GDP growth in 2013 Q3, which was released in October, the change made to that quarter's forecast between the May and August 2013 *Inflation Reports* was not significantly related to the revision made between the February and May *Inflation Reports*.

Table 3 Tests for predictability of forecast revisions[a][b]

Forecast horizon	Inflation	GDP growth
Constant α	**0.1 (0.16)**	**0.0 (0.50)**
Two quarters ahead revision β_1	**0.2 (0.24)**	**0.2 (0.06)**
Three quarters ahead revision β_2	**-0.2 (0.18)**	**0.0 (0.87)**
Four quarters ahead revision β_3	**0.0 (0.75)**	**0.1 (0.44)**
Five quarters ahead revision β_4	**-0.2 (0.11)**	**0.1 (0.59)**
Six quarters ahead revision β_5	**-0.1 (0.34)**	**0.0 (0.97)**

(a) Mean projection based on market expectations for interest rates published between August 1998 and May 2013. For inflation, we adjust RPIX forecasts covering the period 2004 Q1 to 2005 Q4 down by ¾ of a percentage point in order to make the inflation measures comparable. ¾ of a percentage point was the assumed wedge between the RPIX and CPI inflation measures at the time of the change in the inflation target — see the box on page 36 of the February 2004 *Inflation Report*.
(b) Figures are in bold if the p-value associated with each test (in parentheses) is greater than 0.05.

Second, we test whether past forecast revisions *i* quarters ahead of the first publication of the outturn can explain revisions to subsequent quarters. To test *i* quarter ahead forecast revisions, we estimate:

$$Y_t^{t-1} - Y_t^{t-2} = \alpha + \beta_1 \left(Y_{t-1}^{t-i} - Y_{t-1}^{t-i-1}\right) + \beta_2 \left(Y_{t-2}^{t-i} - Y_{t-2}^{t-i-1}\right) + \varepsilon_t \qquad (5)$$

for $i = 1,2,..,6$.

Table 4 reports the joint significance of the coefficients in the regressions using an F-test, with a higher test statistic indicating less evidence of predictability of forecast revisions.

Table 4 F-tests for predictability of forecast revisions[a][b][c]

Forecast horizon	Inflation	GDP growth
Six quarters ahead	**0.30**	**0.28**
Five quarters ahead	**0.24**	**0.09**
Four quarters ahead	0.0	**0.06**
Three quarters ahead	0.02	**0.14**
Two quarters ahead	**0.05**	0.03
One quarter ahead	**0.41**	**0.07**

(a) Mean projection based on market expectations for interest rates published between August 1998 and May 2013. For inflation, we adjust RPIX forecasts covering the period 2004 Q1 to 2005 Q4 down by ¾ of a percentage point so that they are on a comparable inflation measure. ¾ of a percentage point was the assumed wedge between the RPIX and CPI inflation measures at the time of the change in target. See the box on page 36 of the February 2004 *Inflation Report*.
(b) Figures are in bold if the p-value associated with each test is greater than 0.05.
(c) We stop at six quarters ahead as we require three earlier forecasts of the same event. Forecasts made up to February 2004 had only eight forecast quarters.

The results suggest that, for both GDP and inflation there is no strong evidence suggesting serial correlation in forecast revisions. In other words, MPC forecasts have not tended to be revised in a predictable way.

Conclusions

Since the onset of the financial crisis, outturns for GDP growth and inflation have been further from the MPC's mean expectations than in the pre-crisis period. In general, the results presented in this box suggest that, since 1997, the MPC's forecasts did not systematically miss the insights from widely available economic indicators. This is true both in the near term and at longer horizons. But there is some evidence that the MPC has been slow to incorporate new information, and that this has become more acute since the start of the financial crisis. One quarter ahead inflation forecasts show some evidence of being inefficient. But this probably reflects large changes in commodity prices over the crisis period, which feed through quickly to inflation.

(1) The analysis in this box draws heavily on the work in Elder *et al* (2005).
(2) See Broadbent (2013).
(3) The MPC's latest key judgements are set out on page 38 of the November 2013 *Inflation Report*.
(4) We use the Quarterly National Accounts (QNA) vintage of data, because the ONS receives a substantial amount of information between the first time a data point is released and QNA, so the QNA is likely to be more comparable with our forecast.
(5) The criteria are set out on page 333 of the Autumn 2005 *Bulletin*.
(6) For this test, we estimate equation (b) over the sample up to and including 2007 Q2, and then over the sample from 2007 Q3 to 2013 Q2. We use a Chow test to identify structural breaks in the relationship.

The financial position of British households: evidence from the 2013 NMG Consulting survey

By Philip Bunn and May Rostom of the Bank's Structural Economic Analysis Division, Silvia Domit and Nicola Worrow of the Bank's Monetary Assessment and Strategy Division and Laura Piscitelli of the Bank's Market Sectors and Interlinkages Division.

This article examines recent developments in household balance sheets using disaggregated data from an annual survey carried out by NMG Consulting on behalf of the Bank.

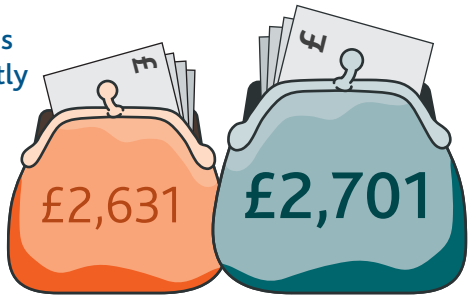
Key findings from the 2013 survey

Household debt levels remain high by historical standards...

£87,000
Average outstanding mortgage

(Broadly unchanged from 2012)

...and monthly pre-tax incomes increased slightly on a year ago.



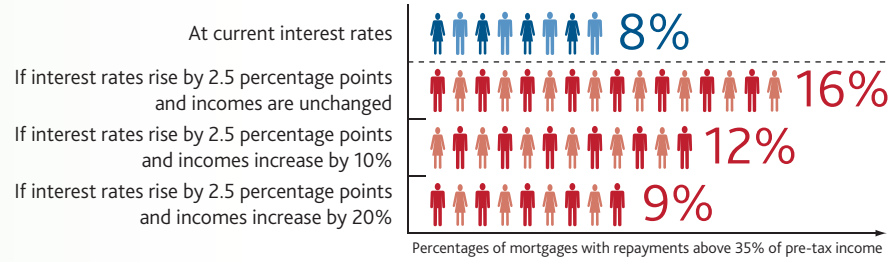
With spending decisions less affected by debt levels...

(Down from 35% in 2012)

...and also less affected by credit conditions than a year ago.

put off spending due to credit availability concerns
(Down from 26.3% in 2012)

However, a rise in interest rates would increase the number of households with high mortgage repayments relative to income — although the scale of the impact will depend on how much incomes pick up.

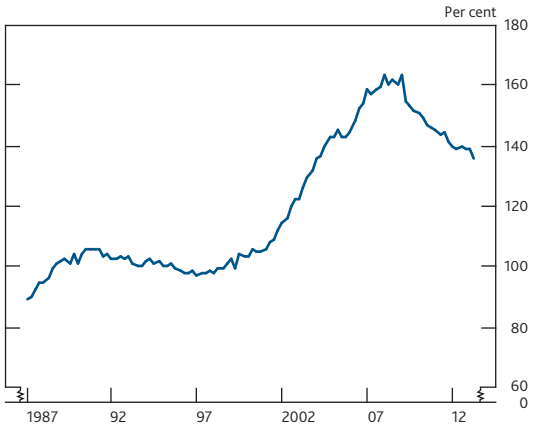


Introduction

The financial position of households has implications for both monetary and financial stability. The ease and cost of access to new borrowing affects households' ability to bring forward spending, and high debt levels can make household consumption more sensitive to shocks such as unexpected changes to their income. Also, households' ability to service their debts, and the extent to which they find debts a burden can have important implications for the stability of the financial system.

The stock of household debt rose substantially in the decade before the financial crisis, but has since flattened off. The debt to income ratio rose from around 100% in the 1990s to a peak of around 160% in 2008 (**Chart 1**). This can be largely accounted for by the rise in house prices over this period.

Chart 1 Household debt to income ratio(a)



Sources: ONS and Bank calculations.

(a) Total financial liabilities as a percentage of annualised total household resources.

Since 2008, the debt to income ratio has fallen back to around 140%, which reflects a broadly flat stock of debt combined with modest growth in nominal incomes. In part, the stabilisation of debt is likely to be related to a tightening in credit conditions since the onset of the financial crisis. That has prevented households from taking on as much debt as they otherwise would have done, for example because fewer households have entered the housing market. But lower house prices may also have played a role in explaining why the stock of household debt has stopped increasing.

Disaggregated survey data are a useful source of information about how households with different characteristics are adjusting their balance sheets following the financial crisis. Survey responses can also shed light on the drivers of observed household behaviour, as well as on the future sustainability of balance sheet positions.

Between 12 and 30 September 2013, NMG Consulting carried out an online survey of around 6,000 UK households on behalf of the Bank and asked them a range of questions about their finances. This is the eleventh annual survey on household finances that the Bank has commissioned from NMG Consulting.(1) As in previous surveys, households were asked a range of questions about their income, debt, credit conditions, uncertainty and saving.

The 2013 survey was the first to contain a substantial longitudinal element: that is, the ability to observe the same households at more than one point in time. Around 2,400 respondents from the 2012 survey were included in the 2013 survey. Tracking the same households through time is particularly useful for analysis because it removes the possibility that differences in results across years reflect differences in the sample. The results reported in this article are from the entire cross-sectional data set (which includes both returning and new respondents) unless stated, although in most cases the cross-sectional and longitudinal data lead to similar conclusions. The box on page 353 contains further details on the survey methodology and the longitudinal data set.

This article examines recent developments in household balance sheets using disaggregated data from the NMG survey and considers the implications for monetary policy and financial stability. It is structured as follows: it starts by summarising the latest data on the level and distribution of household debt, as well as debt-servicing costs and sustainability. It then goes on to discuss the extent to which households are concerned about debt and how they have responded to those concerns. The final section looks at households' ability to access new borrowing. Evidence from the survey on developments in household saving is covered separately in a box on page 354.

Debt levels and distribution

On average, mortgage debt levels were little changed over the past year, although the level of debt remains relatively high by historical standards. Households reported that the average outstanding mortgage was around £87,000, broadly unchanged from the 2012 survey. The survey results are in line with official data, which also suggest that the outstanding stock of secured debt held by UK households was little changed over the year to 2013 Q3, as it has been since 2008.

The distribution of mortgage debt across UK households remained wide in 2013. For instance, while 47% of households had a debt to income ratio of less than 2 in 2013, 16% had a ratio above 4. These proportions are similar to a

(1) The results of each year's survey have been reported in the *Quarterly Bulletin*. See Bunn *et al* (2012) for details of the 2012 survey.

Survey method

Introduction and methodology

This year, the NMG survey was carried out entirely online over the period between 12 and 30 September, covering around 6,000 households. 2013 is the second year that the main survey has been carried out online,(1) but is the first year in which there has been no parallel face-to-face survey.

Self-administered online surveys have a number of advantages over traditional face-to-face methods. The most significant of these is increased disclosure, since asking households questions in a less time-pressured situation without the presence of an interviewer may encourage information about sensitive issues, such as those related to household finances, to be disclosed more accurately.(2) It may also allow for increased accuracy in the information, for example an individual may check a pay slip to give an exact measure of their personal income. Online surveys also make it easier and cheaper to cover a larger sample, something which greatly improves the reliability of results.

In previous years, financial values have been reported in ranges in the survey. A new approach was trialled this year by asking new respondents to enter actual amounts rather than selecting bands. Returning respondents from the 2012 survey (see below for details) were still given ranges to choose from to ensure comparability across the two years.

For the purpose of consistent analysis in this article, the point estimates for new respondents were then converted into bands. Therefore, to calculate ratios, such as a debt to income ratio, the mid-point of the relevant band was taken, thus reducing the impact of any extreme outliers. Asking for point estimates could increase the accuracy of responses, for example, it may encourage respondents to think more carefully when asked to enter an actual saving amount rather than simply choosing a band. But it does potentially mean that a small number of high observations can have a large impact on the average values: for example, average income and saving appear higher when calculated using point estimates rather than band mid-points.

The longitudinal element

Conducting the survey online has facilitated the introduction of a longitudinal element, allowing some of the same households to be easily sampled from one year to the next. All 4,003 respondents from the 2012 online survey were invited to complete this year's survey and a total of 2,354 returned. Using the same sample allows changes in responses to be tracked without the influence of sampling. That is, observed changes in the responses can be taken as genuine rather than simply reflecting differences in the households sampled.

The longitudinal data can also be used to examine distributional changes, for example whether the same households are uncertain about future income from one year to the next or whether it tends to be different households at different points in time.

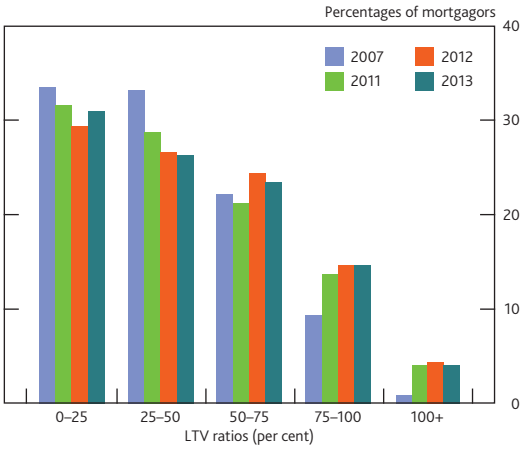
One drawback of the longitudinal data is that certain types of households may be more likely to return to the survey than others. For example, older households appear to be more likely to remain in the survey: those aged over 55 made up almost half of the sample in the longitudinal data in 2013, compared with around a third in the cross-sectional sample.

(1) This followed successful online pilots in 2010 and 2011.
(2) Dayan, Paine Schofield and Johnson (2007) find that disclosure levels to sensitive questions were higher in online surveys.

year ago. Fifteen per cent of mortgagors reported a loan to value (LTV) ratio of between 75% and 100%, while 4% were in negative equity, also broadly unchanged relative to 2012 (**Chart 2**). But the current distribution of LTV ratios remains different to before the financial crisis. In particular, the proportion of households with high LTV mortgages (including those in negative equity) is now higher.

In contrast, unsecured debt holdings increased over the past year, according to the NMG survey. For those with unsecured debt, the average amount outstanding rose from £5,400 in 2012 to £6,300 in 2013. But the increase was much smaller for returning respondents (around £150). Even so, a pickup in unsecured borrowing is consistent with official data, which show that net unsecured lending to individuals, excluding student loans, rose by 4.7% in the year to October 2013.

Chart 2 Distribution of loan to value ratios on mortgagors' outstanding debt(a)



Sources: NMG Consulting survey and Bank calculations.

(a) Refers to mortgage debt owed on households' primary residences only. Results reported for 2011 to 2013 are from the online survey and results for 2007 are from the face-to-face survey.

Household saving

The outlook for household spending depends, in part, on the evolution of saving. There are many influences on household saving decisions, including balance sheet pressures, credit conditions and economic uncertainty. The NMG survey can shed light on what has happened to saving over the past year, expectations for saving over the coming year and on the reasons behind those decisions. These are discussed in turn below.

Households reported an increase in their saving over the past year. Among returning respondents, average monthly saving rose from £196 in 2012 to £255 in 2013, while the average saving ratio increased from 6.6% to 8%. Saving ratios increased for all age groups except those aged 25–34, with the largest increases being for the 18–24 group (**Chart A**).

Chart A Saving ratio by age group[a][b]

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'In general over the past year, how much of your household income would you say that you put aside as savings each month (eg put into savings accounts or other assets, but excluding money paid into pensions)?'.
(b) Excludes households whose minimum possible saving exceeds their maximum possible pre-tax income. The saving ratio is defined as monthly saving divided by monthly pre-tax income. Calculations are based on households who responded in both 2012 and 2013.

The increases in saving reported in the NMG survey are somewhat puzzling and are at odds with the National Accounts saving ratio, which has fallen over the past year. They are also at odds with some other elements of the survey; for example, fewer households said that tight credit conditions or concerns about debt have held back spending than in 2012. But uncertainty about future income has not fallen, which could have encouraged some households to save more. Official data show that households have increased their holdings of bank deposits over the past year — consistent with the NMG survey asking specifically about money put aside into savings accounts. One possible reconciliation of the puzzle that households are seemingly both spending more and saving more in bank accounts is that unsecured borrowing, which has increased over the past year, is helping to finance spending.

Households reported that they plan to increase their saving over the next year: 31% of households were planning to increase saving, while 11% were planning to decrease it.[1] Holding income constant, that would add a further 0.8 percentage points to the average saving ratio. Younger households account for the largest proportion of those reporting that they plan to increase saving over the next year.

Saving for a big item, reducing debt and other personal commitments were the most commonly cited reasons why households plan to save more over the next year (**Table 1**). The share of households citing saving for retirement grew by 5 percentage points on the year, which was almost entirely driven by 35 to 44 year olds. In contrast, reducing debt and saving for a deposit were less common reasons for wanting to save more than in 2012. Fewer households wanting to save to reduce debt is consistent with them becoming more comfortable with the state of their balance sheets.

Among those households that expected to reduce their saving over the coming year, most expected to be forced to save less because of the higher cost of living or lower income (**Table 2**).

Table 1 Reasons cited by households planning to increase monthly saving over the next year[a][b]

Percentages of households

	2011	2012	2013
Saving for big item	38	36	39
Reduce debts	27	34	30
Personal commitments	24	26	26
Saving for a house deposit	22	27	22
Increased income	19	22	20
Retirement	17	14	19
Worried about redundancy	15	12	11
Worried about interest rate rises	8	8	8
Future tax rises	8	6	6
Euro-area developments[c]	n.a.	6	5
Less guaranteed monthly income	3	5	5
Lower mortgage repayments	7	5	4
Value of assets fallen	4	2	2

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'What would you say are the main factors driving this increase?'.
(b) Percentages of households that are planning to increase saving. Columns sum to greater than 100 as respondents were able to select up to four choices.
(c) This option was introduced in the 2012 survey.

Table 2 Reasons cited by households planning to decrease monthly saving over the next year[a][b]

Percentages of households

	2011	2012	2013
Higher cost of essentials	43	57	46
Lower income	37	39	42
Low interest rates	18	23	24
Bought the item was saving for	16	11	15
Have enough savings	9	10	11

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'What would you say are the main factors driving this decrease?'.
(b) Percentages of households that are planning to decrease saving. Columns sum to greater than 100 as respondents were able to select up to four choices.

(1) This excludes those households who answered 'don't know' or 'prefer not to state'.

Income and debt-servicing costs

Alongside debt levels, developments in income are a key factor affecting the sustainability of household debt. Results from the NMG survey suggest that nominal incomes have increased modestly over the past year (**Table A**), in line with official data. The average pre-tax income of returning respondents rose by around 3%, while 'available' income — that is, income left over after paying tax, national insurance, housing costs, loan payments and utility bills — increased by 1.5%.

Table A Monthly household income by housing tenure[a][b]

	Outright owners	Mortgagors	Renters	Total
Percentage of households	42	30	26	100
Income statistics				
Mean monthly pre-tax income (£s)	2,665	3,420	2,001	2,701
Mean monthly available income (£s)	827	776	434	701
Change in mean pre-tax income (per cent)[c]	1.7	3.2	4.8	2.7
Change in mean available income (per cent)[c]	1.1	2.8	1.7	1.5

Sources: NMG Consulting survey and Bank calculations.

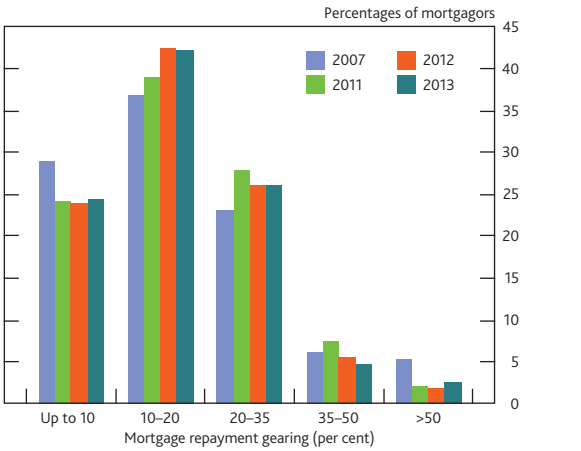
(a) Questions: 'What is the total annual income of the whole of your household, before anything is deducted for tax, national insurance, pension schemes etc?' and 'How much of your monthly income would you say your household has left after paying tax, national insurance, housing costs (eg rent, mortgage repayments, council tax), loan repayments (eg personal loans, credit cards) and bills (eg electricity)?'.
(b) Calculations are based on households who responded in both 2012 and 2013 and exclude households who reported available income greater than pre-tax income. 'Total' includes income of households who chose to not report their housing tenure.
(c) Relative to 2012 NMG survey.

Overall, the modest rise in nominal income was a little less than households had expected a year ago: income was in line with expectations for two thirds of respondents, but a net balance of around 10% of households received less than they had anticipated. The increase in nominal incomes over the past year varied across households. Renters saw faster growth in pre-tax income than homeowners, but their available income rose in line with the average across households. This suggests that renters might have experienced larger increases in housing costs.

With little change in debt levels and mortgage rates and a modest rise in income, average mortgage debt-servicing costs remained broadly unchanged over the past year. Among returning mortgagors, 'repayment gearing' — or mortgage repayments as a share of pre-tax income — fell slightly to 17% in 2013, from 18% in 2012. There were also few changes in the distribution of mortgage repayment gearing. The percentage of mortgagors with mortgage payments in excess of 35% of their income was unchanged at 8%, although that is a little lower than in 2011 and significantly lower than the 11% in the 2007 survey (**Chart 3**).

Higher unsecured debt holdings have led to some increases in debt-servicing costs. Average unsecured repayment gearing rose from 9% in 2012 to 11% in 2013, although it did fall slightly for returning respondents. The survey also suggests that more renters now have high unsecured debt-servicing costs: the percentage with gearing above 20% rose back to levels last seen before the crisis, up from 10% in 2012 to 14% in 2013 (**Chart 4**).

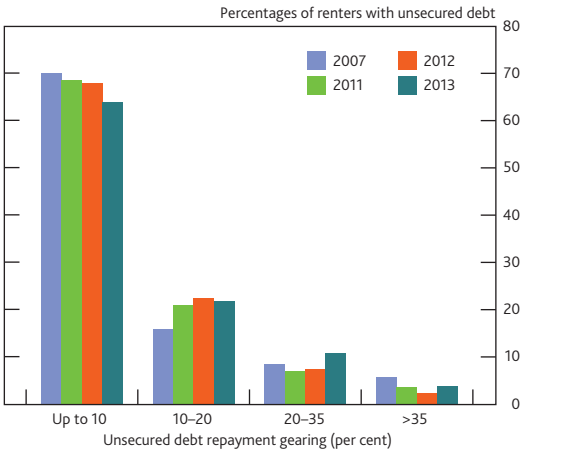
Chart 3 Mortgage repayment gearing[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Mortgage repayment gearing is calculated as total mortgage payments (including principal repayments) as a percentage of pre-tax income. Calculation excludes those whose reported gearing exceeds 100%. Reported repayments may not account for endowment mortgage premia. Results reported for 2011 to 2013 are from the online survey and results for 2007 are from the face-to-face survey.

Chart 4 Unsecured debt repayment gearing[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Unsecured debt repayment gearing is calculated as total unsecured debt payments (including principal repayments) as a percentage of pre-tax income. Calculation excludes those whose reported gearing exceeds 100%. Results reported for 2011 to 2013 are from the online survey and results for 2007 are from the face-to-face survey.

The impact of a rise in interest rates

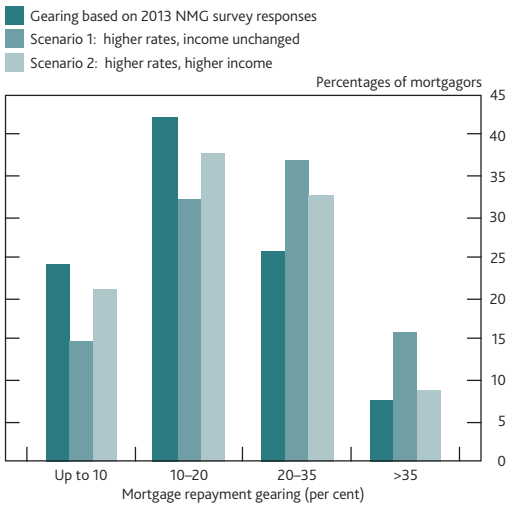
Higher interest rates would increase debt-servicing costs for households, but the extent to which that may pose problems for households in the future will depend on how much incomes increase before rates rise. Based on households' responses to a number of survey questions, it is possible to outline stylised scenarios that quantify the potential impact of a given rise in interest rates on household mortgage repayment gearing under different assumptions for income growth.

In this section, two thought experiments are considered. In the first, monthly mortgage payments reported in the NMG survey are assumed to increase in line with a 2.5 percentage point rise in effective mortgage interest rates, while incomes remain as reported in the survey.(1) In the second experiment, monthly mortgage payments are increased by the same amount, but nominal incomes are also assumed to increase relative to the levels reported by the survey respondents.(2)

The scenarios assume full pass-through of interest rate rises to all mortgagors and therefore the results could be overestimating the true effects. Indeed, households on fixed-rate contracts would not be immediately affected by a rate rise. But with many of those fixed-rate deals only lasting two to three years, these households too would eventually be affected. Also, the stock of debt is assumed to remain unchanged in all cases. The scenarios do not consider the impact on savers without debt, who would be better off if interest rates increased.

In the first experiment, a 2.5 percentage point increase in the interest rate each household is paying on its mortgage (without an increase in income) is estimated to increase average mortgage repayment gearing from its current level of 21% to around 28%. And, relative to results reported in the latest survey, the proportion of vulnerable mortgagors with repayment gearing above 35% of their income would roughly double, to around 16% of mortgagors (**Chart 5**).(3)

Chart 5 Sensitivity of the distribution of mortgage repayment gearing to higher interest rates(a)

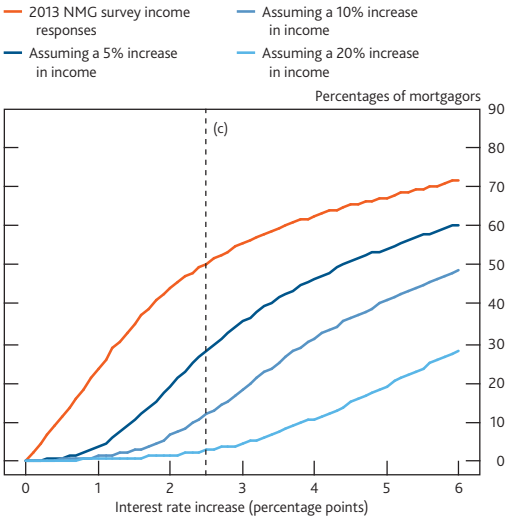


Sources: NMG Consulting survey and Bank calculations.

(a) The mortgage repayment gearing distribution based on the 2013 NMG survey responses replicates the one in **Chart 3**. 'Scenario 1' denotes the distribution under an assumed 2.5 percentage point increase in interest rates with income unchanged from its current level. 'Scenario 2' denotes the distribution under both an assumed 2.5 percentage point interest rate increase and a 20% income rise. The two scenarios assume full pass-through of higher interest rates to all mortgagors. The assumptions listed in footnote (2) also apply.

The survey also asks households about how much their monthly mortgage payments could rise without them having to take some kind of action such as cutting spending or working longer hours. From the responses provided (which are given as amounts in sterling) and the reported mortgage payments, it is possible to calculate how many mortgagors believe they would have to take action for different-sized increases in interest rates, **assuming no change to incomes**. This is shown by the orange line in **Chart 6**: if rates were to rise by 2.5 percentage points, then around 50% of mortgagors (accounting for about one quarter of total mortgage debt) would have to respond. As mentioned earlier, these estimates could overstate the true impact since they assume that all mortgagors — both on fixed and variable rates — would be immediately affected by the full interest rate rise.

Chart 6 Percentage of mortgagors that would need to respond if interest rates were to increase(a)(b)



Sources: NMG Consulting survey and Bank calculations.

(a) Question asked to mortgagors with discounted, base rate tracker or standard variable-rate mortgages: 'The interest payment on mortgages is often linked to the official interest rate set by the Bank of England. If the rate was to increase, your monthly payments would also increase. About how much do you think your monthly mortgage payments could increase for a sustained period without you having to take some kind of action to find the extra money eg cut spending, work longer hours, or request a change to your mortgage?' Households on fixed/capped rate mortgages were asked the following question: 'Although your monthly mortgage payments are currently [fixed/capped] we would like to understand the impact if your payments were to increase tomorrow. About how much do you think your monthly mortgage payments could increase for a sustained period without you having to take some kind of action to find extra money eg cut spending, work longer hours, or request a change to your mortgage?' The answers were provided in pounds.
(b) Households are defined as having to take action if the additional mortgage payments from higher interest rates (calculated using information on the size of the current outstanding mortgage) exceed the income available to meet higher mortgage payments. The scenario lines use the same calculation but assume that monthly disposable incomes are increased in line with a 5%, 10% or 20% increase in annual pre-tax income, compared to the NMG survey responses.
(c) Denotes a 2.5 percentage point increase in interest rates.

(1) A 2.5 percentage point increase in effective mortgage rates would take them back to 2007 levels. Lending rates facing households can be decomposed into two components, Bank Rate and a spread over Bank Rate. The 2.5 percentage point rise in interest rates considered in these experiments could therefore reflect a 2.5 percentage point increase in Bank Rate with the average spread being unchanged, or a larger rise in Bank Rate and a fall back in the spread from its current elevated level. See Button, Pezzini and Rossiter (2010) for a discussion of the factors affecting the price of new lending to households and the November 2013 *Inflation Report* for a discussion of recent developments in credit conditions.
(2) These simulations were conducted under a specific set of assumptions: they use only responses of those households in the survey that have a mortgage; do not assume any transition between renter and mortgagor status; assume that the stock of debt remains unchanged; and that mortgagors are affected by the full extent of the interest rate and income increases.
(3) The 35% threshold is an indicator of households who are most at risk of financial distress.

The impact of higher interest rates on household finances would be much less severe if incomes also rose significantly. Results from the second thought experiment show that if a 2.5 percentage point rise in interest rates were accompanied by an increase in pre-tax nominal income as large as 20%, then the estimated proportion of households with repayment gearing above 35% would be similar to the level implied by the latest survey responses (**Chart 5**). But if incomes were only to increase by 10%, the proportion with repayment gearing above 35% would rise from 8% to 12%.

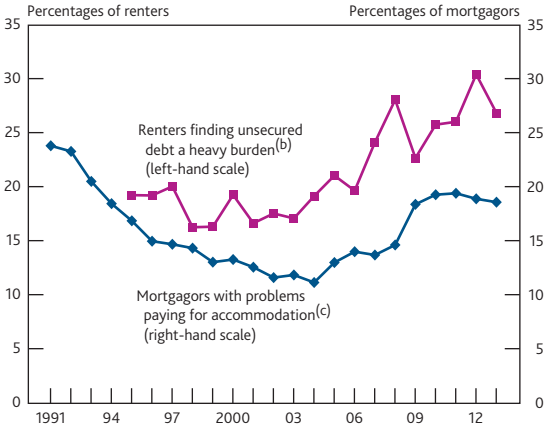
Given the uncertainty about future income developments, the range of possible outcomes is very wide. Smaller income increases would be likely to offset, only in part, the impact of interest rate rises. For instance, if rates rose by 2.5 percentage points, the estimated proportion of mortgagors who would have to take action would fall from 50%, assuming no change to current income levels, to 28% if pre-tax income were to increase by 5% before rate rises. This figure would fall to 12% for a 10% income rise and to only 3% if income were to increase by 20% (**Chart 6**).

The Monetary Policy Committee's (MPC's) forward guidance on the future conduct of monetary policy states that the MPC intends not to raise Bank Rate at least until unemployment has fallen to at least 7%, providing this does not entail material risks to price stability or financial stability.(1) At the time of the November *Inflation Report* Bank Rate was not expected to start to rise by market participants until the second half of 2015, and only reached 2.2% by the end of 2017.(2) Moreover, as discussed in the November 2013 *Inflation Report*, credit spreads are likely to fall further: this would put downward pressure on effective mortgage rates, partially offsetting a rise in Bank Rate. Nominal household disposable income has grown by around 3% a year over the past three years (a cumulative rise of about 10%) and there may be some increase in that rate of growth if the economy continues to recover and productivity picks up. It is therefore likely that incomes will rise before interest rates increase, but the extent to which higher interest rates increase financial pressure on households with a mortgage will depend on the size of that increase in income as well as the distribution of increases in incomes across households and the extent to which households repay debt (or take on more debt) in the meantime.

Financial distress and concerns about debt

As debt-servicing costs have been little changed, the proportion of households suffering financial distress associated with debt is also broadly unchanged from last year's survey. The proportion of mortgagors having problems paying for their accommodation and the share of renters finding their unsecured debt a burden rose between 2006 and 2010, but have remained relatively constant since then (**Chart 7**).

Chart 7 Mortgagors having problems paying for their accommodation and renters finding unsecured debt a heavy burden(a)



Sources: British Household Panel Survey (BHPS), NMG Consulting survey and Bank calculations.

(a) Results reported for 2011 to 2013 are from the online NMG survey. Data are spliced with results from the face-to-face NMG survey between 2005 and 2010 and BHPS before 2005.
(b) Question: 'To what extent is the repayment of these loans and the interest a heavy financial burden to your household?'.
(c) Question: 'In the past twelve months would you say you have had any difficulties paying for your accommodation?'.

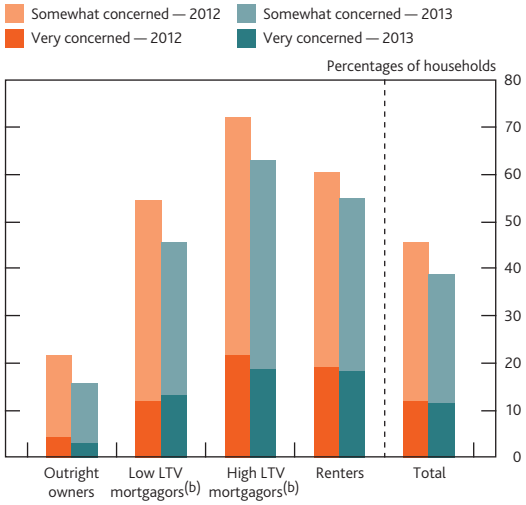
Households may also be concerned about their debts even if they are not currently facing financial problems. **Chart 8** shows that these broader concerns about debt have diminished over the past year: the share of households concerned about their level of debt fell from 46% to 39%, with falls recorded across all housing tenures. The falls mainly reflect fewer households that are 'somewhat concerned', as the share of total households who are 'very concerned' remained at 12%. A reduction in concerns about debt could be linked to healthier balance sheet positions. Indeed, among returning respondents, debt levels have fallen significantly for households who reported concerns last year but not in 2013. Reduced concerns about debt do not appear to reflect reduced uncertainty about future income, however: the proportion of respondents who thought it was very likely that their income would fall sharply over the coming year was unchanged in the 2013 survey (**Chart 9**).

Reasons for and responses to concerns about debt

A new question for this year's survey asked respondents why they were concerned about debt. The most frequently cited reason was the possibility of being unable to meet repayments if interest rates rise, which was the case for 33% of concerned households (**Table B**). That was particularly relevant for mortgagors. This result corroborates the conclusion of the experiment considered in the previous section, that household

(1) See the November 2013 *Inflation Report* for further details on the MPC's latest policy guidance.
(2) Based on market interest rates from overnight index swap contracts at the time of the November 2013 *Inflation Report* (averaged over the fifteen working days to 6 November 2013).

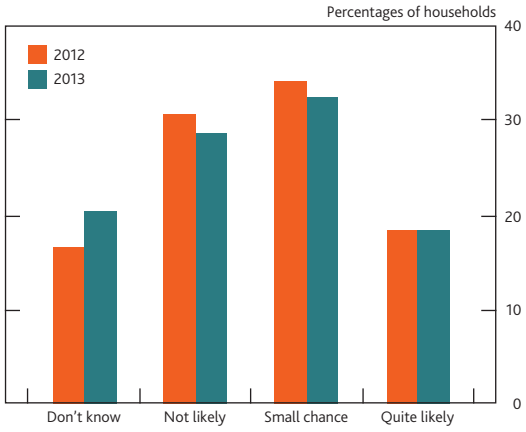
Chart 8 Concerns about debt levels[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'How concerned are you about your current level of debt?'.
(b) High LTV mortgagors are those households with an LTV ratio of above 75%; low LTV mortgagors are those with an LTV ratio of 75% or below.

Chart 9 Households' views on the likelihood that their income will fall sharply over the next year[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'To the best of your knowledge, how likely is it that your household income will fall sharply over the next year or so (for example, because you or someone in your household are made redundant)?'.

Table B Reasons for concerns about debt[a]

Percentages of concerned households

	Total[b]	Very concerned	Somewhat concerned	Mortgagors	Renters
Keeping up with repayments if rates go up	**33**	39	30	42	28
Keeping up with repayments as income may fall	**27**	25	28	26	28
Current income lower than expected	**24**	33	20	23	26
Current difficulties with repayments	**22**	46	12	17	29
Other	**10**	7	12	9	10
Banks are unwilling to lend because of current debt level	**9**	16	6	9	12
Value of the house lower than expected	**2**	3	2	4	1

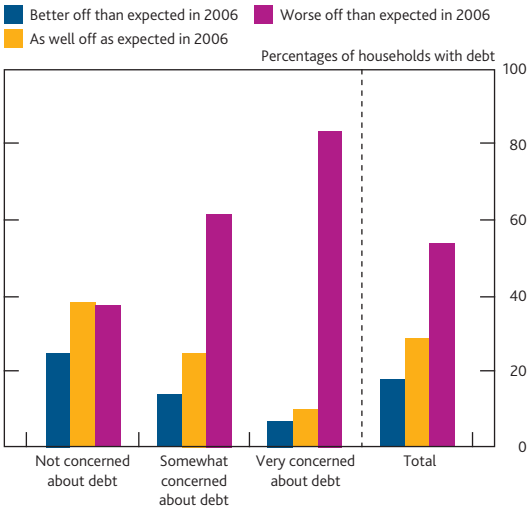
Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'How concerned are you about your current level of debt?' and 'Why are you concerned about your current level of debt?'.
(b) Of those households who were concerned about debt in 2013, 29% were very concerned and 71% were somewhat concerned; and 39% were mortgagors and 44% were renters.

finances would deteriorate in the case of an interest rate rise, particularly in the absence of substantial increases in income. Concerns about households' ability to make repayments because of the risk that their income could fall were also important (cited by 27% of concerned households). Only 2% of concerned households were worried about debt because the house they had borrowed against was worth less than they had expected.

Lower-than-expected current income was also a reason why households were concerned about debt. About a quarter of concerned households reported that this was a reason for their concerns (**Table B**). Analysis of other survey questions also suggests that this is an important factor. Among those households who were very concerned about debt, around 85% were worse off than they expected to be in 2006, compared with roughly 40% for those who were not concerned (**Chart 10**).

Chart 10 Concerns about debt and households financial position relative to expectations in 2006[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'How concerned are you about your current level of debt?' and 'Would you say you are financially better or worse off than you would have expected at the end of 2006, before the start of the financial crisis?'.

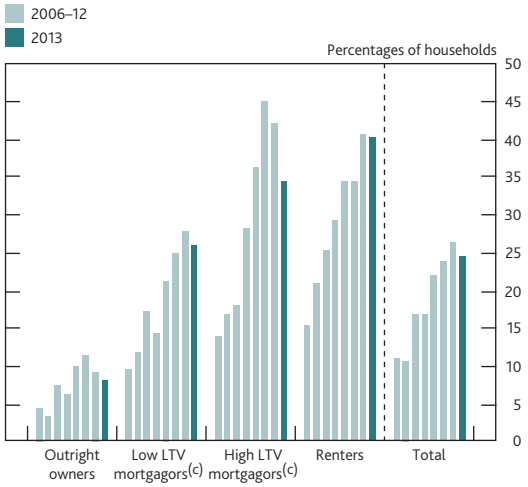
The most common response among households that were concerned about their debts has been to cut spending. But the percentage of concerned households cutting spending was lower than a year ago (73% in 2013, down from 78% in 2012). Taking together the facts that fewer households were concerned about debt combined with fewer of those who were concerned having cut spending, the overall proportion of households who had cut spending because of debt concerns fell from 35% in 2012 to 28% in 2013. The second most common response to being concerned about debt — reported by 61% of respondents in 2013 — was to avoid getting into further debt. Twenty-three per cent of concerned households reported that they had made overpayments in order to clear the debt more quickly.

Credit conditions

The extent to which households choose to take on more debt over the next year will depend heavily on developments in household credit conditions. According to the Bank's *Credit Conditions Survey*, credit conditions have begun to ease over the past year — although they still remain significantly tighter than they were before the start of the financial crisis.

The proportion of households reporting that they had put off spending due to concerns about credit availability fell slightly in 2013 (**Chart 11**). Nonetheless, a quarter of respondents continued to say that their spending decisions had been constrained by concerns about credit availability in 2013, compared to only around 10% before the financial crisis. The improvement in credit conditions over the past year was most noticeable among high LTV mortgagors, where the proportion of affected households fell from 42% to 35%.

Chart 11 Proportion of households put off spending by credit availability concerns[a][b]

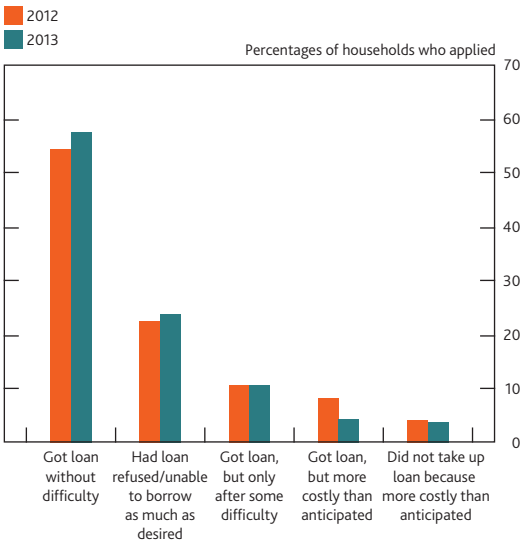


Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Have you been put off spending because you are concerned that you will not be able to get further credit when you need it, say because you are close to your credit limit or you think your loan application will be turned down?'.
(b) Results reported for 2011 to 2013 are from the online survey and results for 2006 to 2010 are from the face-to-face survey.
(c) High LTV mortgagors are those households with an LTV ratio above 75%; low LTV mortgagors are those with an LTV ratio of 75% or below.

Consistent with an improvement in credit conditions, households also reported slightly more success with loan applications over the past year. Around 13% of the survey respondents had applied for a loan over the previous year. Of these, 57% were granted loans without difficulty, up from 54% a year ago (**Chart 12**). These households tended to be older than average and to have higher incomes than those who were refused the loan and those who experienced difficulties with the application process or the loan terms. There were signs that price constraints have eased, with only 4% of applicants noting that their cost of borrowing had been higher than anticipated, compared with 8% in the 2012 survey. There were also more applications from high LTV mortgagors than a year ago, which could also be consistent with there being fewer constraints on the availability of credit for those households.

Chart 12 Outcome of loan applications[a][b]



Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'Have you applied for one or more new loans (including mortgage applications) over the past year?' and 'What was the final outcome of your loan application(s)?'.
(b) Calculations exclude households whose applications were still ongoing.

Nonetheless, one third of respondents living in rented accommodation reported that they were unable to get a mortgage, with those between the ages of 25 and 34 being worst affected. Not having a large enough deposit was by far the most common reason why households were unable to get a mortgage, followed by poor credit history and an inability to afford repayments (**Table C**). The survey was conducted prior to the start of the Help to Buy mortgage guarantee scheme.

Table C Reasons for households not being able to get a mortgage[a]

Percentages of households who do not own a house and are unable to obtain a mortgage

Deposit not large enough	82
Credit record not strong enough	42
Unable to afford repayments	25
Unable to afford the monthly repayments if interest rates rise	20
Personal circumstances (for example, being self-employed)	21
Other	8

Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'Would you like to buy a property but are unable to obtain a mortgage?' and 'What are the reasons you are unable to obtain a mortgage? Please select all options that apply'.

Conclusion

Household debt levels remain high, but the distribution of household debt has been broadly unchanged over the past year. Many households remain concerned about their debts, but the extent to which they are concerned has fallen. Doubts about their ability to make future repayments, either because

interest rates may rise or because income may fall, are the most widely cited reasons for why households remain concerned about credit.

Fewer households have high debt-servicing costs than before the financial crisis. A significant increase in interest rates at current incomes may increase financial pressure on households with a mortgage, but the extent to which higher interest rates may pose problems for households in the future will depend crucially on the extent to which incomes rise before interest rates increase and on how household debt levels change before then.

Credit conditions appear to have eased slightly over the past year, particularly for high LTV mortgagors, but remain much tighter than before the crisis.

References

Bunn, P, Johnson, R, Le Roux, J and McLeay, M (2012), 'Influences on household spending: evidence from the 2012 NMG Consulting survey', *Bank of England Quarterly Bulletin*, Vol. 52, No. 4, pages 332–42.

Button, R, Pezzini, S and Rossiter, N (2010), 'Understanding the price of new lending to households', *Bank of England Quarterly Bulletin*, Vol. 50, No. 3, pages 172–82.

Dayan, Y, Paine Schofield, C B and Johnson, A J (2007), 'Responding to sensitive questions in surveys: a comparison of results from online panels, face to face and self-completion interviews', World Association for Public Opinion Research, Berlin.

What can company data tell us about financing and investment decisions?

By Katie Farrant, Mika Inkinen, Magda Rutkowska and Konstantinos Theodoridis of the Bank's Macro Financial Analysis Division.[1]

- Capital markets play an important role in financing UK companies. Since 2009, corporate bond issuance has been strong, and yet aggregate UK business investment has remained weak.
- In part, this pattern of company behaviour can be explained by companies choosing to issue bonds in order to reduce other forms of debt, such as bank loans.
- But company-level data show that there is considerable heterogeneity in companies' investment behaviour. Companies that use capital markets have increased their investment significantly since the trough in 2009. Their investment growth, however, fell in 2012, suggesting that other factors besides access to finance were also influencing companies' investment decisions at the time.

Overview

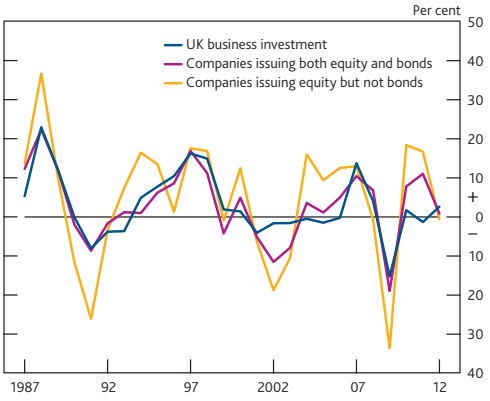
UK business investment growth has been weak since the financial crisis struck in 2007. At the same time, UK companies have been actively raising finance using the corporate bond market, with bond issuance reaching its highest level in 2012 in over a decade. This article identifies three potential reasons why companies have been raising record levels of bond finance at a time of weak UK business investment.

(i) **Balance sheet restructuring**: companies may have been issuing bonds in order to pay off bank loans, for example. There is some evidence of this, both in the aggregate data and in company-level accounts of publicly listed UK companies.

(ii) **UK companies that issue bonds may not matter very much for UK investment**: this could be either because relatively few companies issue bonds, or because those companies that do issue bonds do not invest very much in the United Kingdom. This article finds little support for this explanation: company-level data suggest that publicly listed UK companies that issue bonds accounted for around a third of UK business investment in 2012.

(iii) **Weak aggregate investment growth may reflect heterogeneity across UK companies**: those companies issuing bonds may be investing, while the weakness in aggregate data could reflect investment by companies that do not issue bonds. Much of the evidence supports this explanation: according to company-level data, companies that use capital markets increased their investment significantly in 2010 and 2011 (see **summary chart**).

Summary chart Annual growth in UK real business investment and median annual growth in real capital expenditure for companies in the company-level database



Sources: Dealogic, ONS, Thomson Reuters Datastream Worldscope and Bank calculations.

The evidence in support of the third explanation implies that companies without access to capital markets reduced their investment markedly over this period. In 2012, however, investment growth fell among companies that access capital markets, despite continued strong bond issuance. This suggests that, consistent with survey evidence, factors other than access to finance, for example increased economic uncertainty in the second half of 2011 and the first half of 2012, were also influencing companies' investment decisions at the time.

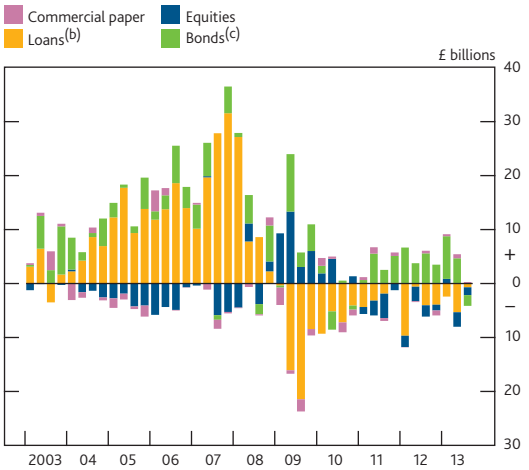
(1) The authors would like to thank David Latto and Crystal Pun for their help in producing this article.

Companies can finance their investment spending in one of two ways. They can use internal funds — that is, companies' cash flow generated from their operations, after general expenses have been paid; or they can raise finance externally, for example by borrowing from banks, by using capital markets to issue bonds and equity, or by raising equity privately.

This means that it is important to consider companies' behaviour in capital markets in order to understand their spending decisions. Following the financial crisis, UK companies revised their spending and financing decisions dramatically. They reduced investment by around 13% in real terms between 2008 and 2012 (see the **summary chart** on page 361). But during that same period, corporate bond issuance was strong: for example, 2012 saw the highest rate of gross corporate bond issuance in over a decade. Taken at face value, this might appear puzzling, as one might expect strong bond issuance to feed into stronger investment.

At first pass, this might suggest that companies were issuing corporate bonds to substitute away from alternative sources of finance, such as bank loans, perhaps in light of the financial crisis. And UK companies did alter the composition of the net external finance they raised between bank and non-bank sources over this period, as shown in **Chart 1**.(1) But there may be other explanations for the pattern of strong corporate bond issuance at a time of weak business investment, which may have different implications for the real economy.

Chart 1 UK PNFCs' quarterly net external finance raised(a)



(a) Includes sterling and foreign currency issuance.
(b) Includes loans made by UK monetary financial institutions. Data are seasonally adjusted.
(c) Includes bonds issued with UK issuing and paying agents.

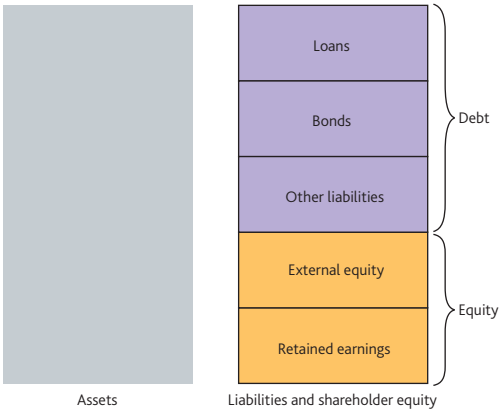
This article sets out some alternative explanations, and assesses the evidence for each. It draws on three main data sources: aggregate statistics on corporate liabilities and investment; a company-level database for publicly listed companies constructed at the Bank of England; and publicly available surveys. The company-level database combines the Thomson Reuters Worldscope annual database with the Dealogic Debt Capital Markets database, and covers approximately 3,600 UK private non-financial corporations (PNFCs) over a period from 1987 to 2012.(2)

The first section of this article outlines the role of external finance raised in public markets and recent trends in corporate bond issuance. The second section identifies three potential reasons for why bond issuance has been strong at a time of weak investment. The third section presents evidence on each of these explanations. The fourth section concludes.

The role of external finance in the corporate sector

A useful way to understand companies' financing behaviour is to consider a stylised balance sheet, which represents a snapshot of a company's financial position at a point in time. This is shown in **Figure 1**, where the right-hand side of the balance sheet represents the different sources of funds available to a company. These can be broken down into types of debt — for example bank loans, corporate bonds and other liabilities such as trade credit — and equity. Equity can come both from external investors, who in return acquire a stake in the business, and from a company's internal funds. In **Figure 1**, retained earnings are a company's accumulated internal funds after dividends have been paid to shareholders. These liabilities together represent claims on the resources of the company, and allow investors to benefit from the cash flows a company generates or a share of its assets in the event of liquidation.

Figure 1 A stylised PNFC balance sheet(a)(b)



(a) PNFC assets typically include: property, plant and equipment; intangible assets; inventory, trading and other receivables; and cash and equivalents.
(b) Other liabilities typically include: deferred tax; short-term debt; and trade and other payables.

Companies typically seek to raise money from outside investors for two main purposes. The first is to increase the size of their balance sheet, with the additional funds used to

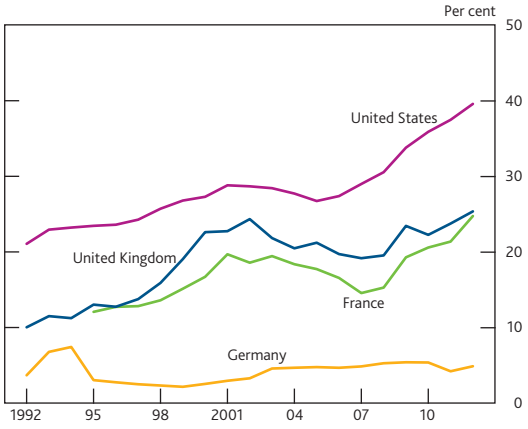
(1) All charts in the article use non seasonally adjusted data, unless stated otherwise.
(2) For each of the companies in the database, the amount of equity, bonds and loans issued each year can be estimated. Each company's financial statements, including its balance sheet, income statement and cash-flow statement items, are also available, providing information on capital expenditure. An annex on page 369 provides further details on the company-level database.

acquire assets such as new machinery. The second reason companies might wish to raise funds externally is to change the structure of their liabilities — for example by substituting debt for equity, or one form of debt or equity for another.

The corporate bond market in the United Kingdom

Corporate bond issuance in the United Kingdom has increased markedly over the past two decades. The stock of outstanding debt securities (most of which are bonds) issued by UK companies, shown in **Chart 2**, has risen from around 10% of nominal GDP in early 1992 to around 25% in 2012. That is similar to the level in France, but remains below the level in the United States, for example. Data from Dealogic suggest that UK companies issued close to £220 billion of corporate bonds between 2009 and 2013 in gross terms, and £140 billion in net terms.(1) **Chart 3** shows cumulative gross corporate bond issuance by UK companies each year, starting in 2003. Issuance since 2009 has been stronger than the average between 2003 and 2008. And in 2012, UK companies issued bonds at the fastest rate in over a decade. That strength has broadly continued in 2013.

Chart 2 Total debt securities of non-financial corporations as a proportion of nominal GDP(a)(b)



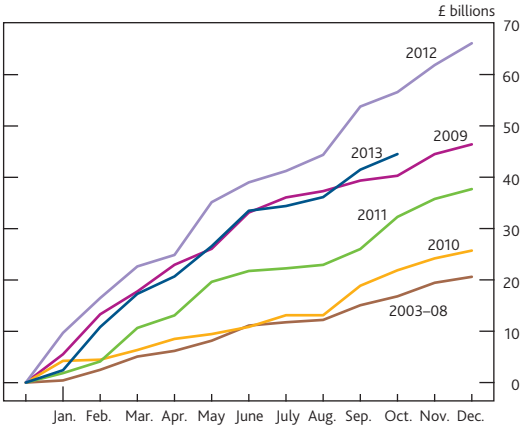
Sources: OECD and Bank calculations.

(a) Securities other than shares, except financial derivatives.
(b) Data for non-financial corporations include both private and public companies, although ONS data suggest that private corporations accounted for 96% of the stock of debt securities of all UK non-financial corporations in 2012.

The growing importance of the corporate bond market is reflected in companies' balance sheet structure. According to ONS data, bonds accounted for 7% of the stock of UK companies' financial liabilities prior to the crisis in 2007. That has since risen to 10% in 2013 Q2. The use of loans as a source of finance, meanwhile, has fallen from its peak of 38% of UK PNFCs' financial liabilities in 2009 Q1, to 27% in 2013 Q2.

The number of companies issuing bonds has also increased, particularly since the beginning of the financial crisis in 2007. **Chart 4** shows that so far in 2013, the number of companies issuing bonds for the first time has already matched the record reached in 1998.

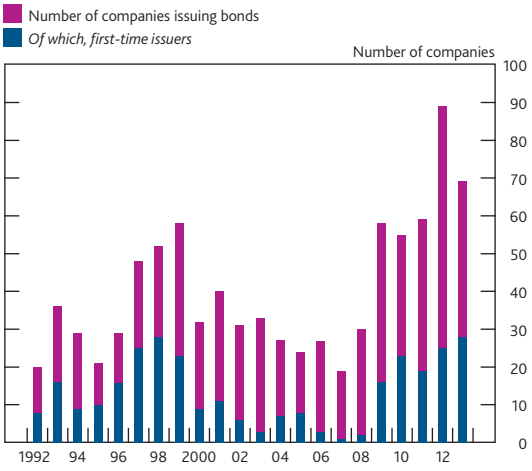
Chart 3 Cumulative gross bond issuance by UK PNFCs(a)



Sources: Dealogic and Bank calculations.

(a) Issuance by PNFCs where the issuer's country of incorporation and that of any parent or guarantor is the United Kingdom. Includes investment-grade and non-investment grade bonds. Data are subject to periodic revisions. 2003–08 is an average over the period.

Chart 4 Estimate of the number of UK PNFCs issuing bonds (all currencies)(a)



Sources: Dealogic and Bank calculations.

(a) 2013 includes data up to October.

There are various potential explanations for why corporate bonds have become a more popular source of finance since the onset of the financial crisis. One is the sharp decline in corporate bond yields, particularly since the beginning of the Bank's programme of asset purchases — 'quantitative easing' (QE) — in 2009. There are at least two ways in which QE affects corporate bond yields. One is directly, via the Bank's purchases of corporate bonds: those purchases were designed to improve the liquidity in the market and to provide a backstop to this market at the height of the crisis. The size of these purchases, however, was very small in comparison with the Bank's purchases of gilts.

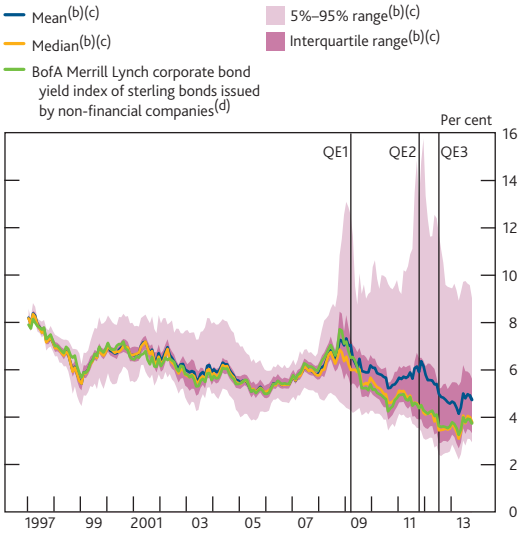
Another way in which QE could affect corporate bond yields is indirectly, through the *portfolio balance channel* of QE. To the extent that sellers of gilts to the Bank regard private sector

(1) Based on data up to October 2013. Net issuance is estimated as the difference between bonds issued and bonds maturing in a given year, using contractual maturities for non-callable bonds based on Dealogic data. For callable bonds, actual call dates (provided by Bloomberg) were used.

assets to be a closer substitute for gilts than money, they may want to reduce the increased money holdings that result from gilt sales and buy private sector assets, such as corporate bonds, instead. As gilt yields change, other investors may also wish to move into riskier assets, including corporate bonds. This provides a boost to corporate bond prices, pushing down on corporate bond yields.(1)

The decline in corporate bond yields since early 2009 appears to be consistent with QE having had an impact, as shown by the green line in **Chart 5**. But **Chart 5** also illustrates that the dispersion of bond yields across companies has increased markedly since the beginning of the crisis. That might be the result of increased discrimination between companies by investors, or companies being affected in different ways by the financial crisis and the subsequent recession.

Chart 5 Distribution of yields for UK companies' bonds issued in sterling(a)



Sources: BofA Merrill Lynch Global Research (used with permission), Dealogic, Thomson Reuters Datastream and Bank calculations.

(a) 2013 includes data up to October. QE1 refers to £200 billion of assets purchased between March 2009 and January 2010; QE2 refers to £125 billion of assets purchased between October 2011 and May 2012; QE3 refers to £50 billion of assets purchased between July 2012 and November 2012.
(b) As the maturity and effective duration of corporate bonds varies widely across the sample, the methodology in Gilchrist and Zakrajsek (2007) was used to adjust bond yields to ensure that neither the cross-sectional nor time-series variation in company-specific bond yields reflect variation in term premia. Specifically, a duration-adjusted nominal bond yield ($\tilde{r}$) has been constructed for each bond (h), issued by each company (j), for each point in time (t), by adjusting the nominal yield (r) with an estimate of the difference in term premia between a duration-matched (d) gilt yield and a gilt yield with a target duration (d^*):

$$\tilde{r}^h_{jt} = r^h_{jt} + [y_t(d^*) - y_t(d^h_{jt})]$$

The target duration was set at seven years, which is approximately equal to the median duration of bonds in the entire sample. A market-value weighted average adjusted yield for each company at each point in time was then calculated.
(c) Data include sterling-denominated investment-grade and high-yield bonds and medium-term notes issued by UK PNFCs.
(d) The index includes sterling-denominated investment-grade bonds of non-financial companies.

Why might companies have been issuing bonds at a time of weak investment?

2012 saw the highest rate of corporate bond issuance in over a decade, which appears puzzling given that aggregate UK business investment has been so weak since 2009. In order to understand the importance of the recent strength in bond market issuance for the real economy, it is necessary to understand what companies are doing with the finance raised. Of course, there will be lags between a company raising funds and undertaking investment — but market intelligence suggests such lags tend to be less than a year.

There are a number of possible explanations for this pattern of strong bond issuance and weak aggregate investment. This article identifies three. They are not mutually exclusive, but they have different implications for the real economy, which are discussed in the final section of the article.

(i) **Companies may want to change the structure of their balance sheets.** One reason for this would be if companies wished to move away from a reliance on the banking system towards alternative sources of finance following the financial crisis — so-called 'disintermediation' of the banking system. This would explain the strength in corporate bond issuance, while weak investment might reflect continuing uncertainty over economic conditions in the euro area or prospects for UK demand.

An alternative reason why companies may have wanted to restructure their balance sheet is because of the impact of QE on term premia. In particular, an argument put forward by Federal Reserve Governor Stein suggests that when term premia are negative, a decline in interest rates driven by lower term premia rather than lower expected interest rates may not encourage companies to increase investment to the same extent. The box on page 365 outlines this argument in more detail and assesses the evidence that this might have been happening in the United Kingdom.

(ii) **Companies that issue bonds may not matter very much for UK growth prospects.** This could be the case if the corporate bond market is not available to most companies and so is not an important source of funds for UK companies in aggregate. Alternatively, it could reflect companies that have access to the bond market not investing very much in the United Kingdom.

(iii) **The aggregate picture may be masking different behaviour across companies.** In particular, it may be that companies with bond market access are investing, while those without access are not. In this case, the recent weakness in investment at the aggregate level would reflect heterogeneity among companies, and imply that companies are likely to be using at least some of the funds raised in the corporate bond market to finance investment.

(1) See Joyce, Tong and Woods (2011) and Joyce, McLaren and Young (2012).

QE, term premia and balance sheet restructuring

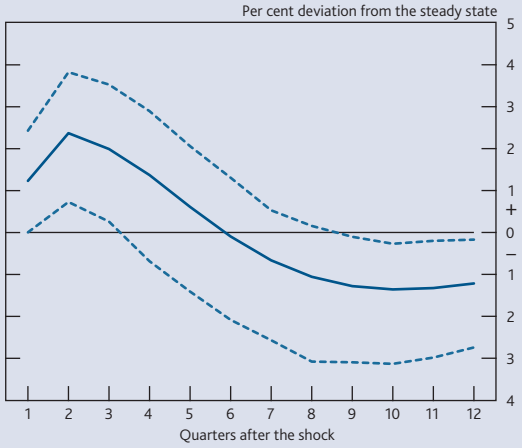
One possible reason why companies may have issued bonds and decided to restructure their balance sheets is because QE has encouraged such behaviour. Federal Reserve Governor Stein (2012) has put forward an argument along these lines, suggesting that companies may respond differently when interest rates move because of a change in term premia rather than expected policy rates.

The term premium is the extra return investors expect to obtain from holding long-term bonds as opposed to holding (and rolling over) a series of short-term securities over the same period. Term premia are often thought to be positive: longer-term assets might be expected to offer a higher return because they are more risky, with greater potential to fall in value. But term premia can also be negative, when longer-term rates are lower than the expected sequence of short-term rates. This could be because long-term bonds give investors a form of insurance, for example if their prices tend to rise during times of low economic growth, providing a hedge against falls in risky asset prices. If term premia are negative — for example, if a company could issue a ten-year bond at an annualised rate of 2%, but expected the sequence of rolled-over short-term rates to average 3% — then the company may be incentivised to restructure its balance sheet. This is because it could issue long-term debt at 2%, and use these funds to pay back short-term debt, repurchase equity, or buy short-term securities, as all these adjustments yield an effective return of 3%. As a result, the 'hurdle rate' for capital investment, defined as the overall return a company must earn before it embarks on an investment project, remains pinned at 3% — the return a company can earn if it invests in financial assets instead. **So according to this argument, once term premia become negative, further QE may encourage bond issuance but have less effect on investment spending**.

It is difficult to test this formally — not least because it is hard to get good measures of term premia in corporate bonds. But to shed some light on this, term premia in corporate bond yields can be proxied by term premia in government bond yields.(1) In order to see how investment responds to a decline in interest rates driven by a fall in the term premium, including when the term premium becomes negative, a dynamic time series structural threshold vector autoregression model (STVAR) can be used. A vector autoregression involves estimating a set of equations, where each variable is regressed on past movements of itself and the other variables in the system. The threshold element of an STVAR allows these estimates of the effect of one variable on another to vary under different 'regimes'. Consistent with Stein (2012), it is assumed that there are two 'regimes': one where the term premium is positive and one where it is negative. The model, which is estimated over the period 1997–2012, includes annual growth in real GDP, annual growth in real business investment (in aggregate, and for companies with different levels of access to capital markets), annual inflation, the policy rate, and the term premium in ten-year government bond yields.(2) The responses of output and inflation to a change in the policy rate in the STVAR are similar to those in Kapetanios *et al* (2012).

Chart A shows the effect of a 25 basis point decline in the term premium on the annual growth rate of business investment when the term premium is negative, assuming that the expected policy rate remains unchanged. It leads to a 2.5 percentage point increase in investment growth, two quarters after the fall in the term premium.(3) This short-run response of investment to a change in the term premium suggests that companies respond to a decline in long-term interest rates by increasing investment, even when the decline in interest rates comes about because of a fall in term premia, and long rates fall below the expected future path of short rates. This result is robust to different measures of the term premium.(4) And it provides little support for the hypothesis that QE has encouraged UK companies to issue bonds to restructure their balance sheets, at the expense of any increase in their investment spending.

Chart A Impulse response of annual aggregate investment growth to a 25 basis point reduction in term premium when the term premium is negative(a)



Source: Bank calculations.

(a) Dashed lines show the 90% confidence interval.

(1) In reality, the corporate term premium is likely to be higher than the government term premium: corporate defaults are procyclical so that, relative to gilts, corporate bonds tend to pay out less in bad times, when returns are most valued — hence the premium required by investors should be higher.
(2) The company-level data are annual. That frequency is too low for this type of analysis so Kalman Filter interpolation techniques are used to transform the annual investment data into quarterly observations. Without loss of generality, it is assumed that the time-series properties of investment are best described by a simple autoregressive moving average model.
(3) In the longer run, it is assumed that the level of investment is unchanged, so a period of growth rates above the steady-state level is then followed by a period of growth rates below steady state, as shown in **Chart A**.
(4) There are various models to decompose bond yields into expected interest rates and term premia. One of the models used in this article is described in Guimarães (2012).

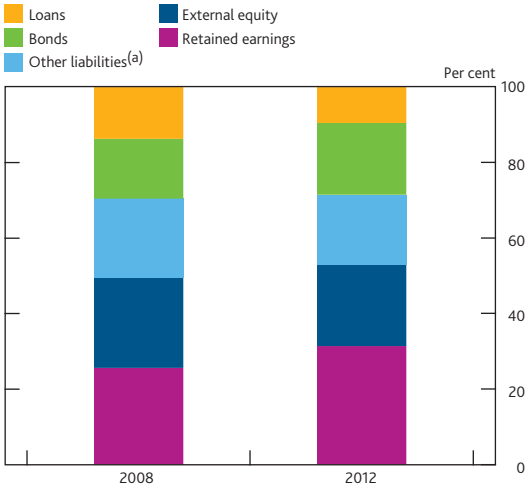
What evidence is there for each of the explanations?

In summary, there is some evidence to support companies having issued bonds since 2009 in order to reduce other forms of debt. But the evidence does not appear to support the idea that companies with access to capital markets are not important for the UK economy. Much of the evidence supports the third explanation, relating to the heterogeneity of companies' investment behaviour. Company-level data show that companies that use capital markets have increased their investment significantly since the trough in 2009, particularly in 2010 and 2011. Their investment growth, however, fell in 2012, suggesting that other factors besides access to finance, such as a rise in economic uncertainty, were also influencing companies' investment decisions at the time.

Companies may want to change the structure of their balance sheets

There is some evidence that companies have restructured their balance sheets and that this is one of the factors behind the recent strength in bond issuance. That can be seen in the aggregate data in **Chart 1**: since 2009, UK companies have been repaying loans and issuing bonds. And based on company-level balance sheet data, **Chart 6** shows that companies have substituted some bank loans (orange bars) on their balance sheets with bonds (green bars). That would suggest that there has been some disintermediation of the banking sector. These companies have also increased equity through retained earnings.

Chart 6 Breakdown of aggregate debt and equity of UK PNFCs issuing both equity and bonds

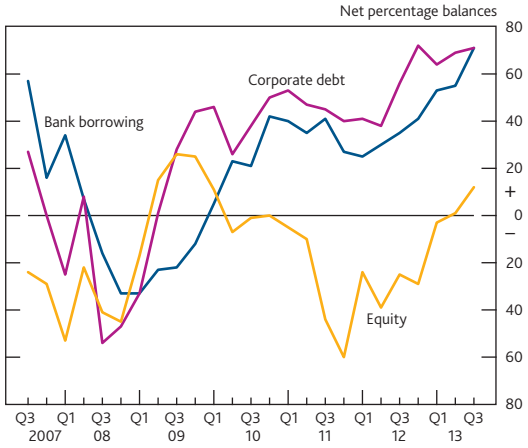


Sources: Dealogic, Thomson Reuters Datastream Worldscope and Bank calculations.

(a) Includes: deferred tax; short-term debt; and trade and other payables.

One reason why companies are likely to have restructured their balance sheets since 2009 relates to the sharp contraction in bank credit that followed the financial crisis. The *Deloitte CFO Survey* of large corporates, for example, showed that bank borrowing, as shown by the blue line in **Chart 7**, went from being the most attractive source of funding in 2007 and 2008 — compared with raising funds through bond and equity issuance — to the least attractive in 2009.

Chart 7 Survey responses on the attractiveness of sources of external funding(a)



Source: *Deloitte CFO Survey*.

(a) Survey respondents were asked whether they rate each of the sources of external funding as 'attractive', 'unattractive' or 'neither'. The lines show the percentage of respondents who thought that the source of funding was attractive less the percentage who thought that it was unattractive.

Companies may have also restructured their balance sheets in response to the impact of QE on term premia in corporate bond yields. But as shown in the box on page 365, there is no evidence to suggest that UK companies would decide not to increase their investment when interest rates decline because of a fall in term premia, even when term premia become negative. So it seems unlikely that the pattern of strong bond issuance and weak investment reflects the impact of QE-related changes in term premia.

Companies that issue bonds may not matter very much for UK growth prospects

As highlighted in the first section, the corporate bond market has become increasingly important as a source of finance for UK companies over time. Drawing on a company-level database of publicly listed companies, the box on page 367 outlines some of the characteristics of UK companies that access capital markets and that issue bonds in particular. It finds that UK companies that issue bonds tend to be large: in 2012, none of the companies that have issued bonds in the past would be classified as a small or medium-sized enterprise. But, despite this, the companies that have access to the bond market play an important role in influencing UK growth prospects. According to the Bank's estimates, all listed UK companies accounted for around 45% of UK business investment in 2012, based on data from their audited financial statements.(1) And while only a few of these listed companies

(1) In line with Pattani, Vera and Wackett (2011), this is estimated as a company's total capital expenditure scaled by the average share of a company's domestic sales and domestic assets (as reported in their financial statements). This approximation may, of course, not be accurate in all cases. For example, a company may hold a majority of its assets (or conduct a majority of its sales) at home, but invest predominantly abroad (or *vice versa*).

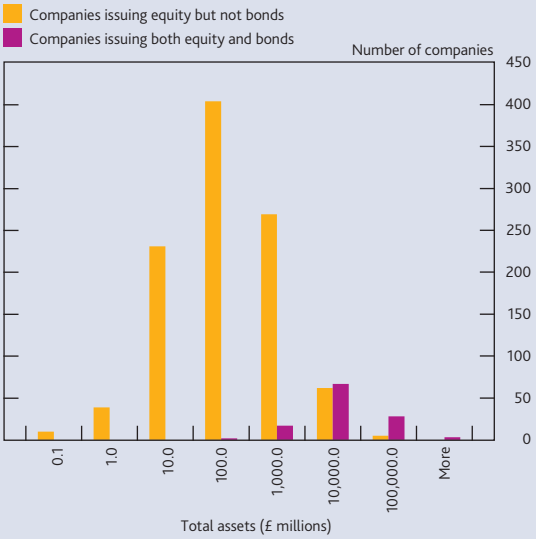
Characteristics of companies with access to capital markets

The company-level database used in this article includes all UK PNFCs with publicly listed equity — both in the FTSE All-Share and in the Alternative Investment Market. There were around 1,100 such companies in 2012. According to the Bank's estimates, only around 100 of these publicly listed companies have also issued bonds in the past.

The companies that access capital markets vary considerably in terms of size. Of those companies that access the equity market but not the bond market, almost half would be classified as small and medium-sized enterprises (SMEs).(1) In 2012, the median company had around £40 million of assets (the orange bars in **Chart A**), turnover of around £20 million and around 200 employees. But around a quarter of the companies had more than £150 million of assets, turnover of over £140 million and more than 1,000 employees. Together, the companies that issue equity but not bonds accounted for around 10% of UK business investment in 2012.

The companies that also issue bonds tend to be much larger than companies that only issue equity (the magenta bars in **Chart A**). These companies jointly accounted for around a third of UK business investment in 2012. In 2012, the median company had close to £3 billion of assets, turnover of around £2 billion and over 15,000 employees. Around a quarter of companies had more than £10 billion of assets, turnover of above £9 billion and more than 40,000 employees. In 2012, none of these companies would be classified as an SME.

Chart A Distribution of companies in the database with respect to total assets (as of 2012)



Sources: Dealogic, Thomson Reuters Datastream Worldscope and Bank calculations.

(1) Using the standard definition from the Companies Act 2006 that a company qualifies as medium sized if it satisfies two of the following three criteria: (i) it has turnover of no more than £25.9 million; (ii) the total size of its balance sheet is no more than £12.9 million; and (iii) it has no more than 250 employees.

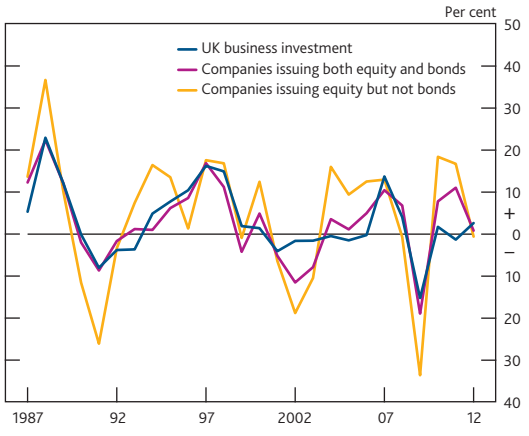
also issue bonds, those that do accounted for around a third of UK business investment. Taken together with the recent strength in bond issuance, there would, therefore, appear to be little support for the strength in corporate bond issuance at a time of weak investment being a reflection of bond issuers not being important for the UK economy.

The aggregate picture may be masking different behaviour across companies

To help shed light on this explanation, **Chart 8** shows growth rates of business investment, using both company-level data and aggregate data. The blue line shows UK business investment growth from the ONS National Accounts; the magenta line shows the median growth rate of investment for companies in the company-level database that have issued in both bond and equity markets; and the orange line shows the median growth rate of investment of listed companies that have not issued bonds.

Up until 2009, there was a close correlation between the aggregate business investment growth rate (blue line) and investment by companies issuing both bonds and equity (magenta line), suggesting no obvious bias in investment behaviour between the median company in the company-level database and the aggregate data.

Chart 8 Annual growth in UK real business investment and median annual growth in real capital expenditure for companies in the company-level database

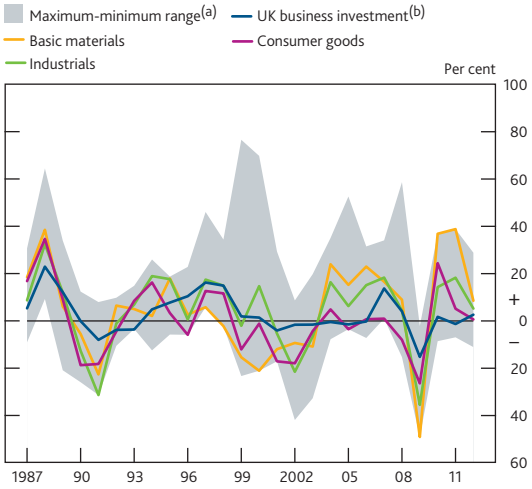


Sources: Dealogic, ONS, Thomson Reuters Datastream Worldscope and Bank calculations.

Since 2010, however, while aggregate UK business investment has remained weak, investment by companies with access to capital markets recovered sharply. This suggests that improvements in capital market conditions have allowed companies with access to those capital markets to undertake investment. That pickup in investment has been broad-based across sectors, as shown in **Chart 9**. And it does not seem to simply reflect investment overseas: the picture in **Chart 8**

does not change markedly if one approximates for domestic investment by scaling each company's total capital expenditure by the proportion of its assets that are held (or sales that originated) domestically. This strength in investment in 2010 and 2011, combined with the weakness in aggregate ONS business investment over that period, suggests that companies without access to capital markets may have reduced their investment markedly in 2010 and 2011.

Chart 9 Annual growth in UK real business investment and median annual growth in real capital expenditure in the company-level database by sector

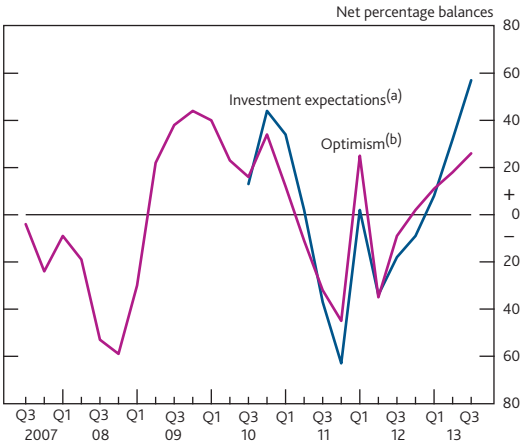


Sources: ONS, Thomson Reuters Datastream Worldscope and Bank calculations.

(a) The maximum-minimum range shows the median growth rate of investment for each sector as defined by the Industry Classification Benchmark used by the FTSE, excluding financials.
(b) ONS data for aggregate UK business investment.

In 2012, however, investment growth has fallen for companies that access capital markets, despite their continued strong bond issuance.(1) This suggests that other factors, besides the availability of finance, are likely to have influenced companies' investment behaviour in 2012. **Chart 10** shows that the *Deloitte CFO Survey* suggests that large companies anticipated a slowdown in investment in late 2011. The deterioration in expectations for investment over the following twelve months appeared to be linked with an increase in financial and economic uncertainty, and a decrease in optimism regarding the economic outlook.(2) The increase in economic uncertainty may also have been reflected in the sharp increase in the dispersion of UK companies' bond yields around the end of 2011 and early 2012, as shown in **Chart 5**. Looking ahead, however, **Chart 10** shows that investment intentions and optimism have since risen, suggesting that investment growth by larger companies with bond market access may have picked up again in 2013, despite the continuing weakness in the aggregate investment data.(3) There may also be a lag between companies raising finance and undertaking investment projects, which may suggest that some of the record bond issuance in 2012 could be used to support investment in 2013.

Chart 10 Net balance of *CFO Survey* respondents feeling optimistic and expecting an increase in capital expenditure



Source: *Deloitte CFO Survey*.

(a) Net balance of respondents expecting capital expenditure by UK corporates to increase over the next twelve months.
(b) Net balance of respondents feeling more optimistic about the financial prospects of their own companies than in the previous quarter.

Conclusion

Understanding companies' behaviour in capital markets is important. Even though a relatively small proportion of UK companies issue debt and/or equity publicly, they appear to account for a relatively large share of UK business investment. And understanding why aggregate investment has remained weak, while corporate bond issuance has been strong, is important in the context of understanding the role public capital markets play for UK companies.

There is some evidence that companies have been raising bond finance because of a desire to restructure their balance sheets — and in particular, to reduce their reliance on banks. To the extent that companies have diversified their sources of funds and reduced the cost of their debt, this may have strengthened their balance sheets and put them in a better position to increase investment in the future.

But much of the evidence presented suggests that the pattern of weak investment in 2010 and 2011 at a time of strong corporate bond issuance reflects heterogeneity among companies, with those with capital market access investing and those without not, such that overall aggregate investment remained weak. That might suggest that an improvement in the availability of external finance to companies without capital market access could provide support for UK business investment. In 2012, however, investment growth across

(1) As the majority of UK companies report full-year results in the following year, 2013 data are not yet available in the company-level database.
(2) Haddow *et al* (2013) discuss a number of indicators of economic uncertainty and estimate the impact these have had on economic activity.
(3) As stated in the November 2013 *Inflation Report* on page 38, the Monetary Policy Committee continues to put relatively little weight on the recent weakness suggested by the official investment data.

companies with capital market access appeared to fall. That suggests that other factors, besides the availability of external finance, have played a role in explaining the weakness of business investment in 2012. These factors may include increased uncertainty about the economic and financial outlook and weak business confidence. Looking ahead, larger companies have become more optimistic in 2013, suggesting that their investment may have picked up again in 2013 even as aggregate investment data have remained weak.

Annex
Differences between the company-level and aggregate data sets(1)

Analysis of companies' corporate financing decisions relies, in part, on examining company-level data. But there are differences in both the coverage and how variables are measured between the company-level database used in this article(2) — which is based on Thomson Reuters Worldscope data from companies' audited accounts, supplemented with Dealogic bond issuance data — and aggregate data from the ONS's National Accounts. The key differences are outlined in **Table A1**.

Table A1 Key differences between the data sets

	Company-level database	ONS data
Coverage	All UK private non-financial corporations (PNFCs) with *publicly listed equity*, both in the FTSE All-Share and in the Alternative Investment Market. There are around 3,600 companies in the database, covering a period of nearly 30 years. These companies accounted for around 45% of UK business investment in 2012. Small and medium-sized companies currently make up around half of the sample.	*All* UK PNFCs, both publicly listed and privately owned.
Data sources	Companies' audited accounts — balance sheets, income statements and cash-flow statements — combined with Dealogic bond issuance data.	Based largely on ONS inquiries and surveys — for example the *Financial Assets and Liabilities Survey*. A number of variables have to be estimated. Data on the issuance of securities are provided by the London Stock Exchange.
Valuation method	Balance sheet data are recorded at book value.	Balance sheet items are reported at market values — changes over time reflect both new issuance and a revaluation of existing assets and liabilities.
Measurement of investment	Investment is measured using the capital expenditure entry in companies' (audited) cash-flow statements. This variable represents the funds used to acquire fixed assets.	Business investment estimates are based primarily on data from the *Quarterly Capital Expenditure Inquiry*. The *Inquiry* has a sample size of approximately 27,000 UK businesses. In addition, data on capital expenditure from public corporations are also collected from company accounts, quarterly questionnaires or *Whole of Government Accounts*. Business investment in the National Accounts also includes investment by monetary financial institutions, although this tends to be small.

(1) For more information on the ONS National Accounts see 'National Accounts Concepts, Sources and Methods', available at www.ons.gov.uk/ons/rel/naa1-rd/national-accounts-concepts--sources-and-methods/index.html; and 'Information Paper on Business Investment', available at www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/economic-statistics/summary-quality-report-of-business-investment.pdf. The worldscope definitions guide can be found at http://extranet.datastream.com/Data/Worldscope/index.htm.
(2) This database has previously been used in Pattani, Vera and Wackett (2011).

References

Gilchrist, S and Zakrajsek, E (2007), 'Investment and the cost of capital', *NBER Working Paper No. 13174*.

Guimarães, R (2012), 'What accounts for the fall in UK ten-year government bond yields?', *Bank of England Quarterly Bulletin*, Vol. 52, No. 3, pages 213–23.

Haddow, A, Hare, C, Hooley, J and Shakir, T (2013), 'Macroeconomic uncertainty: what it is, how can we measure it and why does it matter?', *Bank of England Quarterly Bulletin*, Vol. 53, No. 2, pages 100–09.

Joyce, M, McLaren, N and Young, C (2012), 'Quantitative easing in the United Kingdom: evidence from financial markets on QE1 and QE2', *Oxford Review of Economic Policy*, Vol. 28, No. 4, pages 671–701.

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.

Kapetanios, G, Mumtaz, H, Stevens, I and Theodoridis, K (2012), 'Assessing the economy-wide effects of quantitative easing', *The Economic Journal*, Vol. 122, Issue 564, pages F316–47.

Pattani, A, Vera, G and Wackett, J (2011), 'Going public: UK companies' use of capital markets', *Bank of England Quarterly Bulletin*, Vol. 51, No. 4, pages 319–30.

Stein, J C (2012), 'Evaluating large-scale asset purchases', remarks at The Brookings Institution, Washington DC, October.

Tiering in CHAPS

By Kevin Finan of the Bank's Market Services Division and Ana Lasaosa and Jamie Sunderland of the Bank's Market Infrastructure Division.[1]

- In the United Kingdom, many banks access payment systems via relationships with other banks. This introduces risks to financial stability which can be reduced by increasing direct participation.
- The Bank has worked with the payments industry to increase direct participation in CHAPS, as part of its broader work to reduce systemic risk in the United Kingdom.
- As a consequence, by 2015 a number of banks that are systemically important to the CHAPS system will become direct participants. This is a structural change which will significantly reduce interbank exposures, and hence will enhance UK financial stability.

Overview

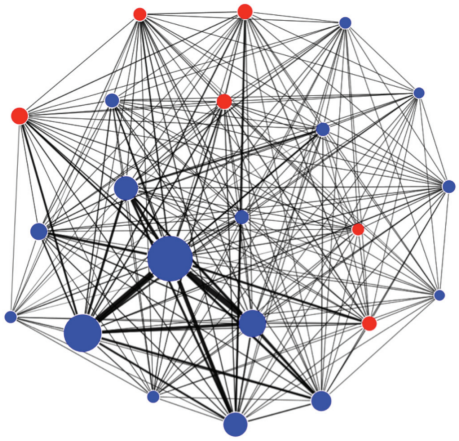
Central banks attach importance to ensuring that payment systems are designed to mitigate the risks to financial stability that can arise in the course of settling transactions between participants. CHAPS, the United Kingdom's high-value sterling payment system, has historically had a small number of settlement banks (banks that participate directly in the system), with a much larger number of indirect participants which access the system through a settlement bank. This arrangement, called 'tiering', introduces credit, liquidity and operational risk between the indirect participant and the settlement bank.

Over a number of years, the Bank has highlighted the merits of decreasing the tiering risks in CHAPS. However, several factors combined to create the basis for a renewed focus on this issue. The financial crisis increased awareness of the risks attached to interbank exposures; the Bank's payment systems oversight regime was put on a statutory basis, bringing the possibility of exercising formal regulatory powers; and improved, richer data on CHAPS payments enabled the Bank to build an evidence base to support the case for increasing direct participation.

The Bank's analysis highlighted that six indirect participants were systemically important to the CHAPS system in terms of the total value of the payments they send and receive, such that financial stability would be enhanced by their direct participation. This would increase the proportion of payments cleared directly between settlement banks from around 50% to approaching 70% of total payments cleared through CHAPS. Network analysis by the Bank shows that these six indirect participants (shown in red in the **summary figure** below) are as systemic to the CHAPS network in terms of connectedness as a number of those banks that were already direct participants.

As a result of this analysis and engagement with the Bank and others, those six indirect participants have agreed to become direct participants in CHAPS. This will materially reduce risks to financial stability.

Summary figure The CHAPS settlement network if the six largest indirect participants joined, January 2011(a)



(a) The size of the circles is proportional to the value of payments sent by each bank on a typical day. The six largest indirect participants, according to values sent in 2011, are included in red. The thickness of the connections is proportional to the value of payments sent between banks.

(1) The authors would like to thank Andrew Georgiou, David Norcross and Simon Rickenbach for their help in producing this article.

Payment systems should be designed to facilitate the safe transfer of money. These transfers can take many forms: they may involve a person withdrawing cash from their bank account via an ATM; a company making salary payments to its employees; or a bank making a multi-million pound interbank loan.

Payment systems often have low public profiles, but the safe, reliable and efficient settlement of payments is vital to the economy. As Alan Greenspan, former Chairman of the Federal Reserve Board remarked: 'We'd always thought that if you wanted to cripple the US economy, you'd take out the payment systems. Banks would be forced to fall back on inefficient physical transfers of money…the level of economic activity across the country would drop like a rock'.(1)

This article explains the concept of 'tiering' in payment systems. It goes on to discuss some of the risks associated with 'tiered' participation in CHAPS, the United Kingdom's high-value sterling payment system, and steps the Bank has taken with a number of banks to address these risks. Finally, it describes progress that these banks have made towards becoming direct participants in CHAPS, thereby reducing the risks to the stability of the financial system that highly tiered participation creates.

Characteristics of a payment system and 'tiering'

Three of the fundamental components of payment systems are:

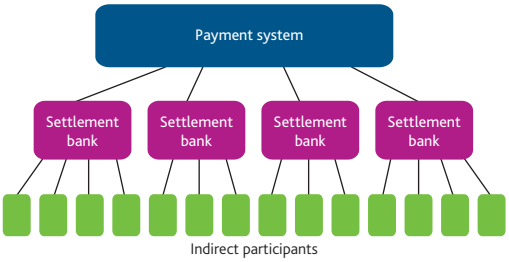
(i) **Rules and infrastructure** of the payment system. These include common standards for participation, a messaging system for sending and receiving payment instructions and a processing system for calculating the obligations of the participants in the system.

(ii) **Settlement banks**, the direct participants in the system. These are typically banks (but could also be other financial institutions) that send and receive payments on behalf of their customers.

(iii) **A settlement agent**, which facilitates the transfer of funds between settlement banks. The settlement agent is often a central bank, and so settlement occurs in central bank money.(2)

In some systems there may be multiple layers of access, sometimes referred to as 'tiered' participation. Tiered participation occurs when the direct participants, or settlement banks, in a system provide services that allow other financial institutions to access the system indirectly. For example, if a consumer pays a bill from an account at a small building society that does not directly access the payment system, a payment will be made from the consumer's account, via their building society's settlement bank (that does participate directly in the system), before being credited to the bank where the bill charger holds its account, possibly via that bank's account at its own settlement bank. Typically, the indirect participant relies on the settlement bank to provide the technical infrastructure to make their payments. This tiered set-up is illustrated in **Figure 1**.

Figure 1 A tiered payment system



Risks associated with tiering

Tiered participation in payment systems can create risks to the stability of the financial system. These risks are greatest for the high-value payment systems given the magnitude of payment flows and interbank exposures.

Such risks have long been recognised nationally and internationally, for example by the International Monetary Fund (IMF) and the Bank for International Settlements (BIS).(3) The internationally agreed 'Principles for financial market infrastructures', published in April 2012, introduced a principle relating to tiered participation.(4) Meanwhile, the Bank of England has highlighted the risk from tiering in UK payment systems in the *Payment Systems Oversight Report* and the *Financial Stability Review*.(5)

The greatest risks to financial stability arise through three main channels:

- **Credit risk**. With tiered participation, credit exposures arise when a settlement bank offers an indirect participant an unsecured overdraft to fund outgoing payments on an intraday basis, or in some cases even on an overnight basis; or when an indirect participant places a deposit with a settlement bank in order to fund its payments. In the first case, the settlement bank has a credit exposure to the

(1) See Greenspan (2007).
(2) See Dent and Dison (2012) for further details on the Bank's role as a settlement agent. For the Bank of England's policy for providing settlement accounts, see www.bankofengland.co.uk/markets/Documents/paymentsystems/boesettlementaccounts.pdf.
(3) See, for example, International Monetary Fund (2003, 2011).
(4) See www.bis.org/publ/cpss101a.pdf.
(5) See Bank of England *Financial Stability Review*, June 2004, *Payment Systems Oversight Report* 2004 and 2005, Jackson and Manning (2007), Lasaosa and Tudela (2008) and Becher, Millard and Soramäki (2008).

indirect participant; in the second case, the indirect participant has a credit exposure to the settlement bank. Credit risk crystallises if one of the parties fails while owing money to the other. If the credit exposure is large, it can threaten the solvency of the bank and in this way payment systems can act as a source of contagion in the financial system.

- **Liquidity risk**. A settlement bank could be exposed to liquidity risk if it uses its liquid resources to make payments on behalf of indirect participants, where there are few offsetting incoming payments to the indirect participants. Additionally, the indirect participant may also be exposed to liquidity risk if the settlement bank decides to cut its credit limits at short notice and is reliant on the settlement bank providing an overdraft to fund its payments.

- **Operational risk**. Indirect participants rely on their settlement bank to make payments on their behalf. An operational incident such as a computer or hardware failure at the settlement bank would impact the other banks that use its services, preventing their payments from being processed. If large enough, these spillover effects could lead to wider disruption to the financial system.

A tiered structure can also offer some benefits. There are a number of costs related to direct participation, including: employing staff to manage the flow of payments and to manage liquidity; procuring and maintaining computer systems and hardware to handle the flow of payments; and the cost of holding sufficient liquidity at the settlement agent to facilitate settlement. These costs mean that it may be uneconomical for some banks to become direct participants, especially those banks that make relatively few payments. Economies of scale may enable settlement banks to offer payments to an indirect participant at a lower unit cost than direct participation. For systems which settle in central bank money, the costs of holding the collateral necessary to access central bank intraday liquidity may outweigh the benefits of direct participation, although settlement banks may well charge for the provision of liquidity as part of the costs of providing payment services to their customers.

It is not possible to eliminate all of the risks that indirect participation brings to a payment system, so financial authorities need to take a view on whether or not the systemic importance of an indirect participant in a payment system warrants a change to direct participation in order to reduce risks to the system. Any additional costs relating to joining the system would be borne by the indirect participant when it begins to participate directly, but the benefits to financial stability would be shared among all participants, as the likelihood of losses crystallising and potential contagion would be reduced.

The CHAPS payment system

CHAPS and the Bank of England's role

CHAPS is the payment system designed for making real-time, high-value sterling payments. The system is used for the settlement of wholesale market transactions by financial institutions. It can also be used by individuals to make lower value but time-critical payments such as house purchases. In 2012, it settled payments with a total value of £285 billion on an average day, equivalent to around 50 times the nominal value of UK GDP over the year.

The CHAPS system is operated by CHAPS Clearing Company Limited (CHAPS Co), whose responsibilities include setting system rules, monitoring compliance and admitting new members. CHAPS Co is owned by its direct participants, with each settlement bank having a representative on the CHAPS Board, alongside three independent directors. The criteria for becoming a CHAPS direct participant are publicly available.(1)

The Bank of England is the settlement agent for CHAPS, and payments are settled over the Bank's Real-Time Gross Settlement (RTGS) infrastructure. All the CHAPS settlement banks hold settlement accounts with the Bank in RTGS in order to facilitate the transfer of funds arising from their payment obligations. When one of the settlement banks wants to make a CHAPS payment, it sends a payment message to the RTGS infrastructure via the SWIFT network. Assuming the settlement bank has sufficient liquidity available, the RTGS infrastructure transfers the money from the paying bank's settlement account to the settlement account of the recipient bank. The benefit of using an RTGS system is that no credit risk arises as a result of the payment mechanism. The transfer is made individually, irrevocably and in real time, meaning the beneficiary's settlement bank has certainty as soon as the payment message is received that the funds have been received in its account.

In addition to its role as settlement agent, the Bank has two other distinct roles relating to CHAPS: first, the Bank is a CHAPS settlement bank making high-value sterling payments for its own customers, such as HM Government; and second, the Bank has statutory responsibilities with regard to financial stability, as set out in Part 5 of the Banking Act 2009, to conduct oversight of systemically important payment systems, including CHAPS.(2)

Tiering in CHAPS

CHAPS is a highly tiered system. The major UK settlement banks' direct participation in CHAPS and its predecessor payment systems can be traced back over 100 years. CHAPS currently has 20 settlement banks, including both domestic

(1) See www.chapsco.co.uk/membership/joining_chaps/.
(2) See www.legislation.gov.uk/ukpga/2009/1/pdfs/ukpga_20090001_en.pdf.

and international banks, and approximately 4,500 indirect participants (including non-banks and corporates) which access the payment system via a banking relationship with one or more of the settlement banks.(1) The large number of indirect participants reflects, in part, the status of London as an international financial centre. International banks have typically been comfortable with correspondent banking relationships and, historically, only a few judged there to be material benefits in direct access.

For a number of years, the Bank has highlighted the merits of reducing the risks that arise from tiering in CHAPS through increasing direct participation. However, several factors combined to create the basis for a renewed focus on this issue over the past five years. The financial crisis highlighted the need to address low-probability events and eliminate arrangements whereby some banks were 'too big to fail'; the Bank's payment systems oversight regime was put on a statutory basis at the end of 2009; and improved, richer CHAPS payment data became available in 2010, enabling the Bank to analyse the risks of the participation structure more deeply, and providing a stronger evidence base for making the case for wider direct participation. The box on pages 375–77 describes the analysis undertaken by the Bank in further detail.

The financial crisis made indirect participants more receptive to becoming settlement banks. Following consultation with the Bank of England, four banks became direct participants between 2007 and 2010: Bank of America, Danske Bank, JPMorgan Chase Bank and UBS. These banks evaluated the risks and costs of indirect participation and took the decision to become settlement banks in order to mitigate them.

Costs of indirect participation

It can be hard to compare the costs of direct and indirect participation. An indirect participant often pays its settlement bank for a bundle of payment services, so the specific costs relating to CHAPS participation are less identifiable. In contrast, the costs of direct participation such as technical or liquidity costs are relatively easy to estimate. These costs may discourage a bank from considering direct participation.

The cost of indirect participation in CHAPS has probably increased since the onset of the financial crisis. This follows the general shift in securing exposures with collateral in order to reduce risks — which has been reflected in correspondent banks' reduced appetite for unsecured intraday lending to their indirect participant customers.(2) Although some banks with low values of payments may still be able to rely on intraday credit lines from their settlement bank, there has been a notable shift towards settlement banks requiring larger indirect participants to 'pre-fund' their CHAPS payments. Pre-funding entails the indirect participant holding funds at the settlement bank so that an intraday credit line is unnecessary. This creates an exposure for the indirect participant and means that one of the largest, previously hidden costs of indirect participation has become quantifiable.

Reducing the extent of CHAPS tiering

Working with CHAPS Co and others, the Bank implemented a strategy to mitigate the risks arising from tiering in CHAPS. The Bank's analysis determined which indirect participants could be considered systemically important to the CHAPS system, concluding that six banks should be targeted for direct participation. Beginning in 2011, the Bank engaged with these six indirect participants, their settlement banks, prudential banking supervisors and CHAPS Co to discuss the risks and encourage these banks to become direct participants in CHAPS. The Bank highlighted the importance that it placed on them becoming direct participants in CHAPS and reducing financial stability risks in the system.

In parallel, CHAPS Co developed system rules that seek to limit the potential for significant risks to build up as a result of tiered participation in the system.(3) In summary, the CHAPS rules, adopted in April 2012, create a presumption that banks with a significant value of sterling payments should participate in the CHAPS system directly, and give the CHAPS Board the power to preclude indirect relationships that present unacceptable systemic risks. An indirect relationship may be prohibited if an indirect participant's average daily payment activities exceed either: (i) 2% of the average total payment activity, by value, processed each day; or (ii) 40% of the average daily value of its settlement bank's own payments.(4) The CHAPS system rules also require the company to consider the credit and liquidity risks that arise between members.

Against this background, the six target banks concluded that the benefits outweighed the costs and decided to become direct participants. Of the many smaller institutions that are eligible to become direct participants, analysis suggests that, for the vast majority, their payment values are too small for direct participation to generate systemic risk reduction relative to its costs. It is therefore unlikely that many further candidates for direct participation will be identified as systemically important in the near future. However, the Bank and CHAPS Co will continue to monitor payment flows and engage banks whose payment values rise sufficiently to warrant direct participation.

(1) See CHAPS Clearing Company Limited (2013). For details of the current CHAPS membership see www.chapsco.co.uk/membership/current_members/.
(2) See Jackson and Sim (2013).
(3) See www.chapsco.co.uk/-/page/2509/.
(4) Includes payments sent through the CHAPS system, and payments that are internalised across the books of a direct participant, rather than entering the CHAPS system (for example where two indirect participants are customers of the same direct participant). See sections D & E of the CHAPS Tiering Criteria for further details: www.chapsco.co.uk/files/chaps/governance_documents/tiering_criteria_2013.pdf.

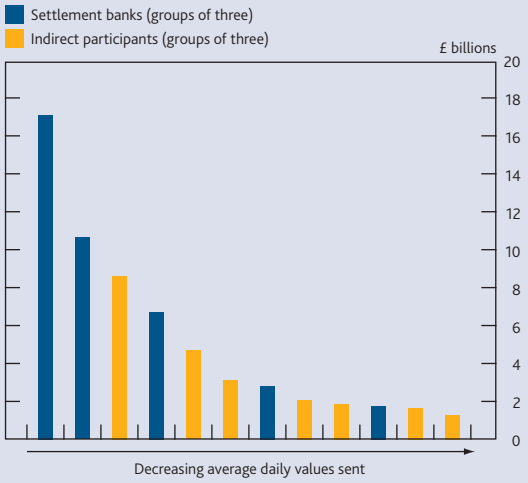
Choosing a target level of tiering in the CHAPS network

This box describes the analysis undertaken by the Bank to support the detiering initiative and understand the impact on the CHAPS network of a larger number of settlement banks. The analysis showed that if the largest indirect participants became settlement banks, the system would be significantly less concentrated; and that these additional banks are as connected to the rest of the network as the existing direct participants, further supporting the case for their direct participation.

The Bank conducted analysis to identify which indirect participants are systemically important to the CHAPS system — that is, matter for the stability of the system as a whole. The results of this analysis suggested that only a modest number of additional new direct participants was required to secure significant benefits to financial stability.(1) The banks approached to consider direct participation in CHAPS were selected on the basis of the results of that analysis.

Chart A shows that the values of payments made in CHAPS by the largest indirect participants in 2011 were similar to those made by mid-sized settlement banks, and substantially larger than the smallest settlement banks (the blue bars represent the existing direct participants, and the orange bars represent indirect participants, grouped into sets of three, to ensure that the confidentiality of payment flow data of individual institutions is preserved).

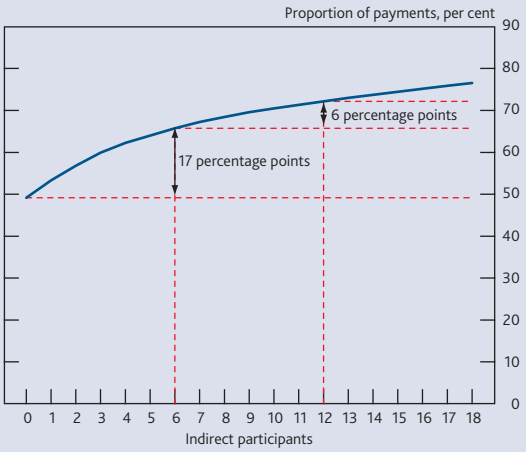
Chart A Average daily values sent by settlement banks and indirect participants, 2011(a)



(a) Banks are grouped in sets of three for anonymity.

If the six largest indirect participants, of which five are global systemically important banks,(2) became direct participants, the value of all CHAPS payments that are settled directly would increase from around 50% to approaching 70% (**Chart B**). **Charts A** and **B** also illustrate that the values of payments made by other indirect participants is lower, so there would be diminishing marginal benefit from requiring further direct participation in the CHAPS system. For example, if a further six indirect participants became direct participants, the value sent by direct participants would only increase by a further 6 percentage points.

Chart B Anticipated effect of increasing membership of CHAPS on the proportion of payments made by direct participants, 2011(a)



(a) There are around 4,500 indirect participants in CHAPS. The chart shows the effect of increasing CHAPS membership to include the largest 18 indirect participants by values sent in 2011.

When considering the systemic importance of a bank, the value of payments sent and received by a participant in CHAPS is a useful guide to the 'size' of a bank. However, it is also important to consider how connected a bank is to other banks within the network. The following section explains the network analysis undertaken by the Bank, and the concept of 'connectedness' in more detail. The Bank's network analysis authenticated the case for the six largest indirect participants becoming settlement banks on grounds of connectedness.

How 'connected' is the CHAPS network?

Banks that make or receive payments to a large number of other banks in the system may be more central to the network than those with a larger value of daily transactions, but fewer connections to the other banks. The more central a bank, the greater its potential to disrupt the rest of the network in the event that it fails. And the greater the risk of contagion, the stronger the policy case is for it to become a direct participant in order to mitigate risks to the stability of the United Kingdom's financial system.

By representing CHAPS as a network, it is possible to measure each bank's connectedness. If a large indirect participant is less connected, and therefore less central, than the settlement

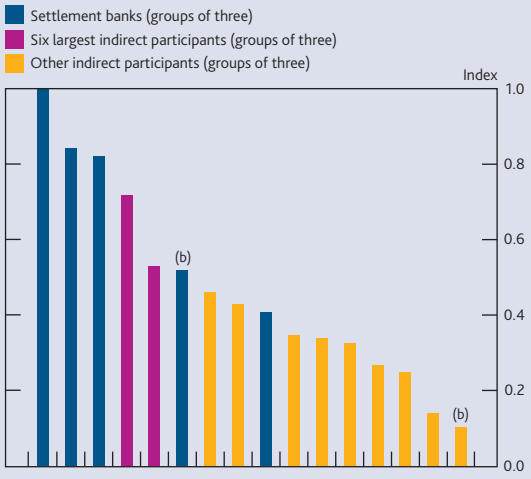
banks, the financial stability case for it joining CHAPS as a direct participant is less strong than if it is well connected.

The Bank's analysis used two well-established measures from the literature on network economics to assess connectedness. First, the proportion of payments (weighted by value) between pairs of banks that pass through a particular bank, or 'flow centrality'; and second, the number and value of a bank's links to other banks in the network, and how many connections those banks have in turn, or 'second-round centrality'.(3)

If a bank is the link between other important banks, the impact of it shutting down is large; flow centrality therefore captures how dependent other banks are on this bank. Second-round centrality, in turn, provides an indication of which nodes are more important in the propagation of a shock once knock-on effects are taken into account.

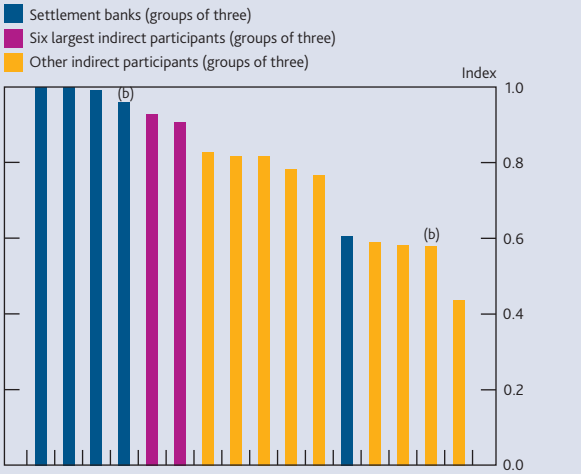
Charts C and **D** show that the largest indirect participants are as central to the CHAPS network as the settlement banks. The blue bars represent the existing direct participants, the magenta bars represent the six indirect participants targeted to become direct participants, and the orange bars represent other indirect participants. For both charts, all banks (direct and indirect participants) are collected into groups and then ranked in terms of their centrality. Each bar represents a group of three (or in some cases four) banks. **Chart C** shows the six largest indirect participants are of similar importance to the network as the direct participant in terms of the flow of payments (flow centrality), but the level of importance falls beyond the six largest indirects. **Chart D** shows that the dependency in terms of propagation of shocks (second-round centrality) declines less markedly after the six largest indirect participants, but that they are more central than some direct participants. It can therefore be concluded that the largest six indirect participants are broadly as systemic in CHAPS as settlement banks, not only in terms of values sent, but also in terms of connectedness.

Chart C Flow centrality in CHAPS, January 2011(a)



(a) Banks are grouped in sets of three and, in two cases, four, for anonymity. Banks are grouped according to values sent in 2011. A higher score indicates that the banks in that group are more important to the CHAPS network in terms of the flow of payments.
(b) Groups of four.

Chart D Second-round centrality in CHAPS, January 2011(a)



(a) Banks are grouped in sets of three and, in two cases, four, for anonymity. Banks are grouped according to values sent in 2011. A higher score indicates that the banks in that group are more central to the CHAPS network.
(b) Groups of four.

Depicting the CHAPS network

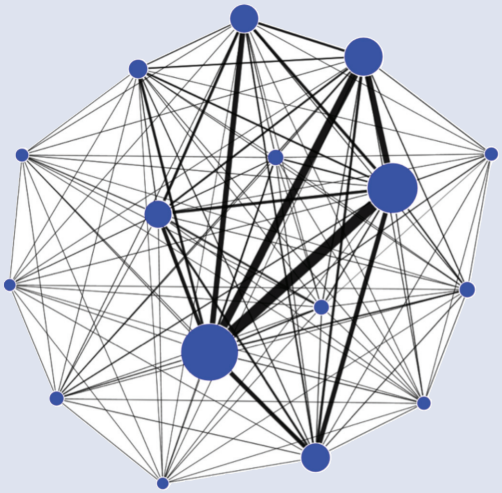
The CHAPS network, as of January 2011, is depicted in **Figure A**. Settlement banks are represented as nodes in the network and payments between banks, in both directions, form the links between these nodes. Each bank is represented by a circle proportional in size to the value of payments sent on a typical day. The lines between banks represent the payments sent, with the thickness proportional to their value. Note that all payments are represented as 'belonging' to the settlement banks sending and receiving them, including those made on behalf of indirect participants using the settlement bank. **Figure A** shows that the CHAPS network as of January 2011 is a very well-connected network, with practically all (96%) of potential links between banks being used.

Figure B shows how the CHAPS settlement bank network would look if the largest six indirect participants as of January 2011 (represented by red circles) became direct participants. To carry out the simulation, the model supposes that the largest six indirect participants become settlement banks, and assigns to these new settlement banks the payments that they previously sent or received through their former settlement bank.

Two observations stand out from this network, in contrast to the one depicted in **Figure A**. First, the reduced size of the largest nodes and reduced width of the largest links illustrates that risk has been mitigated by the reduction in dependency on a small number of key settlement banks. Second, this network is just as well connected as the settlement bank

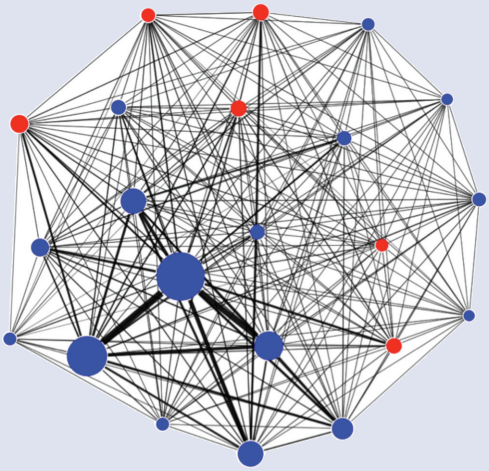
network depicted in **Figure A** — 96% of potential links are active; in other words, adding these six banks as direct participants does not dilute the connectedness of the network. This is further evidence that the largest six indirect participants in CHAPS are as well connected as current settlement banks, supporting the case for them to become direct participants.

Figure A CHAPS settlement network, January 2011(a)



(a) The size of the circles is proportional to the value of payments sent by each bank on a typical day. The thickness of the connections is proportional to the value of payments sent between banks.

Figure B The CHAPS settlement network if the six largest indirect participants joined, January 2011(a)



(a) The size of the circles is proportional to the value of payments sent by each bank on a typical day. The six largest indirect participants, according to values sent in 2011, are included in red. The thickness of the connections is proportional to the value of payments sent between banks.

(1) See Salmon (2011).
(2) As defined by the Financial Stability Board.
(3) 'Flow centrality' is called 'betweenness centrality' and 'second-round centrality' is called 'eigenvector centrality' in the network literature.

Detiering progress

By 2015, 25 banks are on course to be CHAPS direct participants, an increase of eleven since the 2007–08 financial crisis. The six banks identified by the Bank as systemic in 2011 — BNP Paribas, BNY Mellon, ING, Northern Trust, Société Générale and State Street — have all decided to become settlement banks; State Street completed its transition to direct participation in September 2012. One additional bank, Handelsbanken, recently became a settlement bank independently of the Bank's detiering initiative.

These seven banks, in conjunction with the four banks that became direct participants between 2007 and 2010, collectively account for more than 26% of the value of payment flows in CHAPS. They all previously accessed CHAPS as indirect participants via settlement banks. Once all become direct participants, nine of the largest fourteen global systemically important banks (G-SIBs) will be settlement banks in CHAPS; the remaining five G-SIBs do not process significant values in CHAPS. The proportion, by value, of CHAPS payments settled directly between settlement banks will increase to approaching 70%, compared with around 40% at the time of the 2007–08 financial crisis.(1) This will significantly reduce risks to financial stability.

There are parallels to tiering risks in other systems, most notably CREST, the United Kingdom's securities settlement system. The Bank is working alongside CREST's system operator to identify those indirect participants with sufficient business to warrant becoming CREST settlement banks. Analysis of UK retail payment systems indicates that the risks are not currently significant enough to require action on tiering for financial stability reasons. While these systems do exhibit a high degree of tiering, the flows of indirect participants are relatively small and so the consequent risks for financial stability are lower.

The Bank's detiering efforts and the CHAPS system rule will ensure that banks that grow to become systemically important will be identified as candidates for direct participation. However, other banks that meet the requirements for direct participation may also choose to become settlement banks and enjoy the benefits of RTGS settlement, even if the values they process via CHAPS are not of systemic importance.

Conclusion

The Bank assessed the risks to financial stability that arise from tiered participation in CHAPS and has acted to reduce these risks by encouraging the most systemically important banks in sterling wholesale payments to participate directly in CHAPS.

(1) See Salmon (2013).

The direct participation of the six banks identified by the Bank will reduce settlement risks between some of the largest banks operating in the United Kingdom.

The system rules that CHAPS Co has adopted ensure that indirect participants in CHAPS will be monitored and those that grow to become systemically important will be encouraged to become settlement banks. Meanwhile, banks that are not identified as systemic to the CHAPS system can choose to become settlement banks to benefit from the risk reduction that direct participation brings about.

This action has resulted in a material reduction in the risks that settlement of high-value payments creates as part of the Bank's ongoing work to protect and enhance the stability of the UK financial system.

References

Becher, C, Millard, S and Soramäki, K (2008), 'The network topology of CHAPS Sterling', *Bank of England Working Paper No. 355*.

CHAPS Clearing Company Limited (2013), *CHAPS Market Report 2013*.

Dent, A and Dison, W (2012), 'The Bank of England's Real-Time Gross Settlement infrastructure', *Bank of England Quarterly Bulletin*, Vol. 52, No. 3, pages 234–43.

Greenspan, A (2007), *The age of turbulence. Adventures in a new world*, Penguin Press, New York.

International Monetary Fund (2003), 'United Kingdom: financial system stability assessment', available at www.imf.org/external/pubs/ft/scr/2003/cr0346.pdf.

International Monetary Fund (2011), 'Financial sector assessment program. United Kingdom: observance by CHAPS of CPSS core principles for systemically important payment systems detailed assessment of observance', available at www.imf.org/external/pubs/ft/scr/2011/cr11237.pdf.

Jackson, C and Sim, M (2013), 'Recent developments in the sterling overnight money market', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 223–32.

Jackson, J and Manning, M (2007), 'Central bank intra-day collateral policy and implications for tiering in RTGS payment systems', *De Nederlandische Bank Working Paper No. 129*.

Lasaosa, A and Tudela, M (2008), 'Risks and efficiency gains of a tiered structure in large-value payments: a simulation approach', *Bank of England Working Paper No. 337*.

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

Salmon, C (2013), 'The UK payments landscape', available at www.bankofengland.co.uk/publications/Documents/speeches/2013/speech691.pdf.

Recent economic and financial developments

Markets and operations

- The Bank announced changes to the Sterling Monetary Framework designed to increase the availability, term and flexibility of the liquidity insurance it supplies to the UK banking system.
- The Bank also maintained its accommodative monetary policy stance.
- The decision by the Federal Reserve not to slow the pace of its monthly asset purchases following its September meeting led to a fall in short-term interest rates internationally.
- The European Central Bank (ECB) also announced an easing in monetary policy, including a reduction in its main refinancing rate.
- Market expectations of Bank Rate reached 0.75% by around 2015 Q3, slightly later than at the start of the review period.

Overview

The Bank announced a number of changes to its operational frameworks during the review period. In October, changes were made to the Sterling Monetary Framework, through which the Bank implements monetary policy and supports financial stability. These changes are designed to increase the availability, term and flexibility of the liquidity insurance the Bank supplies to the UK banking system. In November, the terms of the Bank's Funding for Lending Scheme were modified to remove incentives to expand household lending, in order to reduce risks from the housing market.

The Bank of England's Monetary Policy Committee maintained Bank Rate at 0.5% and the stock of asset purchases financed by the issuance of central bank reserves at £375 billion. The Committee reached this decision in the context of the monetary policy guidance it announced alongside the publication of the August 2013 *Inflation Report*. Overall, the path of Bank Rate implied by market interest rates fell over the review period.

Market interest rates in advanced economies had increased in expectation that the US Federal Reserve would announce a reduction in the pace of its monthly asset purchases — or 'tapering' — following its September meeting. But, in the event, the Federal Open Market Committee surprised most market participants by deciding not to taper. This caused market rates to fall back somewhat. Later in the review period, the ECB lowered its main policy rate, loosening rather sooner than had been anticipated by many market participants.

Declines in short rates were offset by improvements in the medium-term growth outlook in the United States and United Kingdom, leaving longer-term interest rates broadly unchanged over the review period. In contrast, expectations for economic activity in the euro area remained more subdued. German government bond yields fell by around 10 basis points over the review period, with the gilt-bund spread reaching its widest level since 2010. Reflecting differences in expectations for monetary policy across advanced economies, the sterling exchange rate index increased 4% over the review period.

International equity indices rose, with the US debt ceiling negotiations causing only a temporary decline in share prices. And European stocks were reported to have benefited from strong foreign capital inflows, especially from US investors. Corporate bonds were also broadly unaffected by the short-lived turbulence in the market for US Treasuries, and credit spreads continued to decline, particularly for UK corporates.

In discharging its responsibilities to ensure monetary and financial stability, the Bank gathers information from contacts across a range of financial markets. Regular dialogue with market contacts provides valuable insights into how markets function, and provides context for the formulation of policy, including the design and evaluation of the Bank's own market operations. The Bank also conducts occasional surveys of market participants in order to gather additional information on certain markets.

The first section of this article reviews developments in financial markets between the 2013 Q3 *Quarterly Bulletin* and 29 November 2013. Boxes offer detail on recently announced changes to the Bank's approach to providing liquidity insurance to the banking system, progress towards a fully functioning market for additional Tier 1 capital, and a first assessment of the international impact of US rules on trading of standardised over-the-counter (OTC) derivatives. The second section goes on to describe the Bank's own operations within the Sterling Monetary Framework.

Financial markets

Monetary policy and interest rates

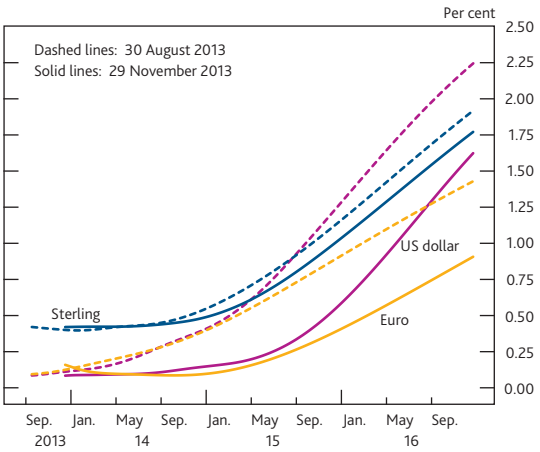
Throughout the review period, the Bank of England's Monetary Policy Committee (MPC) maintained Bank Rate at 0.5% and the stock of asset purchases financed by the issuance of central bank reserves at £375 billion. The MPC also reinvested the cash flows of £1.9 billion associated with the Asset Purchase Facility's (APF's) holdings of the maturing September 2013 gilt. The MPC reached these decisions in the context of the monetary policy guidance announced alongside the publication of the August 2013 *Inflation Report*,(1) according to which the Committee intended to maintain the stance of policy at least until unemployment had reached 7%, provided that this did not entail material risks to price stability or financial stability.

Recent years have seen substantial reforms to the Bank's Sterling Monetary Framework (SMF), through which it implements monetary policy and acts as a backstop provider of liquidity insurance to the UK banking system. In October, the Bank announced a number of changes to the SMF, partly as a result of the recommendations of the 2012 Court Review performed by Bill Winters. Taken together, these changes are designed to increase the availability and flexibility of that insurance, by providing liquidity at longer maturities, against a wider range of collateral, at lower cost and with greater predictability of access (see the box on page 382 for more detail).(2)

By the end of the review period, expectations for Bank Rate — as proxied by forward overnight index swap (OIS) rates — reached 0.75% by around 2015 Q3, slightly later than at the start of the review period. This was similar to the median expectation of economists surveyed in the Reuters poll. A majority of those surveyed also expected unemployment to fall to 7% — the threshold set by the MPC's forward guidance — a quarter before this. This provided some indication that market participants understood the MPC's intention that the 7% unemployment threshold represented a 'way station' at which the Committee would re-evaluate current policy settings, rather than an automatic cue for Bank Rate to rise.

As in the United Kingdom, monetary policy in the United States and euro area remained accommodative, and developed-market forward OIS rates of most maturities fell between the Q3 *Bulletin* and the data cut-off (**Chart 1**).

Chart 1 Instantaneous forward interest rates derived from OIS contracts(a)



Sources: Bloomberg and Bank calculations.

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

In the early part of the period, there developed a strong expectation that the US Federal Open Market Committee (FOMC) would announce tapering of its asset purchases following its September meeting. But, in fact, the FOMC left the pace of its monthly asset purchases unchanged, causing forward OIS rates to fall (**Chart 2**). Contacts suggested that this partly reflected market participants' belief that the FOMC's decision not to taper might signal it would raise the target federal funds rate later than expected. And the October Federal Reserve Primary Dealers Survey indicated that the FOMC was expected to begin to slow the pace of asset purchases at its March 2014 meeting, four months later than in the September survey.

An impasse in negotiations to approve a federal government budget led to a partial shutdown of the US government between 1 and 15 October. At the time, there was a notable rise in yields on Treasury bills maturing in the near term,

(1) Information on the Committee's forward guidance strategy can be found on the Bank's website at www.bankofengland.co.uk/monetarypolicy/Pages/forwardguidance.aspx.
(2) Full details of these changes can be found on the Bank's website at www.bankofengland.co.uk/markets/Documents/money/publications/liquidityinsurance.pdf.

Liquidity insurance — developments in the Sterling Monetary Framework

On 24 October 2013 the Bank announced changes to its approach to providing liquidity insurance to the banking system. These changes were made in light of the recommendations from the review carried out by Bill Winters into how recent reforms to the Sterling Monetary Framework (SMF) were working in practice and whether further changes were warranted.

The changes are designed to increase the availability and flexibility of liquidity insurance, by providing liquidity at longer maturities, against a wider range of collateral, at a lower cost and with greater predictability of access.

Summary of key changes

To reduce stigma and increase the flexibility of the Bank's liquidity insurance:

- The monthly market-wide indexed long-term repo auctions will be expanded from 2014, reducing the price and extending the amount, term and range of eligible collateral.
- The bilateral Discount Window Facility (DWF) has been repriced, introducing a lower, flat-rate 'entry fee', and smoothing the increase in fees for higher usage. The Bank has sought to reduce the financial stability risks posed by premature disclosure of DWF drawings, by extending its own disclosure lag and ensuring firms have the capacity to turn over their liquid assets in markets regularly. The Bank will continue to argue the case for ensuring that new national and international disclosure regimes do not increase that risk through other channels.
- The market-wide Extended Collateral Term Repo Facility is being retained, allowing the Bank to provide whatever liquidity is required in conditions of market-wide stress, against the widest collateral, and at a price it chooses.
- The Bank's list of eligible collateral, which has already been expanded significantly in recent years, will be extended further to include the drawn portions of corporate revolving credit facilities.
- The certainty with which banks can expect to be able to borrow from the Bank has been reinforced through a presumption that all banks and building societies that meet the Prudential Regulation Authority's (PRA's) threshold conditions may sign up for the SMF and have full access to borrow in its facilities.
- The Bank will use the new opportunities made available by the creation of the PRA to ensure that banks better integrate the availability of liquidity insurance into their liquidity planning and use the Bank's facilities at the appropriate time.
- The Bank's rule limiting banking groups to a single reserves account has been relaxed.

To improve the governance of the SMF:

- New decision-making machinery has been set up, led by a Deputy Governor and overseen by Court, to ensure that SMF decisions draw on a wide range of advice, and the views of Deputy Governors are recorded.
- The engagement of the Monetary Policy Committee and Financial Policy Committee in the SMF has been clarified and strengthened, through concordats setting out arrangements for information sharing and consultation.
- Starting in 2014, the Bank will compile and publish an annual review of the SMF, drawing on a wide range of internal and external views.

Over the coming year the Bank will:

- Examine the case for extending SMF access to some non-banks.
- Examine whether it can further clarify the circumstances in which, during periods of market-wide stress, it would be willing to act as market maker of last resort or extend term credit.
- Assist Court in its evaluation of the appropriate capital base for the Bank.

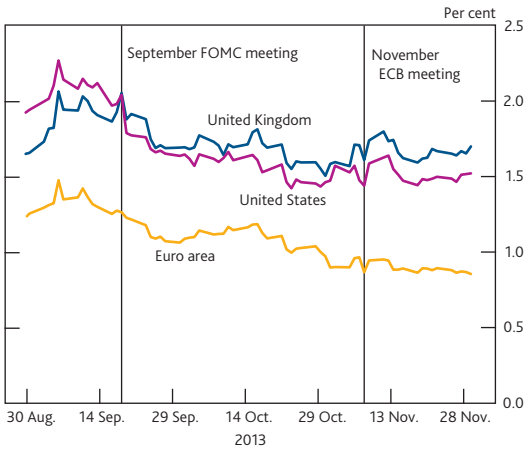
When market expectations begin to point to a near-term rise in Bank Rate, the Bank will:

- Evaluate the case for returning to reserves averaging (versus retaining the current 'floor' system for setting Bank Rate).

Further details on the approach are provided in 'Liquidity insurance at the Bank of England: developments in the Sterling Monetary Framework'(1) and in an updated edition of the Bank's 'Red Book',(2) which provides a comprehensive description of the SMF.

(1) Available at www.bankofengland.co.uk/markets/Documents/money/publications/liquidityinsurance.pdf.
(2) Available at www.bankofengland.co.uk/markets/Documents/money/publications/redbook.pdf.

Chart 2 Instantaneous forward OIS rates, three years ahead[a]

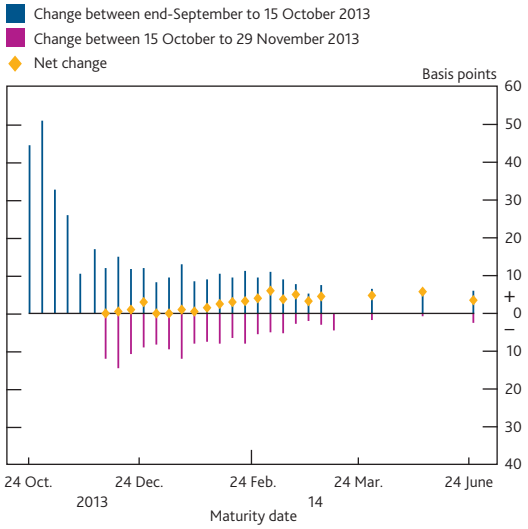


Sources: Bloomberg and Bank calculations.

(a) Forward rates derived from the Bank's OIS curves.

reflecting market participants' uncertainty about whether the US government would be able to meet upcoming coupon payments on its debt (**Chart 3**). On 16 October, Congress approved an extension of the US debt ceiling until 7 February 2014 and reopened the US federal government. This was associated with a sharp decrease in Treasury bill rates, albeit to levels slightly above those prevailing prior to the start of the shutdown. After the data cut-off, legislation to approve the Federal government budget for a further two years was approved by the US House of Representatives and was pending a vote by the Senate.

Chart 3 Changes in yields of US Treasury bills of different maturity dates

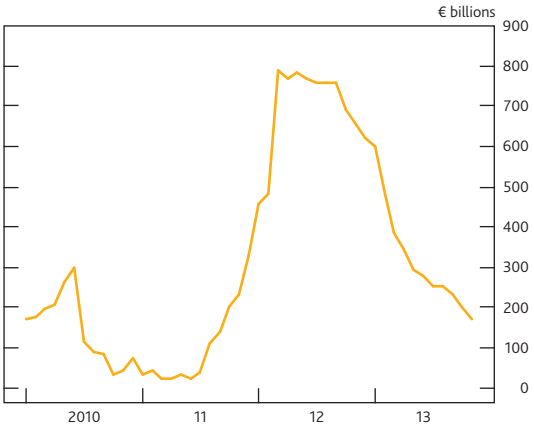


Sources: Bloomberg and Bank calculations.

Repo and other markets continued to function well during the shutdown, although contacts highlighted a material risk of disruption should the US government miss a payment. Channels through which stress in the US Treasury securities market could transmit to other markets and institutions are discussed in the latest *Financial Stability Report*.(1) During the period of the US government shutdown, new rules on the trading of standardised OTC derivatives contracts came into effect. Contacts reported that the coincidence of the rule change with the US shutdown had created additional uncertainty about the likely impact of the new regulation. But concerns about the potential implications of the rules on liquidity had, so far, proved to be unfounded. See the box on page 384 for further details.

In the euro area, ongoing repayments of the European Central Bank's (ECB's) three-year longer-term refinancing operations (LTROs) continued to reduce excess liquidity in the Eurosystem (**Chart 4**). And short-term euro-area market interest rates rose, corresponding to a marginal tightening in monetary conditions.

Chart 4 Excess liquidity in the Eurosystem[a]



Source: Bloomberg.

(a) Excess liquidity is defined as the total amount of reserves held in Eurosystem current accounts and the deposit facility, minus average reserves requirements and use of the marginal lending facility.

On 7 November, the ECB announced a 25 basis point cut in its main refinancing rate to 0.25% and reaffirmed the forward guidance it gave in July. At the same time, the ECB also announced an extension to the full-allotment policy used in its open market operations, from mid-2014 to mid-2015. Euro-area forward rates fell following the decision.

Turning to longer-term market interest rates, US and UK ten-year sovereign bond yields continued to comove closely, and ended the review period largely unchanged (**Chart 5**). In contrast, German government bond yields fell around 10 basis points, with the gilt-bund spread reaching over 100 basis points — its widest level since 2010 (**Chart 5**).

Foreign exchange

The sterling exchange rate index (ERI) appreciated by 4% over the review period, partly due to an improvement in the economic outlook for the United Kingdom (**Chart 6**). Contacts suggested that market participants had become more

(1) See pages 31–33 of the November 2013 *Financial Stability Report*.

Swap Execution Facilities

At their 2009 meeting in Pittsburgh, the G20 leaders agreed that 'all standardised OTC derivatives contracts should be traded on exchanges or electronic trading platforms where appropriate, and cleared through central counterparties'.(1) Considerable progress has already been made internationally in implementing central clearing for OTC derivatives, but few jurisdictions have introduced regulations for trade execution. Regulators in the United States have begun to introduce such measures, however, and some contacts had expressed concerns about the potential impact of the rules on overall market liquidity.

In the United States the G20 commitments for OTC derivatives are effected through Title VII of the Dodd-Frank Act.(2) Title VII establishes a framework for the mandatory trading of OTC derivatives and introduces the concept of a new type of multilateral trading venue called a Swap Execution Facility (SEF). Broadly, a multilateral trading venue is one where market participants are able to interact with multiple third-party interests. The Commodity and Futures Trading Commission (CFTC) finalised its swaps trading rules in May 2013.(3)

According to the CFTC rules, products that are subject to mandatory trading on exchanges or electronic trading platforms must be executed on a CFTC regulated exchange (Designated Contract Market) or a SEF.(4) SEFs are required to offer, at a minimum, order book trading functionality, where market participants submit prices at which they are willing to trade.(5) In addition, the CFTC stipulated that any venue that meets the SEF definition — broadly understood to encompass all multilateral trading venues — would need to register with the CFTC and meet all requirements associated with being defined as a SEF. This is regardless of whether the products they offer are subject to mandatory trading requirements or not. Given the global nature of the products and participants covered by the rules, the CFTC requirements impact trading venues and participants outside of the United States.

Electronic trading platforms were required to register as SEFs with the CFTC by 2 October 2013. Those platforms that missed the deadline would be unable to offer trade execution services to US persons. Market participants had expressed reservations about the ability of multilateral trading platforms to meet the CFTC's SEF requirements in time, or, indeed, the willingness of non-US persons to trade on SEFs. This prompted suggestions that market liquidity could be impaired around the deadline.

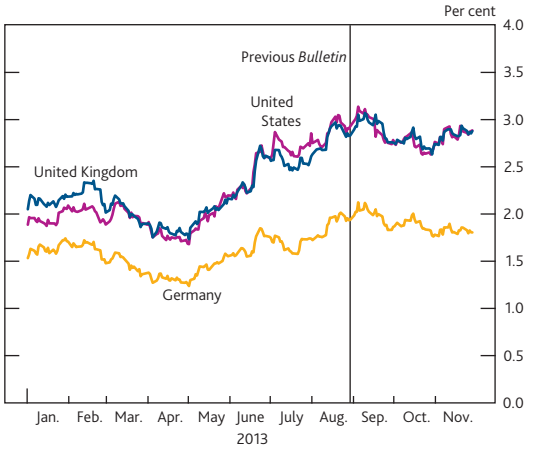
However, the actual impact of the SEF registration deadline was less significant than originally anticipated. Market contacts suggest that this reflected several factors. In part, it was because of the extension by the CFTC of certain requirements until early November 2013, and to end-June 2014 in some instances. But also, a number of multilateral trading venue operators allowed non-US persons, including certain non-US subsidiaries of US banks, to access their other trading platforms, not registered as SEFs. Furthermore, some market participants had switched to using other execution methods — including voice trading and single-dealer platforms — that were still available to them before mandatory trading determinations took effect.

That said, there were certain market segments, such as foreign exchange, and in particular non-deliverable forwards (NDFs), that did show some signs of being affected by the SEF deadline, as few relevant multilateral trading venues were willing or able to register as SEFs. Contacts noted that initial confusion about the rules and the inability of US persons to access non-SEF registered platforms did have a detrimental impact on overall NDF market liquidity.

Thus far, interest rate swaps have been most actively traded on SEFs, with the majority of trading volumes concentrated in US dollar interest rate swaps. On-SEF trading volumes for sterling and euro interest rate swaps remain modest.

(1) www.g20.org/sites/default/files/g20_resources/library/Pittsburgh_Declaration.pdf.
(2) In the European Union, the trading mandate will be implemented as part of the Markets in Financial Instruments (MiFID) review, led by the European Commission.
(3) The Securities Exchange Commission (SEC) and the Commodity and Futures Trading Commission (CFTC) have been tasked with producing the implementing regulations for securities-based swaps and swaps respectively. The SEC's rules are still at the proposal stage.
(4) As well as setting out requirements for trading platforms, the CFTC will indicate which products are subject to the mandatory trading requirements. Under the rules, trades of large size (block trades) will not be included in the mandate.
(5) Also, under the rules, SEFs can offer a request for quote (RFQ) system. But for SEFs, RFQ functionality requires customers to submit requests for quotes to at least two unaffiliated market participants (RFQ2), and to three (RFQ3) from October 2014. Contacts report that RFQ2 and RFQ3 can represent a high hurdle for products which trade only irregularly.

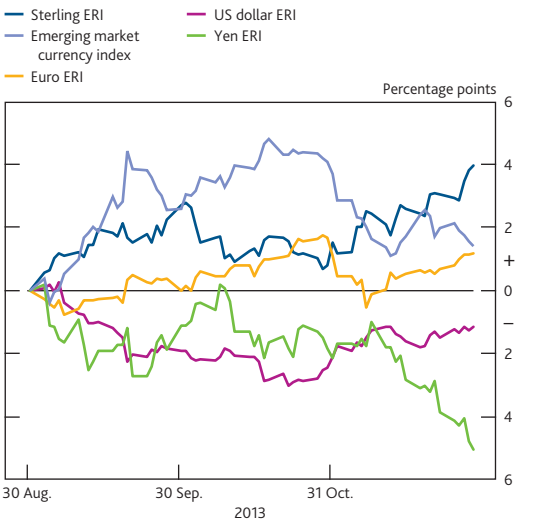
Chart 5 Selected ten-year government bond yields[a]



Sources: Bloomberg and Bank calculations.

(a) Yields to maturity derived from the Bank's government liability curves.

Chart 6 Changes in selected exchange rate indices since 29 August 2013



Sources: Bloomberg, European Central Bank, JPMorgan Chase & Co. and Bank calculations.

balanced in their outlook for sterling, in light of consistently strong economic data, perceiving there to be less of a downside risk to sterling than had previously been the case.

Meanwhile, the US dollar ERI depreciated by 1%. There was a sharp decline in the index following the FOMC's decision in September not to slow the pace of its monthly asset purchases and dollar weakness continued during the federal government shutdown. Contacts noted that the uncertainty caused by the government shutdown led to some temporary 'safe haven' flows out of the dollar, and into sterling and the euro. Despite depreciating on the day of the ECB's decision to lower its refinancing rate, the euro ERI rose over the period. This was partly due to the euro's appreciation against the yen.

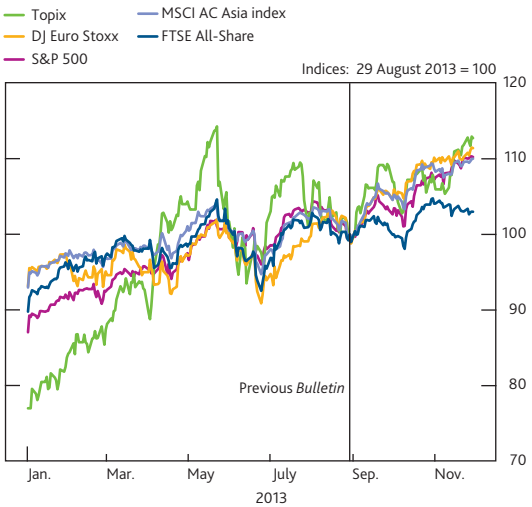
The yen ERI fell by 5% over the review period following speculation about a possible extension to the Bank of Japan's quantitative and qualitative monetary easing (QQE), along with expectations of outflows by large domestic institutional investors.

Emerging market currencies had depreciated markedly during the summer, when markets first began to focus on the risks for emerging economies arising from a change in current US monetary policy settings. Some of that depreciation reversed over the review period, partly due to the postponement of tapering in the United States, improved economic data, and remedial policy measures in some countries. And investors continued to place greater emphasis on differences between countries in terms of underlying economic fundamentals, than had been the case earlier in the year.

Corporate capital markets

International equity indices rose over the review period, with the US debt ceiling negotiations causing only a temporary decline in share prices (**Chart 7**). According to contacts, reduced US political risks, coupled with the unexpected September FOMC decision not to taper, boosted investor demand for risky assets. The decision by the FOMC not to slow the pace of asset purchases in September also alleviated some of the stress in emerging equity markets that had been observed since the spring.

Chart 7 International equity indices[a][b]



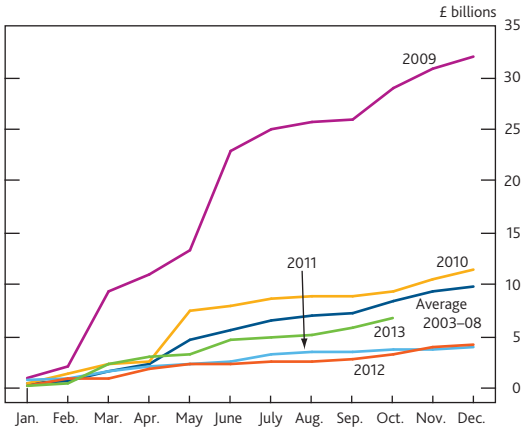
Sources: Bloomberg and Bank calculations.

(a) Indices are quoted in domestic currency terms, except for the MSCI AC Asia index, which is quoted in US dollar terms.
(b) The MSCI AC Asia index is a free-float weighted index that monitors the performance of stocks in Asia.

In Europe, stocks were reported to have benefited from strong foreign capital inflows, especially from the United States, where valuations in the domestic market were already perceived to be elevated. And contacts thought that concerns among US investors about the risks associated with the euro-area sovereign debt crisis had diminished, encouraging a return to the market.

Improving sentiment about growth in the United Kingdom had encouraged a modest pickup in UK equity issuance in the spring. This had continued despite the volatility during the summer. Over the year to date, gross equity issuance was materially higher than during the same period over the past two years (**Chart 8**).

Chart 8 Cumulative gross equity issuance by UK private non-financial corporations



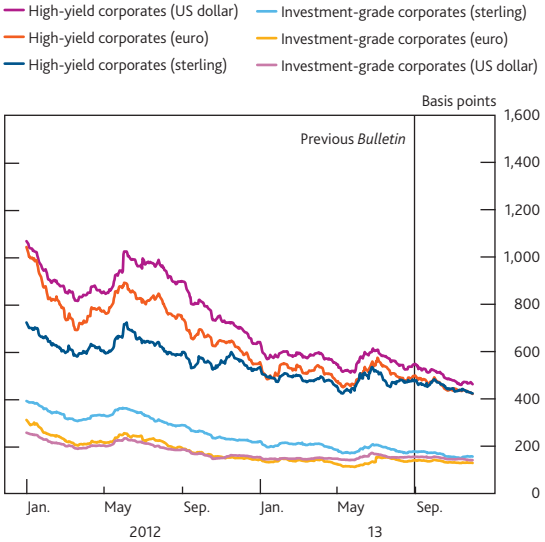
Appetite for equity issuance by privately owned companies had also increased, with a pickup in the overall value of initial public offerings (IPOs) over the course of the year. But contacts reported that investment banks' IPO pipelines remained small compared with pre-crisis. And many contacts were cautious about the prospects for the market, viewing the recent uptick in IPOs as only a temporary reopening of the market, rather than a structural shift toward a more stable environment for corporate flotations.

In corporate bond markets, secondary market bond spreads continued their gradual decline. Spreads were broadly unaffected by the temporary turbulence in the market for US Treasuries (**Chart 9**). High-yield corporate bonds, in particular, were still reported to be benefiting from strong demand.

Sterling spreads on both investment-grade and high-yield bonds fell by more than dollar and euro spreads. Contacts suggested that a relatively bigger improvement in the outlook for UK economic activity, versus prospects for the United States and euro area, was likely to have been a factor. But they also pointed to lower sterling bond supply, compared with euro and dollar-denominated bond issuance. There was a strong pickup in sterling primary issuance in November, as corporates took advantage of low spreads and calm market conditions.

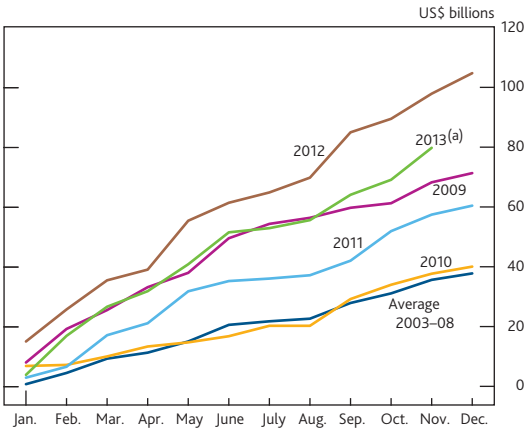
With the exception of the period around the October debt ceiling negotiations, corporate bond issuance remained strong (**Chart 10**). Net issuance by UK corporates was positive for the

Chart 9 International corporate bond option-adjusted spreads



Sources: Bank of America Merrill Lynch and Bank calculations.

Chart 10 Cumulative gross bond issuance by UK private non-financial corporations(a)



Sources: Dealogic and Bank calculations.

(a) Data up to 29 November 2013.

first time since June. Contacts reported that new issues were often heavily oversubscribed and attracted only a negligible yield premium versus outstanding secondary market bonds. And the review period saw the biggest-ever bond issue — a US$49 billion bond offering by the US telecom company Verizon. Even at that large size, the deal was more than twice oversubscribed. Contacts speculated that the sale might have reopened the corporate bond market for the sizable issues associated with large debt-financed mergers and acquisitions.

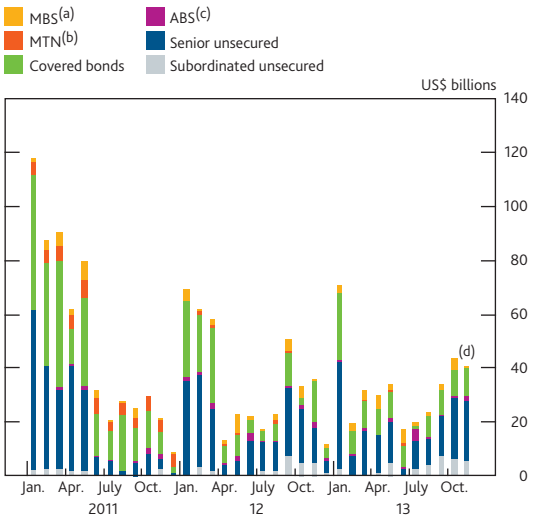
Issuance of collateralised loan obligations (CLOs) and loans with few covenants, or 'cov-lite', continued apace in the United States, with debt to earnings ratios on new loans drifting higher. The pipeline for European CLOs was also reported to be building up, with contacts citing robust demand for low-rated tranches, which offer the highest returns. But a lack of demand for the higher-rated tranches, the relative

scarcity of leveraged loans suitable for securitisation, and risk retention requirements set by the European Banking Authority, are expected to continue to constrain the pace of issuance.

Bank funding markets

European bank issuance of term funding picked up over the review period (**Chart 11**), including from banks based in periphery euro-area countries. Contacts noted that bank debt was in high demand following a dearth of issuance in June. Issuance had begun earlier than usual following the typical seasonal summer lull, as banks sought to raise funds ahead of potential volatility surrounding the September FOMC meeting. Some issuers had paid a relatively large premium to complete deals.

Chart 11 Term issuance by European (excluding UK) lenders in public markets



Sources: Dealogic and Bank calculations.

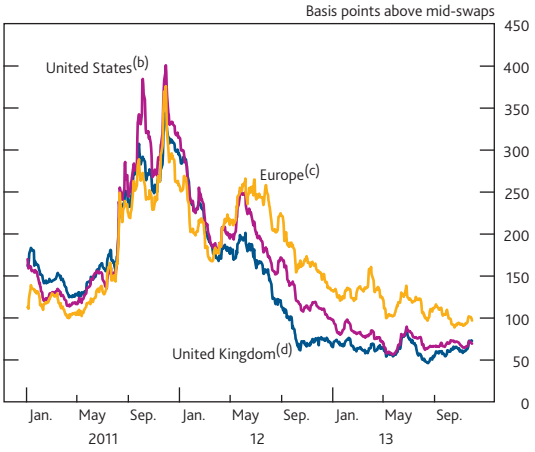
(a) Commercial and residential mortgage-backed securities.
(b) Medium-term notes.
(c) Asset-backed securities.
(d) Data up to 29 November 2013.

In the United Kingdom, contacts continued to emphasise that UK banks' funding needs remain low. But even among UK lenders, primary market bond issuance did rise somewhat during the review period. And there was sizable issuance of euro-denominated senior unsecured debt for the first time since early 2012.

In the secondary market, bond spreads remained virtually flat for both US and UK banks, whereas borrowing costs for euro-area lenders continued on their gradual downward trend (**Chart 12**). A number of Irish, Spanish and Portuguese banks issued senior unsecured debt for the first time in several years, at relatively low spreads.

On the regulatory front, the ECB announced details of the forthcoming 'comprehensive assessment' of banks to come under its supervision, which will conclude in October 2014. The exercise will consist of three elements: a supervisory review of key risks; an asset quality review (AQR); and a stress test. The main goals of the exercise are to improve transparency concerning the condition of banks and repair of their balance sheets, as well as to build confidence by assuring stakeholders that banks are fundamentally sound. Some contacts suggested that recent debt and equity issuance by European banks (see the box on pages 388–89) reflected a desire to bolster capital positions and lock in funding ahead of the comprehensive assessment.

Chart 12 Indicative senior unsecured bank bond spreads(a)

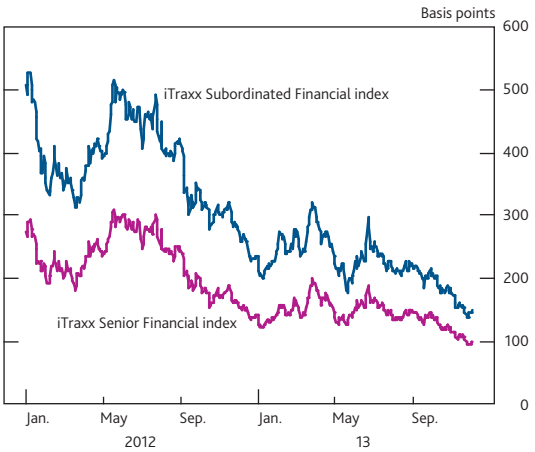


Sources: Bloomberg, Markit Group Limited and Bank calculations.

(a) Constant-maturity unweighted average of secondary market spreads to mid-swaps of banks' five-year senior unsecured bonds, where available. Where a five-year bond is unavailable, a proxy has been constructed based on the nearest maturity of bond available for a given institution and the historical relationship of that bond with the corresponding institutions' five-year bond.
(b) Average of Bank of America, Citi, Goldman Sachs, JPMorgan Chase & Co., Morgan Stanley and Wells Fargo.
(c) Average of Banco Santander, BBVA, BNP Paribas, Crédit Agricole, Credit Suisse, Deutsche Bank, Intesa, ING, Société Générale, UBS and UniCredit.
(d) Average of Barclays, HSBC, Lloyds Banking Group, Nationwide, Royal Bank of Scotland and Santander UK.

Following the announcement of the AQR, European bank equity prices fell, with the largest declines experienced by Italian, Spanish and Portuguese banks. However there were

Chart 13 Credit default swap spreads for European financial entities(a)



Source: Bloomberg.

(a) The iTraxx indices comprise equally weighted euro-denominated five-year credit default swaps on investment-grade European entities.

Additional Tier 1 (AT1) capital issuance

The Basel III capital framework increases the quantity and quality of capital that banks are required to hold. It includes a requirement that banks hold Tier 1 (T1) capital of at least 6% of their risk-weighted assets (RWAs). This is intended to ensure that banks can absorb losses on a 'going concern' basis — that is, without being subject to resolution. 4.5 percentage points of the T1 requirement must be common equity Tier 1 (CET1), and banks may meet the remaining 1.5 percentage points with additional Tier 1 (AT1) capital instruments. AT1 instruments are required to have features that guarantee they will be available to absorb losses. These take the form of 'triggers' that guarantee AT1 instruments will be written down or converted to shares if a bank's CET1 capital ratio falls below a certain value. This trigger feature means AT1 instruments are a form of contingent convertible (CoCo) debt.

Two key choices have guided the design of AT1 instruments. The first of these is the level of the triggers. Investors tend to prefer low triggers because this implies a lower probability of conversion or write-down. Basel III and CRD IV (which will implement Basel III in Europe) set the minimum trigger point at 5.125%. In the United Kingdom, the Prudential Regulation Authority has indicated that AT1 instruments should have a trigger that ensures that they convert before the bank fails. Such a trigger level may be above 5.125% for some banks.(1)

The second design choice is the mechanism through which AT1 instruments absorb losses once they have triggered. There is an ongoing dialogue between issuers and investors about whether it is preferable for AT1 instruments to convert into equity or to be written down once the trigger point is breached. Some investors, including some large pension funds and asset managers, prefer conversion into equity, as it enables them to have a continuing stake in a bank and potentially profit from any recovery. But other fixed-income investors express an aversion to equity conversion for two reasons:

- Some fixed-income mandates prohibit holding equity (including instruments that may convert to equity). It has been suggested that mandates could be changed if necessary and would probably adapt over time to include these instruments.

- It is also difficult to assess the losses arising following conversion, because of uncertainty about the prevailing market price at that point. This makes it difficult to value equity-converting AT1.

A further feature of AT1 that has recently attracted attention from market participants is the potential for payment of its coupons to be suspended. Under Basel III/CRD IV, issuers must have full discretion as to whether or not to pay coupons on AT1. There is also an automatic mechanism for restricting banks' distributions to investors (including coupons) should the issuing bank's capital ratio fall below certain regulatory buffers. These include: the capital conservation buffer; the countercyclical buffer, which is a macroprudential policy tool; and systemic risk surcharges. National regulators may also mandate additional capital requirements (denoted Pillar 2A/B) that could affect the likelihood of distribution restrictions applying.

Contacts expect that distribution restrictions are, in practice, more likely to occur than conversion, given that the trigger ratios on current AT1 instruments will probably be below future regulatory buffers. The potential for such restrictions reduces the value of AT1. In particular, Pillar 2 requirements — which form part of the regulatory buffer — might not be publicly disclosed. And, in addition, banks have flexibility to determine how the restrictions are allocated between coupons and other distributions, such as dividends to shareholders and staff remuneration. Contacts say these factors make it difficult for investors to measure this risk and factor it into their pricing.

Despite the perceived drawbacks noted above, in recent months the market for AT1 has begun to mature, with a number of successful issues by banks. Contacts report that banks have been keen to make use of AT1 instruments because they offer a relatively low-cost means for lenders to meet T1 capital and leverage ratio requirements. Contacts also suggest that issuance has been spurred by clarification of the features required for the instruments to be eligible as T1 capital, particularly the minimum level of trigger ratios. Some jurisdictions had also provided detail on the tax treatment of coupon payments.

Table 1 compares the trigger capital ratios of recent AT1 issues along with the means by which they absorb loss. They are divided between those that convert to equity and those that are written down. The recent AT1 instruments issued by

Table 1 Selection of recent AT1 capital issues

Issuer	Size	Trigger	Conversion terms
Société Générale	US$1.75 billion	5.125% CET1	Write-down
Credit Suisse	US$2.25 billion	5.125% CET1	Write-down
Barclays	€1 billion	7% CET1 (fully loaded)	Equity conversion
Barclays	US$2 billion	7% CET1 (fully loaded)	Equity conversion
Banco Popular	€0.5 billion	5.125% CET1/6% T1/4 quarters of losses reduce capital by 1/3	Equity conversion
Société Générale	US$1.25 billion	5.125% CET1	Write-down
Credit Suisse	CHF290 million	5.125% CET1	Write-down
BBVA	US$1.5 billion	5.125% CT1/CET1 (in steady state)	Equity conversion

Barclays attracted a large amount of investor interest and were oversubscribed by a wide margin, suggesting that investor reactions may be adapting as they become more familiar with AT1 and the broader implications of Basel III for bank capital issuance.

There has also been a diversification in the investor base for these instruments. Early issues tended to be taken up primarily by high-yield investors such as hedge funds and Asian investors. Recently, however, institutional investors, such as pension funds and insurers, have started to take a bigger share of new issuance. Contacts attribute this to less restrictive investment mandates alongside a broader search for higher-yielding investments.

(1) See Consultation Paper 5/13, 'Strengthening capital standards: implementing CRD IV', August 2013.

few obvious signs of increased concern in credit default swap (CDS) markets, which remained at multi-year lows across much of Europe. Indeed, some contacts expressed surprise at how little reaction to the announcement there had been in subordinated bond spreads, with the iTraxx indices for subordinated and senior CDS continuing to fall over the review period (**Chart 13**). On the whole, contacts viewed the announcement of the comprehensive assessment as positive, but noted that the effectiveness of the exercise would depend on certain details of the process that have yet to be clarified.

Operations

Operations within the Sterling Monetary Framework and other market operations

This section describes the Bank's operations within the Sterling Monetary Framework over the review period, and other market operations. The level of central bank reserves is determined by: (i) the stock of reserves injected via the Asset Purchase Facility (APF); (ii) the level of reserves supplied by indexed long-term repo (ILTR) operations and the Extended Collateral Term Repo (ECTR) Facility; and (iii) the net impact of other sterling ('autonomous factor') flows across the Bank's balance sheet.

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. As a consequence, average use of the deposit facility was £0 million in each of the August, September and October maintenance periods. Average use of the lending facility was also £0 million.

Indexed long-term repo open market operations

The Bank conducts ILTR operations as part of its provision of liquidity insurance to the banking system. These typically occur once every calendar month. 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'); the other set contains a broader class of high-quality debt securities that, in the Bank's judgement, trade in liquid markets ('wider collateral').

During the review period, the Bank offered £5 billion via three-month ILTR operations on both 10 September and 8 October 2013, and £2.5 billion via a six-month operation on 12 November (**Table A**).

Table A Indexed long-term repo operations

	Total	Collateral set summary	
		Narrow	Wider
10 September 2013 (three-month maturity)			
On offer (£ millions)	5,000		
Total bids received (£ millions)[(a)]	35	5	30
Amount allocated (£ millions)	35	5	30
Cover	0.00	0.00	0.01
Clearing spread above Bank Rate (basis points)		0	5
Stop-out spread (basis points)[(b)]	5		
8 October 2013 (three-month maturity)			
On offer (£ millions)	5,000		
Total bids received (£ millions)[(a)]	0	0	0
Amount allocated (£ millions)	0	0	0
Cover	0.00	0.00	0.00
Clearing spread above Bank Rate (basis points)		n.a.	n.a.
Stop-out spread (basis points)[(b)]	n.a.		
12 November 2013 (six-month maturity)			
On offer (£ millions)	2,500		
Total bids received (£ millions)[(a)]	0	0	0
Amount allocated (£ millions)	0	0	0
Cover	0.00	0.00	0.00
Clearing spread above Bank Rate (basis points)		n.a.	n.a.
Stop-out spread (basis points)[(b)]	n.a.		

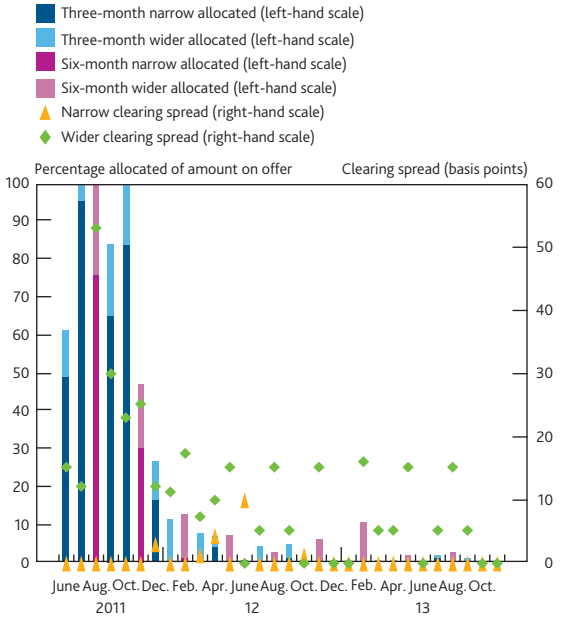
(a) Due to the treatment of paired bids, the sum of bids received by collateral set may not equal total bids received.
(b) Difference between clearing spreads for wider and narrow collateral.

Over the quarter, and in line with recent quarters, short-term secured market interest rates remained below Bank Rate — the minimum bid rate in the ILTR operations — making the ILTR facility a relatively more expensive source of liquidity. Reflecting this, usage of the facility remained limited over the period (**Chart 14**).

Extended Collateral Term Repo Facility

The ECTR Facility is a contingent liquidity facility, designed to mitigate risks to financial stability arising from a market-wide

Chart 14 ILTR reserves allocation and clearing spreads



shortage of short-term sterling liquidity.(1) The Bank reviews demand for use of the Facility on a monthly basis, in consultation with ECTR eligible institutions.(2) In the three months to 30 November 2013, the Bank did not conduct any ECTR auctions.

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. The average daily amount outstanding in the DWF between 1 April 2013 and 30 June 2013, lent with a maturity of 30 days or less, was £0 million.

Other operations

Funding for Lending Scheme

The Funding for Lending Scheme (FLS) was launched by the Bank and the Government on 13 July 2012. The FLS was designed to incentivise banks and building societies to boost their lending to UK households and non-financial companies, by providing term funding at low rates. The quantity each participant can borrow in the FLS, and the price it pays on its borrowing, is linked to its performance in lending to the UK real economy. The initial drawdown period for the FLS opened on 1 August 2012 and will run until 31 January 2014.

The Bank and HM Treasury announced an extension to the FLS on 24 April 2013, which will allow participants to borrow from the FLS until January 2015. The extended drawdown period will run from 3 February 2014 to 30 January 2015, following the initial drawdown period.(3)

On 28 November 2013 the Bank and HM Treasury announced changes to the terms of the FLS extension to refocus the incentives in the Scheme towards supporting small business lending in 2014.(4)

The Bank publishes quarterly data showing, for each group participating in the FLS, the amount borrowed from the Bank, the net quarterly flows of lending to UK households and firms, and the stock of loans as at 30 June 2012. On 2 December 2013, the Bank published data showing that in the quarter ending 30 September 2013, 21 participants made FLS drawdowns of £5.5 billion. This took the total amount of outstanding drawings under the Scheme to £23.1 billion, with 33 groups now benefiting from funding under the Scheme.(5)

US dollar repo operations

Since 11 May 2010, in co-ordination with other central banks, the Bank has offered seven-day US dollar liquidity in weekly fixed-rate tenders, and since 12 October 2011 the Bank has also offered US dollar tenders with a maturity of 84 days.

On 31 October 2013, the Bank alongside the Bank of Canada, the Bank of Japan, the European Central Bank, the Federal Reserve and the Swiss National Bank announced that swap arrangements were being converted to standing arrangements constituting a network of bilateral swap lines among the six central banks.(6) The arrangements allow for the provision of liquidity in each jurisdiction in any of the five currencies foreign to that jurisdiction, should the two central banks in a particular bilateral swap arrangement judge that market conditions warrant such action in one of their currencies. There was no use of the Bank's US dollar facilities during the review period.

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 (CRDs). The portfolio consists of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity, though sales may be made from time to time, reflecting, for example, risk or liquidity management needs or changes in investment policy. The portfolio currently includes around £4.7 billion of gilts and £0.4 billion of other debt securities.

(1) Further details are available at www.bankofengland.co.uk/markets/Pages/money/ectr/index.aspx.
(2) Further details are available at www.bankofengland.co.uk/markets/Documents/marketnotice121120.pdf.
(3) Further details are available at www.bankofengland.co.uk/markets/Documents/marketnotice130424.pdf.
(4) Further details are available at www.bankofengland.co.uk/markets/Documents/marketnotice131128.pdf.
(5) Further details are available at www.bankofengland.co.uk/markets/Pages/FLS/data.aspx.
(6) Further details are available at www.bankofengland.co.uk/publications/Pages/news/2013/125.aspx.

Asset purchases

As of 29 November 2013, outstanding asset purchases financed by the issuance of central bank reserves under the APF were £375 billion, in terms of the amount paid to sellers. On 7 November, the MPC voted to maintain the stock of asset purchases financed by the issuance of central bank reserves at £375 billion. There were no asset purchases over the period.

Gilts

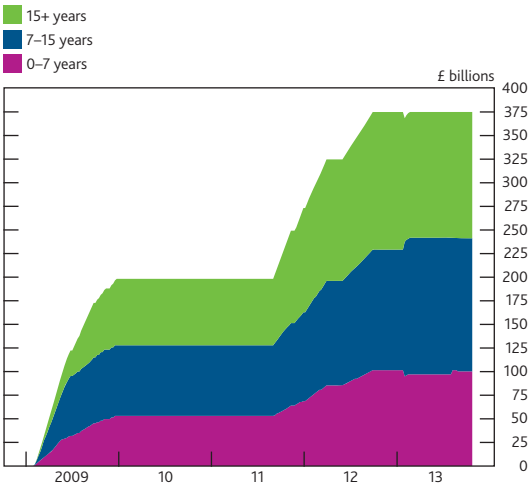
Alongside the publication of the August *Inflation Report* on 7 August, the MPC announced that it would maintain the stock of outstanding asset purchases by reinvesting the cash flows associated with all maturing gilts held in the APF. This reinvestment would continue while the Labour Force Survey unemployment rate remains above a 7% threshold, subject to the three knockout conditions outlined in the forward guidance publication, published together with the August *Inflation Report*.(1) In line with this the Bank reinvested the cash flows of £1.9 billion associated with the redemption of the APF's holdings of the September 2013 gilt. This reinvestment was completed over three reverse auction operations between 30 September and 3 October.

The total stock of gilts outstanding, in terms of the amount paid to sellers, was £375 billion, of which £100.3 billion of purchases were made in the 3–7 residual maturity range, £140.9 billion in the 7–15 residual maturity range and £133.8 billion with a residual maturity of greater than 15 years (**Chart 15**).

Gilt lending facility(2)

The Bank continued to offer to lend some of its gilt holdings via the Debt Management Office (DMO) in return for other UK government collateral. In the three months to 30 September 2013, a daily average of £274 million of gilts was lent as part of the gilt lending facility. Average daily lending in the previous quarter was £462 million.

Chart 15 Cumulative gilt purchases by maturity(a)(b)(c)



(a) Chart includes the March 2013 and September 2013 redemption and the subsequent reinvestments across the maturity sectors.
(b) Proceeds paid to counterparties on a settled basis.
(c) Residual maturity as at the date of purchase.

Corporate bonds

There were no purchases of corporate bonds during the review period and future sale or purchase operations will be dependent on market demand. The Bank will review that in consultation with its counterparties in the Corporate Bond Scheme.(3) The Scheme currently holds no bonds as the last remaining bonds matured in the last review period.

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.(4) The facility remained open during the review period but no purchases were made.

(1) For more information on the forward guidance threshold and the three knockouts, please see www.bankofengland.co.uk/publications/Documents/inflationreport/2013/ir13augforwardguidance.pdf.
(2) 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.
(3) More information can be found in the Market Notice available at www.bankofengland.co.uk/markets/Documents/marketnotice130627.pdf.
(4) The SCP facility is described in more detail in the Market Notice available at www.bankofengland.co.uk/markets/Documents/marketnotice120801.pdf.

Reports

The foreign exchange and over-the-counter interest rate derivatives market in the United Kingdom

By John Lowes of the Bank's Statistics and Regulatory Data Division and Tsvetelina Nenova of the Bank's Foreign Exchange Division.[1]

- In April this year, the Bank of England conducted its usual three-yearly survey of turnover in the United Kingdom's foreign exchange and over-the-counter (OTC) interest rate derivatives market.
- The results show that turnover in foreign exchange rose by just under one half (47%) between April 2010 and April 2013. The increase in turnover in OTC interest rate derivatives was more modest (9%) over the same period.
- This article reviews some short and long-term factors that are likely to account for the increase in foreign exchange turnover between the two surveys.

Overview

In April this year, the Bank of England conducted its usual triennial survey of turnover in the United Kingdom's foreign exchange and OTC interest rate derivatives market. This forms part of the latest worldwide survey co-ordinated by the Bank for International Settlements, with the aim of monitoring the structure of, and developments across, global markets.

Results of the UK survey

Average daily turnover in the UK foreign exchange market was US$2,726 billion during April 2013, 47% higher than in April 2010. This increase was larger than the rise reported across other major financial centres and cemented the United Kingdom's position as the largest centre of foreign exchange activity.

Similarly, the United Kingdom remained the largest financial centre for OTC interest rate derivatives, accounting for just under half (49%) of global daily turnover during April 2013. Turnover rose by a relatively modest 9% over the period.

Underlying influences on foreign exchange turnover

Short-term drivers are likely to account for some of the strong rise in foreign exchange turnover. In particular, the volume of trades involving the Japanese yen more than doubled during the latter part of the period, seemingly stimulated by monetary and fiscal policy changes in Japan.

Longer-term factors continued to play an important role in the foreign exchange market. Technological improvements and increased demand for electronic trading resulted in an increase in the total number of electronic trading platforms. While this is likely to have contributed to the overall rise in turnover, contacts suggested it might also have made foreign exchange liquidity more fragmented and, in effect, increased the complexity of the market.

Foreign exchange activity in the United Kingdom remained dominated by financial customers. Heightened market stress and a slow economic recovery were thought to have caused a decrease in non-financial clients' trading activity between 2010 and 2013.

(1) The authors would like to thank Chris Cox, Perry Francis, James O'Connor and David Osborn for their help in producing this article.

Introduction

In April this year, central banks and monetary authorities in 53 countries, including the United Kingdom, conducted national surveys of turnover in foreign exchange (FX) markets(1) and in over-the-counter (OTC) interest rate derivatives markets. These surveys have taken place every three years since 1986(2) and measure turnover for the whole of April. They are co-ordinated on a global basis by the Bank for International Settlements (BIS), with the aim of obtaining comprehensive and internationally consistent information on the size and structure of the corresponding global markets.

This article begins by outlining the results of the latest UK contribution to the BIS global survey.(3) The focus is largely on developments in FX markets, highlighting the significant increase in UK turnover since the previous survey. OTC interest rate derivatives survey results are summarised in the box on page 399. The second part of the article considers the main developments in the UK FX market in recent years that may have contributed to the marked increase in turnover.

The UK survey was conducted by the Bank of England, covering the business of 47 institutions (both UK-owned and foreign-owned) located in the United Kingdom. The box on pages 396–97 describes the types of trades captured in the survey.

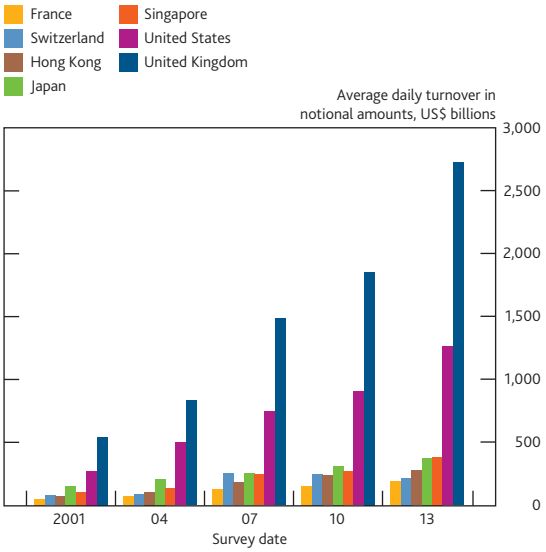
The results of the UK survey

Average daily turnover in the UK FX market during April 2013 was US$2,726 billion, 47% higher than in April 2010. This continues the upward trend in FX turnover reported in previous surveys.

Most global financial centres saw increased activity over the three years to April 2013 (**Chart 1**). The United Kingdom recorded the largest increase in turnover and strengthened its position as the centre of FX activity, accounting for 41% of the global market in 2013, up from 37% in 2010.

The United Kingdom's share of the global FX market has exceeded 30% in each of the past six surveys. The next largest centre was the United States, with 19% of the global market share in 2013, up from 18% in 2010. Singapore displaced Japan as the third largest centre, accounting for 6% of the market share. The majority of turnover in the UK FX market was cross-border(4) — some 60% of total turnover in April 2013 — reflecting London's role as an international financial centre. While this is less than the cross-border share in April 2010 (71%) it does not necessarily mean that the market has become less international. The increased trading activity in financial centres suggests that a rising proportion of business is between counterparties located in the United Kingdom that may be headquartered elsewhere.

Chart 1 Average daily FX turnover in the United Kingdom and other major centres



Source: BIS.

In comparison, growth in OTC interest rate derivatives turnover was less marked, increasing by 9% since April 2010 to stand at US$1,348 billion per day in April 2013 — see the box on page 399. The rest of this article focuses on the results of the FX market. The remainder of this section highlights some of the key trends from the survey before the subsequent section examines the underlying factors that have contributed to those developments.

Increase in swap and spot transactions

Turnover increased across all FX instruments, as illustrated in **Chart 2**. FX swaps showed the largest increase in absolute amounts, up 45% to US$1,127 billion per day. Swap transactions remain the most traded FX instrument, accounting for 41% of all FX transactions. Spot transactions increased to US$1,032 billion from US$697 billion per day in April 2010. Turnover in FX options rose by 67% to US$227 billion per day, while outright forwards increased by 35% with turnover of US$309 billion per day. At the same time turnover in currency swaps grew by 77%, but still only accounted for 1% of the FX market with turnover of US$32 billion per day.

(1) Unless otherwise stated, turnover figures published in this report are adjusted to remove double counting of trades between UK principals that will have been reported by both parties (so-called 'local double counting').
(2) In the 1986 survey four countries, including the United Kingdom, reported data to the BIS. The first published global data were for the 1989 survey, which also included results of the 1986 survey. OTC derivatives were included for the first time in 1995.
(3) All the data shown in the charts and tables in this article are sourced from this and previous surveys, unless otherwise stated. The Bank published a summary of the UK results on 5 September 2013 (see www.bankofengland.co.uk/publications/Pages/news/2013/101.aspx). The BIS global results can be found on the BIS website at www.bis.org/publ/rpfx13.htm.
(4) 'Cross-border business' covers transactions with entities located outside of the United Kingdom.

BIS triennial survey definitional issues

Participants

Forty-seven institutions, mainly commercial and investment banks, participated in the UK survey — the same number that participated in 2010. Others active in the UK market were not directly involved in the survey, but their transactions with participating principals will have been recorded by those institutions.

The questionnaire

Survey participants completed a questionnaire prepared by the Bank of England, based on a standard format agreed with other central banks and the Bank for International Settlements (BIS). Participants were asked to provide details of their gross turnover for the 21 business days in April 2013. Gross turnover (measured in notional values) is defined as the absolute total value of all deals contracted; there was no netting of purchases against sales. Data were requested in terms of US dollar equivalents, rounded to the nearest million. The basis of reporting was the location of the sales desk of the trade, as with the past three surveys. The questionnaire asked for data broken down by currency, instrument and type of counterparty.

The survey distinguished the following types of transaction:

Foreign exchange

- *Spot transaction*: a single outright transaction involving the exchange of two currencies at a rate agreed on the date of the contract for delivery (cash settlement) usually within two business days. The spot legs of foreign exchange (FX) swaps and FX swaps that were for settlement within two days (that is, 'tomorrow/next day' swap transactions) were excluded from this category.

- *Outright forward*: a transaction involving the exchange of two currencies at a rate agreed on the date of the contract for delivery (cash settlement) at some time in the future (more than two business days later). Also included in this category were forward FX agreement transactions, non-deliverable forwards, and other forward contracts for difference.

- *FX swap*: a simultaneous transaction that involves the exchange of two currencies, first the near leg and then, subsequently, a reverse transaction at a forward date (the far leg). Short-term swaps carried out as overnight and 'tomorrow/next day' transactions are included in this category.

- *Currency swap*: a contract which commits two counterparties to exchange streams of interest payments in different currencies for an agreed period of time, and to exchange principal amounts in different currencies at a pre-agreed exchange rate at maturity.

- *Currency option*: an option contract that gives the right to buy or sell a currency against another currency at a specified exchange rate during a specified period. This category also includes currency swaptions, currency warrants and exotic FX options such as average rate options and barrier options.

Single-currency over-the-counter interest rate derivatives

- *Forward rate agreement*: an interest rate forward contract in which the rate to be paid or received on a specific obligation for a set period of time, beginning at some time in the future, is determined at contract initiation.

- *Interest rate swap*: an agreement to exchange periodic payments related to interest rates on a single currency. This could be fixed for floating, or floating for floating based on different indices. This category includes those swaps for which notional principal is amortised according to a fixed schedule independent of interest rates.

- *Interest rate option*: option contract that gives the right to pay or receive a specific interest rate on a predetermined principal for a set period of time. Included in this category are interest rate caps, floors, collars, corridors, swaptions and warrants.

Reporting institutions were asked to distinguish between transactions with:

- *Reporting dealers*: financial institutions that are participating in the globally co-ordinated survey. These institutions actively participate in local and global FX and derivatives markets.

- *Other financial institutions*: financial institutions that are not classified as reporting dealers. This category includes:

  - *Non-reporting banks* — covers smaller banks and securities houses, not directly participating as a reporting dealer.

  - *Institutional investors* — includes mutual funds, pension funds, insurance companies and endowment funds.

  - *Hedge funds and proprietary trading firms* — covers investment funds, money managers and proprietary trading firms that invest, hedge or speculate on their own account.

  - *Official sector financial institutions* — comprises central banks, sovereign wealth funds, international financial

institutions of the public sector, development banks and agencies.

- *Other* — all remaining financial institutions that cannot be classified to any of the above categories.

- *Non-financial customers*: covers any counterparty other than those described above — so mainly non-financial end-users, such as businesses and governments.

In each case reporters were asked to separate local and cross-border transactions (determined according to the location, rather than the nationality of the counterparty) to permit adjustment for double counting.

Market conditions

Participants were asked whether they regarded the level of turnover in April 2013 as normal. The responses, summarised in **Table 1**, suggest that the survey results can be regarded as representative of FX turnover at the time of the survey.

The aggregate responses (adjusted for double counting) for the 2013 questionnaire and previous years are shown in **Tables C** and **D** at the end of this article.(1) The BIS published a report on FX activity on 5 September 2013 and further analysis of the global survey results in its December *Quarterly Review*.(2)

A survey of global outstanding positions in the derivatives market (measured at the end of June 2013) was also undertaken, and global results for this survey were published in November.(3)

Table 1 Survey participants' estimates for FX turnover levels

In April 2013

	Number of reporters	Percentage of turnover(a)
Below normal	4	0
Normal	30	47
Above normal	13	52

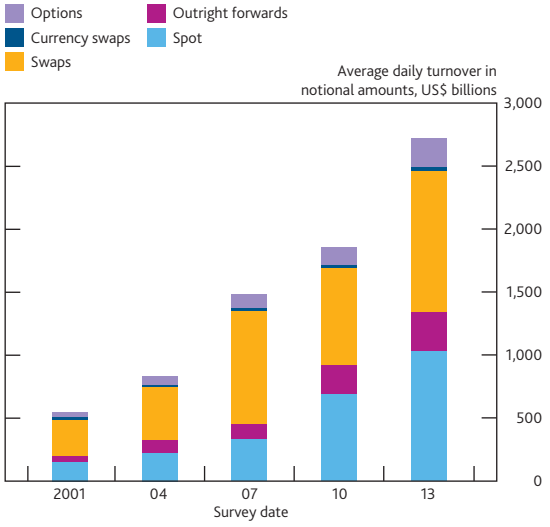
In preceding six months

	Number of reporters	Percentage of turnover(a)
Decreasing	6	1
Steady	18	19
Increasing	23	80

(a) Percentages may not sum to 100% due to rounding.

(1) A full breakdown of aggregate responses for the 2013 questionnaire is available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/full2013triennialsurveyresults.xls.
(2) The report on FX activity can be found on the BIS website at www.bis.org/publ/qtrpdf/r_qt1312.htm.
(3) Results of the BIS amounts outstanding global survey can be found on the BIS website at www.bis.org/publ/rpfx13.htm.

Chart 2 FX turnover by instrument type(a)



(a) For a definition of the different instrument types, see the box on pages 396–97.

Continued importance of the US dollar

The US dollar continued to be the dominant currency in the UK FX market, with 88% of all trades having one side denominated in US dollars in April 2013 (**Table A**). While the euro remained the second most traded currency, its market share fell from 44% to 37%. In contrast, the proportion of FX turnover involving the Japanese yen increased from 17% to 23%. This reflects the large increase in US dollar/yen trades to an average of US$516 billion per day, more than double the level in April 2010. The proportion of turnover involving sterling fell to 16%, continuing the decline shown in previous surveys.

Table A FX turnover — currency breakdown

Per cent(a)

	2004	2007	2010	2013
US dollar	88	88	85	88
Euro	43	42	44	37
Japanese yen	16	15	17	23
Pound sterling	27	21	18	16
Australian dollar	4	4	6	8
Swiss franc	6	6	6	5
Canadian dollar	3	3	4	4
Other currencies	13	21	20	20

(a) Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.

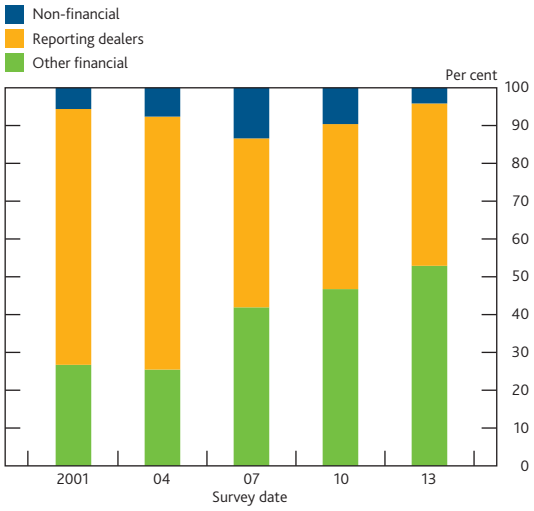
Increased diversity of market participants(1)

Turnover with 'other financial institutions' (OFIs), a category that includes hedge funds, pension funds, and smaller banks

(1) The definition of counterparty categories is detailed in the box on pages 396–97.

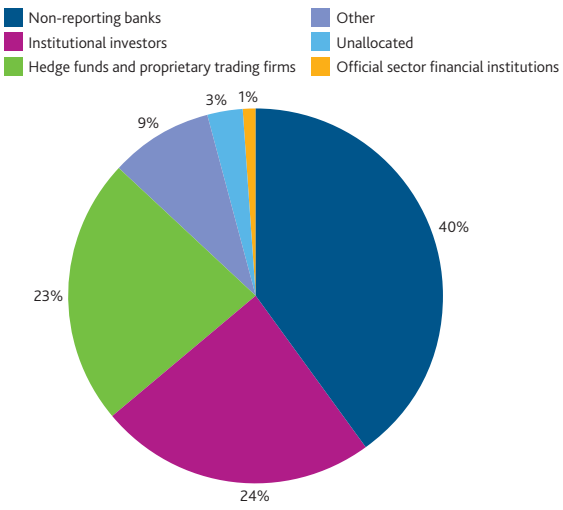
and securities houses, continued to increase and accounted for more than half (53%) of all FX turnover (**Chart 3**). Turnover in this category grew by 66% compared with April 2010, to US$1,442 billion per day. Interbank trading[1] rose by 45% to US$1,170 billion per day, while trades with 'non-financial institutions' fell by 36% to US$113 billion per day. Interbank trading now accounts for 43% of all FX turnover, while trades with 'non-financial institutions' only make up 4% of total turnover.

Chart 3 FX turnover by counterparty



A further breakdown of OFIs was collected for the first time in the April 2013 survey (**Chart 4**). Within this category, 'non-reporting banks' represented the largest counterparty, comprising 40% of FX turnover with OFIs. Just under half of FX turnover within this category relates to FX swap contracts. The next largest subsectors by turnover are 'institutional investors' and 'hedge funds and proprietary trading firms', accounting for 24% and 23%, respectively. In contrast, spot transactions accounted for over half of FX turnover within these categories.

Chart 4 FX turnover with other financial institutions



The concentration of the UK FX market is broadly unchanged compared with April 2010. The combined market share of the ten institutions with the highest level of turnover fell from 77% to 76%, while the share of the top 20 increased from 93% to 94%. **Table B** shows how concentration varied by instrument. Five institutions appear in the top ten for all five instruments.

Table B FX turnover — market concentration

Per cent share

	Spot	Forwards	FX swaps	Currency swaps	Options	Total
Top five institutions	66	58	48	73	67	53
Top ten institutions	84	82	71	91	87	76
Top twenty institutions	97	97	92	99	100	94

Developments in trade execution

Electronic trading was the most popular way to execute trades with 55% of all FX turnover conducted over an electronic medium, at US$1,487 billion per day. But trades executed directly over the phone — not via a third party — still remain an important way to execute trades, comprising 26% of total turnover at US$709 billion per day. Trades executed through voice brokers stood at US$506 billion per day.

Underlying influences on FX turnover

Short-term drivers are likely to account for a significant proportion of the large rise in FX turnover between the 2010 and 2013 BIS triennial surveys. Semi-annual turnover data collected by the London Foreign Exchange Joint Standing Committee (FXJSC) show that around half of the pickup between the 2010 and 2013 BIS surveys happened quite early on in the period under analysis, between October 2010 and April 2011, while the remainder occurred much more recently, in the six months between October 2012 and April 2013 (**Chart 5**). For a comparison between BIS and FXJSC data see the box on page 401.

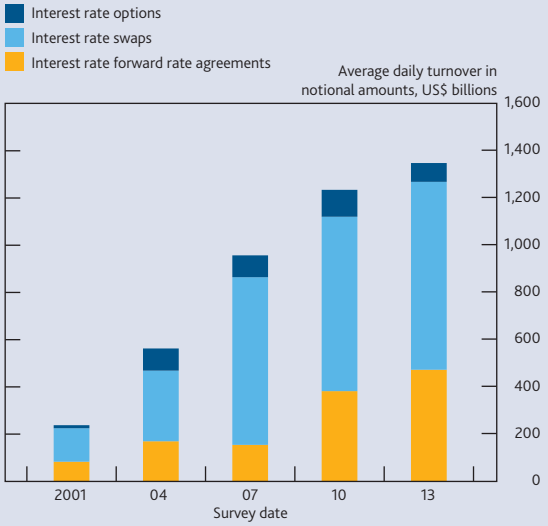
The majority of this latter increase can be attributed to a rise in the volume of trades involving the Japanese yen (**Chart 6**). This is likely to have been spurred by changing monetary and fiscal policy in Japan at the time the survey was conducted, which also led to a yen depreciation against a range of currencies. Contacts suggest that the yen depreciation drove greater activity in other currency pairs too, for example, due to related portfolio rebalancing flows. But as yen volatility subsided during the summer of 2013, contacts noted that volumes fell back somewhat.

(1) That is, trading with other banks and securities houses that participate in the survey (labelled 'reporting dealers' in **Chart 3**).

OTC interest rate derivatives turnover in the United Kingdom

Average daily turnover for over-the-counter (OTC) interest rate derivatives in the United Kingdom was US$1,348 billion in April 2013, a 9% increase since April 2010. Within this, turnover in forward rate agreements recorded the largest increase between 2010 and 2013, up 24% (**Chart A**). Turnover in interest rate swaps also increased, up 8% from US$739 billion to US$796 billion. While swaps still accounted for 59% of the turnover in the OTC interest rate derivatives market, this figure is slightly down on the 60% reported in April 2010. In contrast, turnover in interest rate options fell by 30% from US$114 billion to US$80 billion in April 2013.

Chart A OTC interest rate derivatives turnover by instrument type



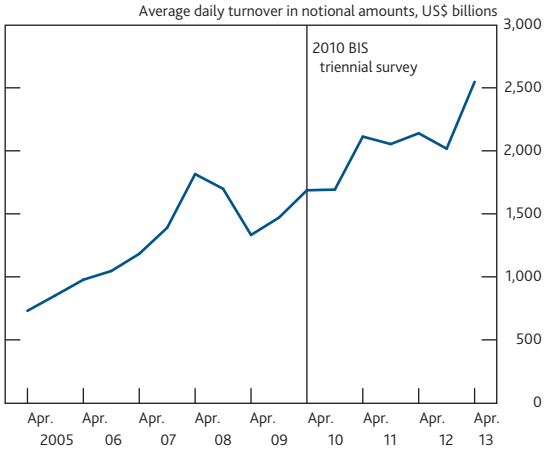
The United Kingdom remained the main centre for OTC interest rate derivatives trading, increasing its share of the global market to 49%, compared with 47% in 2010. The next largest centre was the United States (23%), followed by France (7%). For the first time local trades were greater than cross-border trades, and accounted for 54% of OTC interest rate derivatives turnover.

The euro remained the dominant currency in the OTC interest rate derivatives market, accounting for 69% of total turnover, up from 54% in April 2010. Compared with the foreign exchange market, the currency concentration was higher in the OTC interest rate derivatives market. Currencies other than the top four — US dollar, euro, sterling and Australian dollar — account for just 7% of the interest rate derivatives market, compared with 18% for foreign exchange.(1)

The increase in activity was more than accounted for by customer business, up by 40% since April 2010. This was driven by increased activity with other financial institutions which now account for 54% of the interest rate derivatives market, slightly greater than in the foreign exchange market (53%). Factors contributing to the growth in customer business could include the growing prime brokerage business. In contrast, turnover with other reporting dealers declined by 17% since April 2010 and now account for only 41% of total turnover.

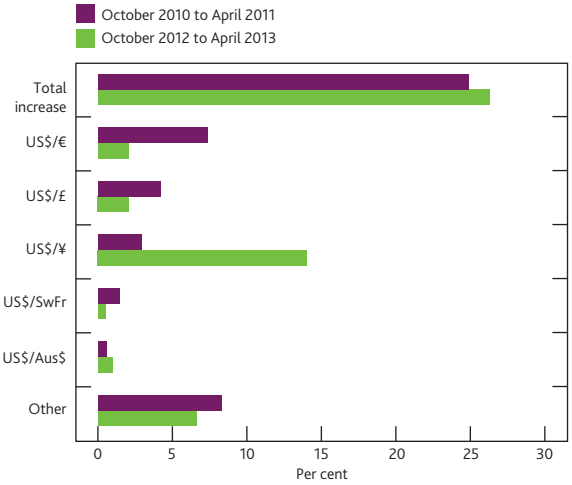
(1) For foreign exchange the top four traded currencies were US dollar, euro, yen and sterling.

Chart 5 Average daily FX turnover from the London FXJSC survey



Source: London FXJSC.

Chart 6 Breakdown of FXJSC semi-annual turnover growth reported in the April 2011 and April 2013 surveys by currency



Source: London FXJSC.

The earlier step-up in FX turnover between October 2010 and April 2011 was, in part, driven by a continued recovery from the temporary dip in trading activity observed during the 2008–09 financial crisis. The start of 2011 saw an improvement in sentiment and a related pickup in trading activity across a number of markets. **Chart 6** shows that a wide range of currency pairs contributed to the increase in trading volume between October 2010 and April 2011.

To a lesser extent, long-term factors, some of which are highlighted in Broderick and Cox (2010) on the previous BIS triennial survey results,(1) have continued to influence FX turnover during the latest survey period. The long-term factors can be split into the following three broad categories: (i) technological advances and associated changes in FX market infrastructure; (ii) changes to the mix of counterparties active in the UK market; and (iii) the attractiveness of FX to investors as a distinct asset class. The following section considers developments in these long-term drivers of FX activity.

Developments in market infrastructure

Broderick and Cox (2010) highlighted advances in the technology supporting electronic trading in the FX market and outlined how the development of electronic trading benefited end-customers. Although these advances in electronic trading continued to open access to the market for a wider range of FX market participants than in the past, contacts noted that the marginal benefit of further advances for end-customers had declined over the past three years. And it was unclear whether technological advances, in and of themselves, had helped to increase FX turnover. Nevertheless, technology continued to facilitate fundamental changes in the FX market infrastructure, especially in the spot market.

Continued strong customer and bank demand for more efficient trade execution had promoted an increase in the number of electronic FX trading venues on offer. And banks had sought to internalise transactions by matching more trades within the institution, wherever possible, rather than using third-party intermediaries. According to market contacts, this proliferation of external and internal trading venues has led to a fragmentation of liquidity. Contacts noted that the market has become more complex as a result, with investors finding it difficult to judge the depth of the market as a whole or what volumes it would be possible to transact, at a given price.

Rising complexity saw banks and third-party software providers develop a range of tools, aimed at navigating the trading environment more efficiently. These include advanced liquidity management tools, such as aggregation and execution algorithms, as well as post-trade evaluation and risk management tools. Some participants have also invested heavily in the capacity to process large amounts of data. These tools have now become essential for those participants managing very high volumes, at high speed, and add multiple additional layers of complexity to FX market infrastructure. Contacts suggest such complexity brings a great dependency on the efficient operation of all nodes in the FX trading landscape.

Perhaps reflecting the widening use of liquidity aggregation tools, contacts noted that there has been a decline in the extent to which market participants now differentiate between venues used to either access or provide liquidity. In turn, the reduction in the differentiation between venues might have enabled a larger number of them to survive than otherwise. As a result, traditional electronic broking platforms have gradually lost market share to newer platforms and the total volume of FX transactions executed electronically has become more evenly divided among a greater number of trading venues compared with 2010.

Counterparties

Alongside these ongoing structural changes in the FX market, there were noteworthy changes in the activities and overall mix of market participants.

Other financial institutions

Other financial institutions overtook reporting dealers as the largest single counterparty group for the first time in 2010. In the 2013 survey, OFIs became even more significant, having seen the greatest increase in trading activity among the three counterparty groups between the 2010 and 2013 surveys. Here, we consider some of the subgroups within OFIs.

(i) Non-reporting banks

As highlighted in the first section, the 2013 BIS triennial survey provided for the first time a breakdown of reporting dealers' FX turnover with OFIs (**Chart 4**). Perhaps surprisingly, this shows that 'non-reporting banks' are by far the largest subgroup, accounting for 40% of OFIs' FX activity in the United Kingdom.

One driver of non-reporting banks' relatively high turnover might be related to their funding needs. Banks often use the FX swap market to obtain short-term funding in a particular currency. Consistent with this, the BIS data show that non-reporting bank transactions in FX swaps account for half of this counterparty group's total turnover. In addition, contacts suggest that the average maturity of smaller European banks' wholesale funding has fallen over the past three years. This might have increased the frequency of their refinancing transactions, part of which takes place in the FX swap market.

(1) See www.bankofengland.co.uk/publications/Pages/news/2013/101.aspx.

BIS triennial survey and the Foreign Exchange Joint Standing Committee survey

Since October 2004, the London Foreign Exchange Joint Standing Committee (FXJSC) has been publishing foreign exchange turnover data for the United Kingdom. The FXJSC is a UK market liaison group established by the banks and brokers of the London foreign exchange market and is chaired by the Bank of England. Data are published on a six-monthly basis, for April and October. Further details of the FXJSC can be found on the Bank's website at www.bankofengland.co.uk/markets/Pages/forex/fxjsc/default.aspx.

The FXJSC survey collects similar information to the foreign exchange section of the BIS triennial survey. However, there are two important differences, in institutional coverage and definition. First, more institutions participate in the BIS survey (47 compared with 30 in the respective April 2013 surveys). Second, the reporting basis for the FXJSC survey is based on the location of the price-setting dealer or trading desk (where transactions are executed), while the BIS triennial survey is based on the location of the sales desk (where transactions are arranged).

Despite these differences the two surveys are broadly comparable. Institutions that participate in both surveys report very similar results (**Table 1**) and account for the large bulk of turnover in the BIS survey (**Table 2**). This suggests that the FXJSC survey provides a reliable, and more frequent, indication of activity within the UK foreign exchange market.

Table 1 Comparison of BIS triennial and FXJSC data for FXJSC reporting institutions

Daily average in US$ billions, unadjusted[a]

	BIS triennial	FXJSC	Difference
Spot	1,159	1,222	-62
Outright forwards	325	298	27
FX swaps	1,286	1,258	28
Currency swaps	42	32	10
FX options	255	216	39
Total	**3,068**	**3,027**	**41**

(a) To allow this comparison these data are not adjusted to remove double counting of trades between UK principles that will have been reported by both parties.

Table 2 FXJSC reporters' contribution to the BIS triennial data

Daily average in US$ billions, unadjusted[a]

	Total BIS triennial	*Of which*, FXJSC reporting institutions	Per cent
Spot	1,167	1,159	99
Outright forwards	329	325	99
FX swaps	1,318	1,286	98
Currency swaps	43	42	98
FX options	256	255	99
Total	**3,114**	**3,068**	**99**

(a) To allow this comparison these data are not adjusted to remove double counting of trades between UK principles that will have been reported by both parties.

Another possible explanation of the large share of total OFI activity is that small non-reporting banks might be using trading infrastructure from other providers, in order to offer their retail or corporate clients better access to the FX market than if they were to provide services directly themselves.

(ii) Hedge funds

According to the 2013 BIS survey, hedge funds accounted for 23% of total OFI activity. Contacts, however, suggest that hedge fund activity can be volatile and depends more heavily on market conditions than for other OFIs. Some noted that the policy changes in Japan in April 2013 were accompanied by greater hedge fund activity, in particular. And contacts thought that general market conditions were thought to have been supportive of risk-taking by speculative investors in early 2013.

Consistent with this, data from the FXJSC survey suggest that dealer prime brokerage activity saw a 52% increase between October 2012 and April 2013, while total FX turnover increased by 26% over the same period. This provides some evidence to support contacts' reports that hedge fund activity was an important driver of the increased yen trading volumes.

(iii) Central banks and sovereign wealth funds

Official sector investors, which include central banks, accounted for less than 1% of total UK FX turnover in April 2013 (**Chart 4**). But market contacts continued to report that central banks and sovereign wealth funds are increasingly important participants in the foreign exchange market.

In part, this reflects growth in the value of FX reserves held by central banks. According to the IMF's Currency Composition of Official Foreign Exchange Reserves (COFER) survey, global FX reserves rose by 32% between 2010 Q2 and 2013 Q2.[1] The reason why the perceived importance of official sector investors and their substantial foreign reserve holdings do not translate into a higher proportion of total trading volumes, however, remains unclear.

(1) See www.imf.org/External/np/sta/cofer/eng/index.htm.

Non-financial customers

The continued increase in financial companies' FX activity was not mirrored in transactions by non-financial market participants. Both as an absolute amount and as a proportion of total UK FX turnover, the non-financial clients' volumes (corporates and retail clients) declined between 2010 and 2013. Contacts report that, for non-financial customers, economic headwinds may have decreased the need to transact in FX markets.

Contacts suggest that heightened market stress during much of the period, along with a slow economic recovery, continued to suppress growth in international trade and cross-border mergers and acquisitions, and associated currency transactions. And heightened uncertainty about expected cash flows will have made it more difficult for corporates to hedge the currency risk associated with those cash flows.(1) Moreover, corporates may have reduced their hedging activities due to the relative stability of the major currency pairs in recent years, and the very low levels of interest rate differentials.

FX as an asset class

Broderick and Cox (2010) highlighted how some market participants that were unable to access markets during the financial crisis had instead hedged existing exposures to other assets via the FX market, through so-called 'proxy trades'.

FX remained one of the most liquid markets globally. Reflecting this, investors have continued to use FX instruments over the past three years to hedge exposures to correlated, less liquid assets.

But contacts suggested that the decline in many well-established correlations between certain currency pairs and some other assets since around mid-2012 rendered many popular 'proxy trades' less effective.

More recently, a different usage of 'proxy trades' has emerged. During the period of reduced liquidity in some emerging markets in Summer 2013, some investors were reportedly using major currency pairs as proxy for exposures to emerging market assets that they were unable to hedge efficiently.

Conclusion

Average daily turnover in the UK FX market increased at a quicker pace than reported in the previous triennial survey, rising 47% over the past three years, to US$2,726 billion per day. The United Kingdom consolidated its position as the largest centre of FX activity.

But growth in FX turnover has not been evenly spread over the past three years. Some of it appears to be due to a continued recovery following the fall in activity during the 2008–09 financial crisis. The remainder is likely to be largely a reflection of a rise in activity related to changes in monetary and fiscal policy in Japan.

That aside, ongoing structural changes continued to shape the FX market. Most notably, technological developments during the period have driven further change in market infrastructure, making it more interconnected and complex than at the time of the 2010 survey. This complexity has also brought greater dependency on the effective functioning of the underlying technology and infrastructure.

In addition, FX activity in the United Kingdom became even more dominated by banks and other financial institutions. Meanwhile, non-financial 'end-users' of the FX market saw their share of trading activity decline.

(1) See www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb110204.pdf for further detail on corporate FX hedging behaviour.

References

Broderick, T and Cox, C (2010), 'The foreign exchange and over-the-counter interest rate derivatives markets in the United Kingdom', *Bank of England Quarterly Bulletin*, Vol. 50, No. 4, pages 354–65.

O'Connor, J and Wackett, J (2011), 'The use of foreign exchange markets by non-banks', *Bank of England Quarterly Bulletin*, Vol. 51, No. 2, pages 119–26.

Table C Foreign exchange market turnover by instrument, counterparty and maturity[a]

Daily averages in April, in US$ billions and percentages

	2004		2007		2010		2013	
Instrument/counterparty	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent
Spot	**223**	**27**	**335**	**23**	**697**	**38**	**1,032**	**38**
with reporting dealers	147	18	158	11	293	16	385	14
with other financial institutions	59	7	135	9	344	19	614	23
with non-financial customers	17	2	43	3	60	3	32	1
Outright forwards	**103**	**12**	**124**	**8**	**228**	**12**	**309**	**11**
with reporting dealers	60	7	37	2	63	3	114	4
with other financial institutions	28	3	62	4	124	7	173	6
with non-financial customers	15	2	26	2	40	2	21	1
Foreign exchange swaps	**428**	**51**	**899**	**61**	**775**	**42**	**1,127**	**41**
with reporting dealers	301	36	419	28	399	22	574	21
with other financial institutions	102	12	375	25	309	17	503	18
with non-financial customers	25	3	105	7	67	4	50	2
Currency swaps	**16**	**2**	**18**	**1**	**18**	**1**	**32**	**1**
with reporting dealers	11	1	9	1	7	0	21	1
with other financial institutions	3	0	6	0	11	1	10	0
with non-financial customers	2	0	2	0	1	0	1	0
Options and other instruments[b]	**67**	**8**	**106**	**7**	**135**	**7**	**227**	**8**
with reporting dealers	40	5	39	3	47	3	76	3
with other financial institutions	21	3	44	3	79	4	141	5
with non-financial customers	6	1	23	2	10	1	9	0
Total	**835**	**100**	**1,483**	**100**	**1,854**	**100**	**2,726**	**100**
with reporting dealers	559	67	663	45	809	44	1,170	43
with other financial institutions	213	25	622	42	866	47	1,442	53
with non-financial customers	64	8	199	13	178	10	113	4
Local	262	31	465	31	547	29	1,095	40
Cross-border	573	69	1,019	69	1,307	71	1,631	60
Outright forwards[c]	**113**	**100**	**126**	**100**	**241**	**100**	**329**	**100**
Up to seven days	64	56	61	49	144	60	167	51
Over seven days and up to one year	47	41	62	49	94	39	138	42
Over one year	2	2	3	2	3	1	24	7
Foreign exchange swaps[c]	**527**	**100**	**966**	**100**	**873**	**100**	**1,318**	**100**
Up to seven days	394	75	792	82	653	75	932	71
Over seven days and up to one year	129	24	167	17	215	25	302	23
Over one year	4	1	7	1	6	1	84	6

(a) Adjusted for local double counting.
(b) The category 'other instruments' covers highly leveraged transactions and/or trades whose notional amount is variable and where a decomposition into individual plain vanilla components was impractical or impossible.
(c) Data for maturity breakdown cannot be adjusted for local reporting dealers, so maturity values will not be equal to product totals.

Table D OTC interest rate derivatives turnover by instrument, counterparty[a]

Daily averages in April, in US$ billions and percentages

	2004		2007		2010		2013	
Instrument/counterparty	Amount	Per cent	Amount	Per cent	Amount	Per cent	Amount	Per cent
Forward rate agreements	**170**	**30**	**154**	**16**	**382**	**31**	**473**	**35**
with reporting dealers	89	16	100	10	233	19	203	15
with other financial institutions	78	14	36	4	125	10	263	20
with non-financial customers	2	0	18	2	25	2	7	1
Swaps	**299**	**53**	**710**	**74**	**739**	**60**	**796**	**59**
with reporting dealers	198	35	329	34	377	31	314	23
with other financial institutions	87	15	347	36	268	22	431	32
with non-financial customers	15	3	34	4	93	8	50	4
Options and other instruments[b]	**94**	**17**	**93**	**10**	**114**	**9**	**80**	**6**
with reporting dealers	42	8	52	5	57	5	36	3
with other financial institutions	44	8	33	3	47	4	40	3
with non-financial customers	7	1	7	1	10	1	4	0
Total	**563**	**100**	**957**	**100**	**1,235**	**100**	**1,348**	**100**
with reporting dealers	329	59	481	50	668	54	552	41
with other financial institutions	209	37	417	44	440	36	734	54
with non-financial customers	24	4	59	6	127	10	61	5
Local	189	34	242	25	427	35	731	54
Cross-border	374	66	715	75	808	65	617	46

(a) Adjusted for local double counting. Single-currency interest rate contracts only.
(b) The category 'other instruments' covers highly leveraged transactions and/or trades whose notional amount is variable and where a decomposition into individual plain vanilla components was impractical or impossible.

Qualitative easing: a new tool for the stabilisation of financial markets

By Roger E A Farmer, Senior Houblon-Norman Fellow at the Bank and Distinguished Professor, UCLA.

This paper presents the text of the annual John Flemming Memorial Lecture, given at the Bank of England on 16 October 2013. The views expressed are those of the author and do not represent those of the Bank or the Monetary Policy Committee.[1]

My memory of John Flemming

Let me begin this talk with a few words in honour of the person after whom this lecture series is named: John Flemming. It is a privilege to be standing here today, not just because of the distinguished cast of economists who have preceded me, but also because of the opportunity to honour the memory of one of England's finest minds.

Although I did not know John well, he had an important influence on my early development. In 1977, John was an important figure in international economics. I, at the time, was a Masters student at Manchester University, with uncertain prospects as to my future in the discipline. At the time, I was contemplating a move to Canada in the footsteps of David Laidler, who had just moved from Manchester to the University of Western Ontario and who had mentored me in Manchester. David offered me a scholarship of 4,000 Canadian dollars to study in Canada, a considerable sum at the time, and the prospect of relocating to North America was an enticing one.

Among the other possibilities that I was entertaining, was the prospect of a research Fellowship at Nuffield College Oxford, where John was Bursar and a leading figure at the College.

One cold day in the autumn of 1977 I set off to Oxford for an interview, and was greeted by John in his Nuffield office. This being before the advent of the PC, John used the floor as a filing system. At the time, he was editor of the *Economic Journal* and to reach his desk, I was required to step around the next issue of the journal, which was assembled in an orderly fashion on the floor. Here was a man who knew his priorities: we had an instant rapport.

At the time, the hot topic in macroeconomics was a new book by Edmond Malinvaud, *The Theory of Unemployment Reconsidered*. I had studied Malinvaud's work at Manchester and John and I had a stimulating conversation that became increasingly lively as we walked across the quad to the place where my interview would take place. As we entered the door of the interview room, a silence descended. John took his appointed seat with two other Fellows behind an oak desk and I sat opposite in the hot seat. The interview was an intensive grilling on the operation of monetary policy and it would be an understatement to say that it did not go well. I returned to Manchester and the next day I sent off a letter to the University of Western Ontario accepting David's offer to study in Canada for a Ph.D.

This turned out to be altogether premature. The next week I received a letter from Oxford which began: 'We were so impressed with your performance at interview that we have decided to offer you early acceptance and a bursary to support your studies for a Ph.D'. This, I believe, owed a great deal more to my conversation with John over the pages of the *Economic Journal* than it did to my formal interview. I have had a fondness for John ever since and I continue to wonder, to this day, where my path would have taken me had I not sent off that acceptance letter to Canada so quickly. It is rewarding that my path has led me back to my home country today to discuss monetary and fiscal policy once again in a lecture that honours the legacy of John Flemming.

Introduction

I want to take the opportunity today to share some economic ideas and policy proposals stemming from my own academic research. Five years after the collapse of Lehman Brothers, in September 2008, the world is still mired in a deep recession. Unemployment in the United States is 7.3%. In the United Kingdom it is 7.7% and in Europe 11%. In Greece and Spain a staggering 27% of the population is without a job. What can we do about it?

(1) This lecture series was inaugurated in 2005 in memory of John Flemming, who worked at the Bank of England between 1980 and 1991. A short biography can be found in the box on page 406. Past lectures have been given by Professor Alan Taylor, Professor Michael Artis, Dr Adam Posen and Professor Thomas Sargent.

John Flemming

John Flemming worked at the Bank of England between 1980 and 1991, for much of that time as Chief Economist. Prior to that he was a Fellow in Economics at Nuffield College, Oxford, a position to which he was originally appointed in his early 20s.

His association with the Bank began in 1975, when he took leave from Oxford for a year to work as a special adviser to the then Governor, Gordon Richardson. Commuting from Oxford, he took the opportunity the journey provided to write his influential book *Inflation*, a key theme of which was the importance of expectations in determining inflation.

John joined the Bank full-time in 1980 as Chief Economic Adviser, before becoming Chief Economist in 1984 and an Executive Director in 1988. He subsequently departed to become Chief Economist of the European Bank for Reconstruction and Development in 1991 before returning to Oxford as Warden of Wadham College in 1993. Among other activities, he served for many years as a member of the Royal Commission on Environmental Pollution, his contributions to which were cited when he was appointed CBE in 2001.

John was an economist of great standing whose advice and work was much appreciated by his peers. He is best captured, perhaps, by the quote by fellow economist John Helliwell, who said:

> 'If one could choose parts to assemble someone to epitomise the best of Oxford and British Universities in general, the result would match Flemming. He was brilliant without being brassy, incisive in thought, precise in speech, encyclopaedic in knowledge, interested in everything he heard and saw, and a lively companion for all those lucky enough to share a journey, a job or a dinner with him.'

That question is particularly resonant at a time when our politicians are implementing a programme of austerity, amid calls from leading journalists and academics for more fiscal stimulus. Those who argue that now is the time to rebuild our infrastructure are right. The UK Government can currently borrow money at an interest rate of 3.5% fixed for 30 years. That is a lower rate of interest than at any time since the Great Depression and it would be foolish not to take advantage of that opportunity to put in place new rail lines, roads and bridges that will improve the productive capacity of the private sector and promote future economic growth.

Those who argue that more government spending is not the solution also have a point. In a recent online poll in the United States, 61% of respondents were opposed to additional government spending to reduce unemployment.(1) The public, understandably, is growing weary of business as usual. I believe that we can and should go beyond traditional fiscal policy if we are willing to learn from the new facts the Great Recession has offered us, and to expand our horizons by redefining what we mean by fiscal policy.

I am not an advocate of increasing the size of the government sector, but an unregulated private sector cannot safely be left to its own devices.

When we teach undergraduates the difference between fiscal and monetary policy, we stress the distinction between flows, (the domain of fiscal policy) and the maturity structure of government liabilities (the domain of monetary policy).

Fiscal policy deals with the expenditure decisions made by national treasuries and the choice of how to fund those expenditures, with taxes or with increased borrowing. Monetary policy deals with the asset composition of the public debt. How much of the government debt, held by the public, should be in the form of short or long-term government bonds, and how much should be in the form of money? Many economists believe that, although it matters a lot whether government expenditure is funded by borrowing, or by printing money, it doesn't matter at all if the government borrows by issuing three-month bonds, five-year bonds or 30-year bonds. I believe that that perception is gravely mistaken. It matters a great deal.

Following the 2008 financial crisis, central banks throughout the world engaged in an unprecedented set of new and unconventional policies. I would like to draw upon a distinction that was made by Willem Buiter, a former member of the Monetary Policy Committee, between quantitative and qualitative easing (Buiter (2008)). When I refer to **quantitative easing** I mean a large asset purchase by a central bank, paid for by printing money. By **qualitative easing**, I mean a change in the asset composition of the central bank.(2) Both policies were used in the current crisis, and both policies were, in my view, successful. In this talk I argue that qualitative easing is a fiscal policy and it is a tool that should be permanently adopted by national treasuries as a means of

(1) See the guest author question by Roger Farmer, 'Should the federal government increase spending in order to reduce the unemployment rate?', isidewith.com/poll/308735830.
(2) Farmer (2013d).

maintaining financial stability and reducing persistent long-term unemployment.

I am heartened that the Nobel Prize Committee this year has chosen to recognise three economists who have highlighted important empirical features of asset markets. Eugene Fama (1970) taught us that asset prices are unpredictable at short horizons. Lars Hansen (2008) gave us tools to study their statistical properties; and Robert Shiller (2000) taught us that asset prices, at long horizons, are both predictable and impossible to understand using standard tools of economic theory. In a series of books and papers I explain why stock market fluctuations are inefficient, and I provide a theory that explains the findings of both Eugene Fama and Robert Shiller.(1) My co-authored paper (Farmer, Nourry and Venditti (2012)), explains why we cannot make money by trading in asset markets, and why long-horizon movements in asset markets are inefficient. My proposed policy tool follows directly from my research findings of the past twelve years. Those findings demonstrate that, by trading in asset markets, national treasuries can and should act to prevent swings in asset prices that have had such destructive effects on all of our lives.

The institution that I would like to promote is a fiscal authority, with the remit to actively manage the maturity structure and risk composition of assets held by the public. This authority would continue the policy of qualitative easing, adopted in the recent crisis, and by actively trading a portfolio of long and short-term assets it would act to stabilise swings in asset prices. I will show that asset price instability is a major cause of periods of high and protracted unemployment, and I will argue that by varying the maturity and risk composition of government debt, we can control large asset price fluctuations, and prevent future financial crises from wreaking economic havoc on all of our lives.

The role of the state in economic affairs

Beginning with David Hume and Adam Smith in the 18th century, economic thought has wavered between two visions of the social world. On one side, there are proponents of free markets who argue that any intervention in the market system is unwarranted. On the other, there are those who believe that socialist planning is a rational response to the anarchy of the free market. In this lecture I am going to stake out a position somewhere in the middle ground.

I will argue that there are good reasons for state intervention in markets; but the reasons for intervention must always be spelt out clearly. My presumption is that, for the most part, free markets work well and any intervention by appointed mandarins should be explained to the public and subject to control by elected politicians.

In 1936, John Maynard Keynes wrote a book, *The General Theory of Employment, Interest and Money*. That book changed the way we think about the role of the state. Before the publication of *The General Theory* most economists, both academic and policymakers, did not see a role for government to maintain full employment. After its publication, governments everywhere accepted full employment as a legitimate and central goal of economic policy.

In *The General Theory*, Keynes made two key arguments. The first was that capitalist market economies, if left to themselves, will often end up in a state of perpetual high unemployment. In the language of modern general equilibrium theory, Keynes argued that any unemployment rate can be a steady-state equilibrium. Second, he argued that fluctuations in the animal spirits of investors determine which unemployment rate we end up with. Both messages have been forgotten by his mainstream followers. My own recent research (Farmer (2010a,b, 2012a,c, 2013c)), has been aimed at reintroducing these two central insights of Keynes' work and reconciling them with the body of microeconomics, which teaches us that markets, most of the time, work well.

But not all markets work well. I will explain in this talk why financial markets and labour markets are both subject to important failures.

First, let me explain why financial markets are not efficient and provide evidence to support my case. My argument is based on the fact that financial crises are incredibly persistent and most of the people who are affected by a crisis were not born at the time the crisis hit. We cannot buy insurance against the occurrence of financial panics that occur before we are born or before we reach the age of consent. That simple fact is an important idea because it explains why asset markets are so volatile and why that volatility is something that governments should try to avoid. I am advocating that governments can and should intervene in the asset markets to trade on behalf of the unborn and protect the economic legacy of future generations.

Second, how does asset market volatility impact our ability to find a job or find an affordable house? My theoretical work on that topic explains how high unemployment can persist and why flexible wages are not a solution to the problem.(2) Although I do not have the time to explain the theory behind that idea in this lecture, I will document the fact that asset market volatility and unemployment are closely correlated and I will argue that by stabilising asset markets, we can maintain demand and prevent the spectre of persistent unemployment.

Finally, there is the question: how can we prevent high persistent unemployment from reoccurring? Keynes argued that, in recessions, the state should spend more than it earns.

(1) Farmer (2002a,b, 2010a,b, 2012a,c, 2013a,b,c,d). Farmer, Nourry and Venditti (2012).
(2) Farmer (2012a, 2013a,b).

He thought that government deficit spending would replace private investment spending and help to maintain full employment. Although there are very good arguments for the use of government expenditure to repair infrastructure during recessions, we should not rely on countercyclical government investment expenditure as our primary tool to stabilise business cycles. Qualitative easing is an effective and more efficient alternative.(1)

In testimony to the Treasury Committee this past April (Farmer (2013d)), I argued for direct control of excess asset market volatility through active management of the Treasury's loan portfolio. This policy would be implemented by open market operations between risky and safe assets that are not too dissimilar from the policies that the Bank of England and the Federal Reserve have been engaged in for the past five years. I am going to explain why those policies worked and why they should be continued, even when the current crisis is over.

Why are financial markets inefficient?

There has been a tremendous amount of debate in recent years about the efficiency of financial markets. Following WWII, financial markets were heavily regulated because the legacy of the Great Depression damaged the public's confidence in free markets. Beginning in the 1970s, financial regulations were gradually relaxed in response to pressure from economists of the Chicago School who promoted a new idea: the 'efficient markets hypothesis'. The gradual relaxation of financial regulation led to two decades of financial turmoil that culminated in the Lehman Brothers' bankruptcy of 2008. We are currently living through the consequences.

The efficient markets hypothesis has two parts that are often confused. The first, 'no free lunch', argues that without insider information, it is not possible to make excess profits by buying and selling stocks, bonds or derivatives. That idea is backed up by extensive research and is a pretty good characterisation of the way the world works.

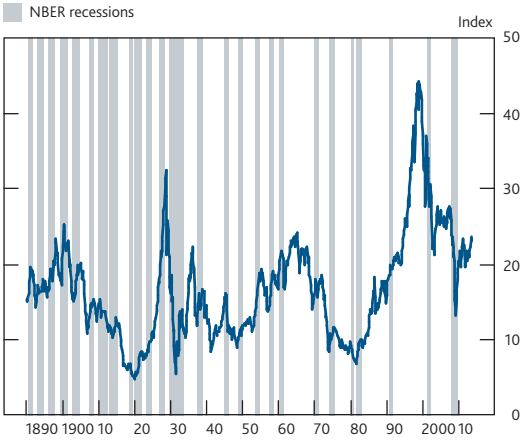
The second, 'the price is right', asserts that financial markets allocate capital efficiently in the sense that there is no intervention by government that could improve the welfare of one person without making someone else worse off. That idea is false. Although there is no free lunch, the price is not right. In fact, the price is wrong most of the time.

The argument for free trade in financial assets is the same as the argument for free trade in goods. If I have something that you want, and you have something that I want, we will both be better off if we are able to exchange one good for the other. The economist Vilfredo Pareto formalised that argument in the 19th century. Pareto's argument is taught to every student of economics under the imposing title of the first welfare theorem of economics.

I argue that the first welfare theorem of economics does not apply to financial markets. For those markets to work well, everybody who will be affected by asset price fluctuations must be present to insure against them. Economists call that requirement 'complete participation'. Complete participation fails in financial markets because we cannot insure against events that occur before we are born. My individual and co-authored research has shown that the fact that people die, and new people are born, is sufficient to invalidate the thesis that free financial markets are good for all of us, in a quantitatively important way.(2)

If financial markets were efficient, the value of a share in a company should be equal to the present value of its earnings. Simple economic theories predict that the ratio of the price of a share to the earnings of that share should be roughly constant. **Chart 1** shows that, in reality, the price to earnings ratio swings wildly and it has been as low as five (in 1919) and as high as 44 (in 1998).

Chart 1 US stock market fluctuations: the price/earnings ratio

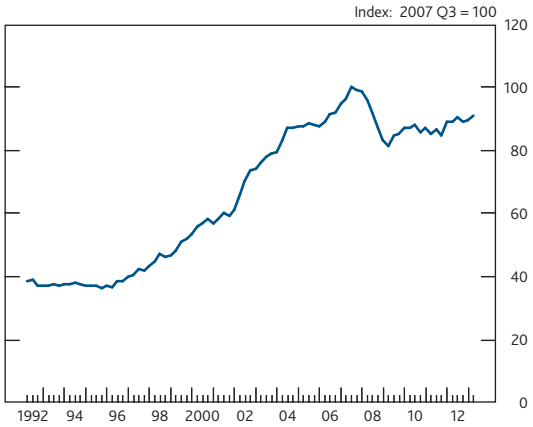


Sources: NBER, Shiller (2013) and author calculations.

Chart 2 shows the cost of a house in the United Kingdom in units of constant purchasing power. This chart illustrates in a very stark way how asset price fluctuations impact all of our lives. Those of us buying our first house in 2007 paid twice as much as those who bought their first house in 1992. And that change is not just a difference in pounds sterling; it is adjusted for changes in purchasing power. Asset price fluctuations are a big deal.

(1) Farmer (2012b).
(2) Farmer (2002a,b) and Farmer, Nourry and Venditti (2012).

Chart 2 UK real house prices[a]



Sources: ONS and author calculations.

(a) Deflated using the consumer prices index.

Why should we care?

I have shown, in **Chart 2**, that swings in asset prices affect our ability to step onto the housing ladder. They also affect our ability to find a job. Recent empirical research has shown that the lifetime earnings of school leavers whose first job occurs in a recession is 10% to 15% lower than the lifetime earnings of those who enter the labour market in a boom.[1] Those are big numbers.

If asset price fluctuations were simply a matter of the gains and losses of big banks then perhaps we should be unconcerned. In good times the owners of the banks would be richer than in bad times. What's a £100 million loss to a billionaire? But in reality, financial fluctuations do not just affect the City of London and Wall Street; they affect all of us through feedback effects on the real economy.

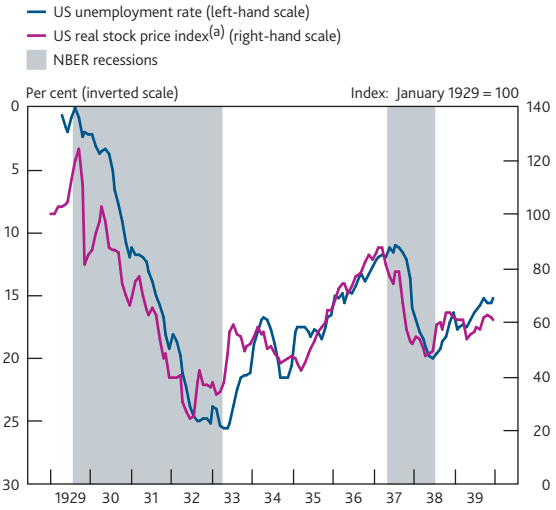
The reality is that fluctuations in financial wealth cause fluctuations in the number of unemployed — and long-term unemployment is a very bad situation to be in. But what is the evidence that financial crises are associated with unemployment?

Wealth and the Great Depression

In *The General Theory*, Keynes argued that economic cycles are caused by fluctuations in the confidence of investors. He called those fluctuations 'animal spirits', and he developed a theory and a set of policies that governments can use to help to prevent the effects of financial fluctuations from damaging our lives. In 1936, when Keynes wrote *The General Theory*, most economists did not see a role for governments in promoting full employment. At the end of WWII, Keynesian employment policies became written into law.

Chart 3 shows what happened to the real value of US assets during the Great Depression. The magenta line is the value of the stock market in real units and the blue line (measured on the left-hand side on an inverted scale) is the unemployment rate. The chart shows clearly that the crash in the value of financial assets preceded the increase in the unemployment rate. In a series of recent books and papers (Farmer (2010a,b, 2012a, 2013a)), I have provided the theoretical framework to understand how the stock market crash could have *caused* the Great Depression.

Chart 3 Equity prices and the unemployment rate in the United States during the Great Depression



This chart is reproduced from Farmer (2012c).

(a) Deflated using the consumer prices index.

Keynes did not just provide a policy recommendation. He provided a theoretical framework to understand what went wrong in the Great Depression, and why. In response to Keynes' analysis, governments throughout the world began to operate active stabilisation policies through monetary and fiscal mechanisms. Those policies were effective and led to several decades of relative stability. But the value of financial assets continued to be highly volatile and, in 2008, a new financial crisis hit.

Wealth and the Great Recession

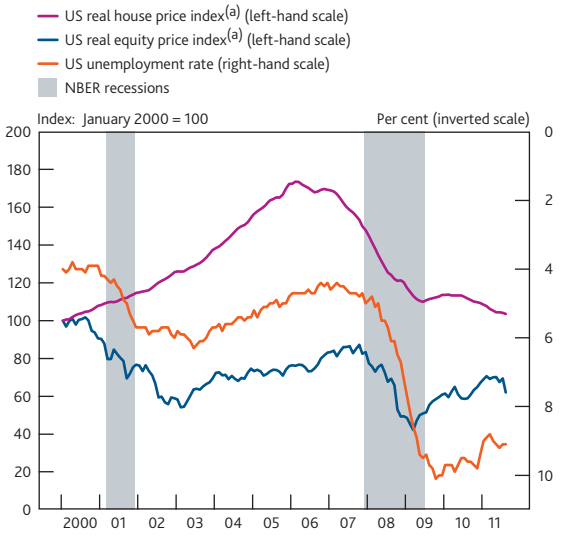
The 2008 financial crisis was remarkably similar to the Great Depression; but this time, it was housing wealth that provided the trigger. To put this in perspective, housing wealth, in the United States, makes up roughly two fifths of tangible assets held by the private sector; the remaining three fifths is held as claims on the nation's factories and machines that is capitalised in the stock market. In the United Kingdom, the balance is reversed and housing wealth is a more important component of assets owned by UK households.

Chart 4 shows that the real value of housing wealth in the United States (the magenta line on the chart) began to decline at the beginning of 2006. This decline in house prices was

(1) Oreopoulos, Von Wachter and Heisz (2012).

unprecedented and it had immediate effects on the real economy as households had been using the value of housing equity to purchase consumer goods. Demand fell, and as it fell, unemployment (the orange line on **Chart 4**, measured on an inverted scale) began to increase. As the recession gained steam, it led to declines in the equity value of financial companies that owned assets backed by the value of US housing equity. The effect of declines in US housing wealth was global in scale and reached out across the Atlantic and the Pacific and triggered declines in financial markets in London, Frankfurt and Tokyo.

Chart 4 US real house and equity price indices and unemployment during the Great Recession



This chart is reproduced from Farmer (2012c).

(a) Deflated by the consumer prices index.

In response to the collapse in stock prices, and the increase in unemployment, central banks in America, Asia and Europe slashed the interest rate on overnight loans in an attempt to provide much needed cash to financial firms that could no longer raise short-term financing. That response is precisely why central banks were created in the first place and it is a prescription for combatting financial panic that goes back to the English economist, Walter Bagehot, who wrote a famous treatise on central banking in 1873 (Bagehot (1873)).

A similar financial panic occurred in 1987 and at the time, the Federal Reserve under Paul Volcker was successful at preventing the crash from having a major effect on the real economy. But 2008 was different because the standard channel of monetary response, lowering the interest rate on short-term loans, was exhausted. In the United States, the short-term interest rate was slashed to one tenth of 1% in the autumn of 2008 and the Bank of England followed suit shortly after, lowering rates to half a percentage point in early 2009.(1)

What can we do about it?

Once interest rates hit zero, the traditional response of central banks was no longer an option. Instead, inspired by the writings of the American economist Milton Friedman (Friedman and Schwartz (1963)), central banks engaged in a process of massive and unprecedented monetary expansion. The balance sheets of the Bank of England, the Federal Reserve and the European Central Bank increased by a factor of three or more in the space of a few months. That expansion had two components. The first was **quantitative easing**; the second, **qualitative easing**.(2) We are still trying to understand the effects of these policies and there has been a tremendous amount of research asking if they worked and, if so, how they worked. My research explains how quantitative easing and qualitative easing worked and I will present some evidence to back up the claim that both policies were successful.

Quantitative easing prevented deflation

The Bank of England is charged with maintaining price stability, currently interpreted as 2% inflation, and to the extent that it is compatible with the inflation target, to support the Government's economic policy, including its objectives for growth and employment. The mandate of the Federal Reserve is similar and, although the United States has not embraced an inflation target, the Federal Reserve has operated in a way that is consistent with inflation targeting for the past 20 years.

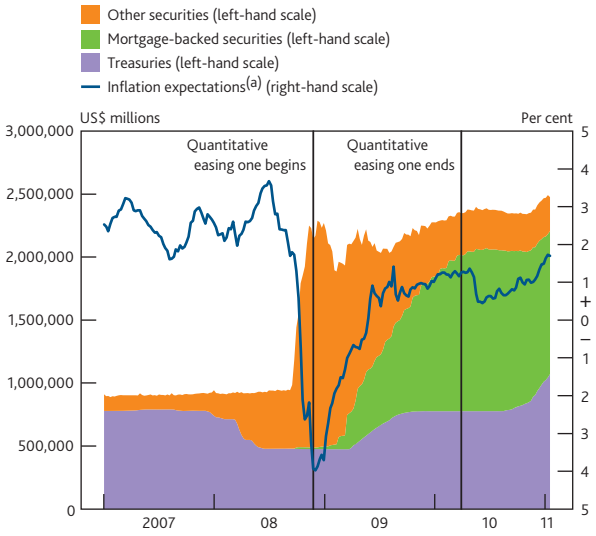
Price stability is important because large fluctuations in the value of money have unintended consequences. That is true both of large unanticipated inflations, which transfer wealth from lenders to borrowers, and large unanticipated deflations, which transfer wealth from borrowers to lenders. Deflation is extremely disruptive to economic activity and is associated with bankruptcy and unemployment as firms struggle to repay fixed nominal loans with earnings that are worth less in monetary units.

Chart 5 shows how the Federal Reserve Board responded to the financial crisis. The blue line, measured in per cent per year on the right-hand axis, measures the expected rate of inflation.(3) The boundary of the shaded region, measured on the left-hand axis in millions of dollars, is the size of the Federal Reserve's balance sheet.

From the beginning of 2007, through the autumn of 2008, expected inflation was about 3%. When Lehman Brothers declared bankruptcy in September 2008, expected inflation

(1) Farmer (2012c, 2013c) establishes that the connection between the stock market and unemployment extends well beyond these two subperiods. It is stable in post-war data.
(2) As defined above, by **quantitative easing** I mean a large asset purchase by a central bank, paid for by printing money. By **qualitative easing**, I mean a change in the asset composition of the central bank.
(3) **Charts 5** and **6** appear in Farmer (2013b).

Chart 5 'Quantitative easing' and inflation expectations in the United States



This chart is reproduced from Farmer (2012b).

(a) One year ahead inflation expectations implied by swaps.

fell precipitously to -4% as financial markets began to expect a large deflation. The main piece of information to take from this chart is that the Federal Reserve's balance sheet (the shaded region) went from US$800 billion in August 2008 to US$2.5 trillion in January 2009. And right after the Federal Reserve bought US$1.3 trillion of new securities, expected inflation went back up into positive territory. If you think, as most economists do, that deflation is very bad for the real economy, then this was a big success story for quantitative easing.

Qualitative easing prevented depression era unemployment rates

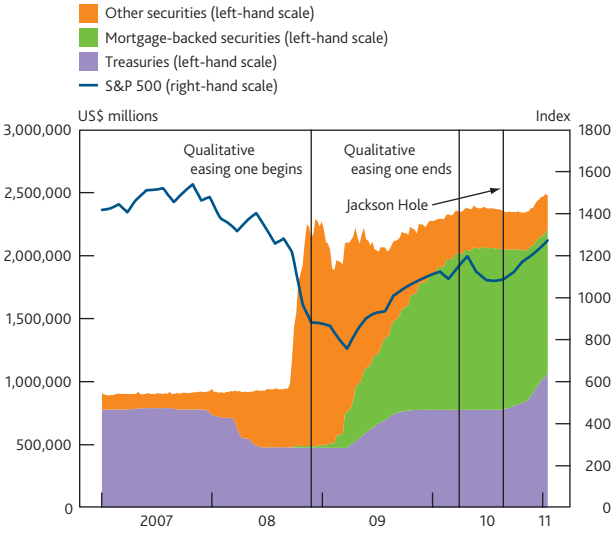
In normal times central banks are very conservative; they buy short-term securities backed by high-quality collateral, and in so doing, they face little or no risk. The assets they buy are paid for by creating money that is used by private agents to buy and sell goods. Central banks provide liquidity that 'oils the wheels of trade'.

In times of crisis, central banks act very differently; they are a backstop to the financial system that prevents systemic bankruptcies from disrupting economic activity. The 2008 crisis was a good example of this process in action, as central banks throughout the world no longer confined their purchases to safe short-term assets. The Bank of England began a programme of purchases of long-term government bonds and the Federal Reserve purchased long-term bonds as well as agency-guaranteed mortgage-backed securities. These long-term assets carry two kinds of risks. When, in the future, interest rates rise, central banks will take capital losses on their bond portfolios since, as the interest rate rises, bond prices fall. Mortgage-backed securities face a second risk since the holders of the mortgages may repay early resulting in a loss to the lender who must relend money at a lower rate.

Chart 6 contains the same information on asset purchases as **Chart 5**. Instead of plotting expected inflation on this chart, the blue line is the value of the stock market. I want to use this chart to make a point about the effects on markets of the *type* of assets that central banks buy.

The shaded area on **Chart 6** is broken down into three regions. The purple region is holdings of treasury securities. In normal times this is *all* that the Federal Reserve holds. The orange area is other securities, mainly long-term bonds and the assets of the banks that were bailed out by the Federal Reserve. Finally, the green area is the Federal Reserve's holding of mortgage-backed securities.

Chart 6 'Qualitative easing' and equity prices in the United States



This chart is reproduced from Farmer (2012b).

Notice the coincidence in timing of the Federal Reserve's purchases of risky mortgage-backed securities — the green area on the chart — with movements in the stock market, shown by the blue line. The turn around in the stock market that occurred at the beginning of 2009 coincides closely with the decision by the Federal Reserve to start purchasing mortgage-backed securities. Further, when asset buying was suspended temporarily, in the second quarter of 2010, the stock market resumed its downward spiral, picking up again only when the Federal Reserve announced at the Jackson Hole conference in the autumn of the same year, that large-scale asset purchases would resume. This was a big success story for qualitative easing.

A more recent episode occurred on 19 June of this year, when Chairman Bernanke made a rather mild statement that the policy of quantitative easing that the Federal Reserve had been following might slow down later in the year. The Federal

Reserve has been pumping US$85 billion dollars a month into the US economy and merely the mention that this policy might soon be reduced caused markets all over the world to tumble by 4 percentage points in two days.

The lessons for economic policy

In the wake of the 2008 crisis, central banks throughout the world engaged in massive expansions of their balance sheets, so-called quantitative easing. These policies were unlike anything we have seen since the inception of central banking over 300 years ago. The Great Recession did not turn into Great Depression II, in large part because of these co-ordinated central bank actions. My empirical results (Farmer (2013c)) on the connection between unemployment and asset markets suggest that in the absence of quantitative easing, the unemployment rate would have peaked at 18% rather than the rise from 5% to 10% that occurred in practice. Central banks saved the day.

The crisis was caused by inefficient financial markets that led to a fear that financial assets were overvalued. When businessmen and women are afraid, they stop investing in the real economy. Lack of confidence is reflected in low and volatile asset values. Investors become afraid that stocks, and the values of the machines and factories that back those stocks, may fall further. Fear feeds on itself, and the prediction that stocks will lose value becomes self-fulfilling.(1)

If confidence is low, the private sector places a low value on existing buildings and machines. Low confidence induces low wealth. Low wealth causes low aggregate demand, and low aggregate demand induces a high-unemployment equilibrium in which the lack of confidence becomes self-fulfilling.

Qualitative easing works to combat this vicious cycle by increasing the value of wealth as governments absorb the risks that private agents are unwilling to bear. In both the United Kingdom and the United States, qualitative easing reduced the real expected return on long-term government bonds, which in turn nurtured a recovery in the stock market. In my view, the policy of qualitative easing should be retained as a permanent component and new tool for the stabilisation of financial markets.

Initially it was considered a radical step for central banks to control interest rates. The use of interest rate control to stabilise prices has proven to be effective and should be continued. But one instrument, the interest rate, is not sufficient to successfully hit two targets. My work demonstrates that the instability of financial markets is not just a reflection of inevitable fluctuations in productive capacity; it is a causal factor in generating high unemployment and persistent stagnation. The remedy is to design an institution, modelled on the modern central bank, with both the authority and the tools to stabilise aggregate fluctuations in the stock market.

Since the inception of central banking in the 17th century, it has taken us 350 years to evolve institutions that have proved to be successful at managing inflation. The path has not been easy and we have made many missteps. It is my hope that the development of institutions that can mitigate the effects of financial crises on persistent and long-term unemployment will be a much swifter process than the 350 years that it took to develop the modern central bank.

(1) Farmer (1999).

References

Bagehot, W (1873), *Lombard Street: a description of the money market*, Library of Economics and Liberty, available at www.econlib.org/library/Bagehot/bagLom.html.

Buiter, W H (2008), 'Quantitative easing and qualitative easing: a terminological and taxonomic proposal', *Financial Times*, Willem Buiter's mavercon blog.

Fama, E F (1970), 'Efficient capital markets: a review of theory and empirical work', *Journal of Finance*, Vol. 25, pages 383–417.

Farmer, R E A (1999), *The macroeconomics of self-fulfilling prophecies*, MIT Press, Cambridge MA (second edition).

Farmer, R E A (2002a), 'Fiscal policy, equity premia and heterogenous agents', *UCLA Working Paper*, prepared for the conference on 'New Developments in Fiscal Policy Analysis' at Universitat Pompeu Fabra, Barcelona, May 2002, available at www.rogerfarmer.com/NewWeb/Working%20Papers/barcelona.pdf.

Farmer, R E A (2002b), 'Business cycles with heterogenous agents', *UCLA Working Paper*, presented at the GREQAM conference, 'New Perspectives of (In)Stability, the Role of Heterogeneity', Marseilles, June 2001, available at www.rogerfarmer.com/NewWeb/Working%20Papers/business.pdf.

Farmer, R E A (2010a), *Expectations, employment and prices*, Oxford University Press, Oxford.

Farmer, R E A (2010b), *How the economy works: confidence crashes and self-fulfilling prophecies*.

Farmer, R E A (2012a), 'Confidence crashes and animal spirits', *Economic Journal*, Vol. 122, pages 155–72.

Farmer, R E A (2012b), 'The effect of conventional and unconventional monetary policy rules on inflation expectations: theory and evidence', *Oxford Review of Economic Policy*, Vol. 28, No. 4, pages 622–39.

Farmer, R E A (2012c), 'The stock market crash of 2008 caused the Great Recession: theory and evidence', paper prepared for a Plenary Address to the 2012 meeting of the Society for Computational Economics *Journal of Economic Dynamics and Control*, Vol. 36, pages 696–707.

Farmer, R E A (2013a), 'Animal spirits, financial crises and persistent unemployment', *Economic Journal*, Vol. 123, No. 568, pages 317–40.

Farmer, R E A (2013b), 'The Natural Rate Hypothesis: an idea past its sell-by date', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 244–56.

Farmer, R E A (2013c), 'The stock market crash really did cause the Great Recession', *NBER Working Paper No. 19391* and *CEPR Discussion Paper No. 9630*.

Farmer, R E A (2013d), 'Quantitative easing', written evidence to the Treasury Committee, Session 2012–13. Oral evidence presented 24 April 2013.

Farmer, R E A, Nourry, C and Venditti, A (2012), 'The inefficient markets hypothesis: why financial markets do not work well in the real world', *CEPR Discussion Paper No. 9283* and *NBER Working Paper No. 18647*. Winner of the Inaugural 2013 Maurice Allais Prize in Economic Science.

Friedman, M and Schwartz, A J (1963), *A monetary history of the United States*, Princeton University Press, Princeton NJ.

Hansen, L P (2008), 'Generalized method of moments estimation', in Durlauf, S N and Blume, L E (eds), *The New Palgrave Dictionary of Economics*, second edition.

Keynes, J M (1936), *The general theory of employment, interest and money*, Macmillan, London.

Malinvaud, E (1977), *The theory of unemployment reconsidered*, three lectures delivered for the Yrjö Jahnsson Foundation, Helsinki, Basil Blackwood, Oxford.

Oreopoulos, P, Von Wachter, T and Heisz, A (2012), 'The short- and long-term career effects of graduating in a recession: hysteresis and heterogeneity in the market for college graduates', *American Economic Journal: Applied Economics*, Vol. 4, No. 1, pages 1–29.

Shiller, R J (2000), *Irrational exuberance*, Princeton University Press.

Shiller, R J (2013), Online data, www.econ.yale.edu/~shiller/data.htm.

Summaries of speeches and working papers

Bank of England speeches

A short summary of speeches and *ad hoc* papers made by Bank personnel since 1 September 2013 are listed below.

Monetary policy making and forward guidance

Martin Weale, Monetary Policy Committee member, November 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech695.pdf

In a speech given to A-level students at Quintin Kynaston Community Academy in London, Martin Weale outlined the modern history of monetary policy in the United Kingdom — from the 1970s to the present day. Martin explained the principles of forward guidance, the latest development in UK monetary policy, and the role of the 7% unemployment threshold under the framework. He also emphasised the importance of the Monetary Policy Committee's 'knockout' over medium-term inflation expectations. While assessments of medium-term inflation expectations have always been important for monetary policy makers, Martin argued that the second knockout of the forward guidance framework has made this indicator even more critical. Taking a range of indicators for medium-term inflation expectations, Martin stated that there appears to be an average increase of 0.15% at present. However, he added that he would have to be convinced that the upward movement would persist, as it would be 'quite wrong' to react to a short-term movement.

Housing, leverage and stability in the wider economy

David Miles, Monetary Policy Committee member, November 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech694.pdf

In a speech given at the Dallas Federal Reserve, David Miles argued that greater use of outside equity in financing house purchases may help counteract some of the macroeconomic problems created by excessive leverage in housing markets.

Miles noted that monetary policy and macroprudential policy could also influence leverage. But monetary policy could be a blunt instrument with which to attempt to stabilise housing markets, as its impact on borrowing and spending unrelated to housing may well be greater than the effect on the intended target. In contrast, greater use of outside equity funding could permanently reduce the level of gearing and might much reduce the need to rely on macroprudential or monetary policy levers.

Outside equity funding would allow outside investors to share the risk — and rewards — of home ownership. According to Miles, switching even just 10%–20% of funding from debt to outside equity would very substantially reduce leverage, while the moral hazard inherent in such contracts — for example, homeowners potentially having less incentive to maintain their properties — might be low enough to make them commercially feasible.

The interactions of macroprudential and monetary policies: a view from the Bank of England's Financial Policy Committee

Donald Kohn, Financial Policy Committee member, November 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech692.pdf

In this speech delivered at the Oxford Institute for Economic Policy, Donald Kohn explored the interactions of macroprudential and monetary policies.

He discussed the potential for policy spillovers. First, he explained how the monetary policy cycle can contribute to the financial cycle and how this can feed back to the economic cycle. And second, he explained that macroprudential policies, by influencing financial conditions under a variety of circumstances, would have broader effects on how the monetary authorities pursue their objectives.

Donald Kohn highlighted that most of the time the two policies generally will be acting in synch with one another — leaning against both boom and bust. But policies will need to adapt to each other. He moved on to discuss the ways in which the situation of the past few years has posed special challenges to how each policy must respond to each other.

Turning to the present, he outlined some of the recent developments in the housing market and the potential for financial stability risks to arise from this sector. He explained his view that it is not the Financial Policy Committee's role to micro-manage housing or other asset and credit cycles, but to prevent the amplification of these cycles through the financial markets.

The UK payments landscape

Chris Salmon, Executive Director for Banking Services and Chief Cashier, November 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech691.pdf

In these remarks, Chris Salmon outlined a number of changes that have occurred in the UK payments system — as well as priorities for future reform — as the Bank works to further strengthen this critical infrastructure. He noted that while payments systems performed well during the crisis, some of the lessons derived from the crisis have prompted the Bank to address a number of credit, liquidity and operational risk issues within our core systems with more vigour than previously, and have shaped much of the Bank's recent work programme. He outlined changes initiated in both the wholesale and retail spheres following concerns about tail risks and contagion. The Bank has also sought to reduce the operational risks the Bank runs as the core infrastructure provider by working with SWIFT to develop a product that will act as a virtual third site for RTGS. Among other things, the Bank is now looking at cyber risk to the core payments systems.

The United Kingdom at the heart of a renewed globalisation

Mark Carney, Governor, October 2013.

Speech given at an event to celebrate the 125th anniversary of the *Financial Times*, London, on 24 October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech690.pdf

The Governor began by reflecting on London's place at the heart of the global financial system. If organised properly, a vibrant financial sector brought substantial benefits. Financial services accounted for a tenth of UK GDP and were the source of over one million jobs. More broadly, London's international markets provided a valuable service to the global economy. These benefits, on both sides, would be greatest as part of an open, integrated global financial system.

It was not for the Bank to decide how big the financial sector should be. The Bank's task was to ensure that the United Kingdom could host a large and expanding financial sector in a way that promoted financial stability. Only then could it be both a global good and a national asset.

The Governor focused on the three core elements of the Bank of England's new Financial Stability strategy. First, the Bank was working to complete the jobs of making banks more resilient and tackling 'too big to fail'. Second, the Bank was making markets more robust in order to turn the shadow banking system from a source of risk to a pillar of resilience. Third, the Bank was changing how it backstopped private firms' liquidity management, offering money and collateral for longer terms against a wider range of assets for smaller fees. These initiatives would help set the stage to improve further the supply of credit within the United Kingdom.

In the style of the *Financial Times* 125 years ago, the Bank of England today was the friend of resilient banks, continuous markets, and good collateral; and the enemy of taxpayer bailouts, fragile markets and financial instability. The Bank was playing its part in helping the United Kingdom renew globalisation to the benefit of all.

The UK economic outlook

Charlie Bean, Deputy Governor, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech689.pdf

Speaking at the Society of Business Economists Annual Conference, Deputy Governor Charlie Bean discussed whether the pickup in UK growth was likely to be sustained, and considered the impact of forward guidance on interest rate expectations. He suggested there were signs that the recovery may be gaining traction, noting that UK banks had made progress in bolstering their capital positions and that the euro area was no longer in existential crisis. But he warned that the pace of recovery was likely to remain fairly modest. On forward guidance, he believed that businesses understood that policy would only be tightened once the recovery was entrenched. He noted that interpreting the recent rise in bond yields was complicated by the run of unusually strong UK data, but observed that the yield curve had steepened by less than previous similar episodes would suggest. That could indicate some effect from guidance in preventing unwarranted movements.

Remarks at the joint Black Country Reinvestment Society and Black Country Diners Club networking lunch

Martin Taylor, Financial Policy Committee member, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech688.pdf

In a speech in Wolverhampton, Martin Taylor described the responsibilities and powers of the Financial Policy Committee (FPC). He contrasted the Committee's remit with that of the Monetary Policy Committee (MPC), pointing out that the FPC's remit is both broader and less precise than that of its longer-established sister body. He discussed the way in which the FPC was increasingly being used as a backstop to potentially risky policies developed elsewhere — the Treasury's Help to Buy scheme, and the MPC's incorporation of a formal financial stability knockout into its forward guidance. He also covered housing market developments, where FPC

intervention to cool the market down has been urged in some quarters, reminding the audience that the FPC would be likely to show concern only if and when it felt financial stability was threatened.

Regulating international banks

Andrew Bailey, Deputy Governor, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech687.pdf

Andrew Bailey spoke at the British Bankers' Association's annual international banking conference to explain the Prudential Regulation Authority's (PRA's) thinking on issues concerning the pressures on international banking business and the establishment and supervision of non European Economic Area (EEA) bank branches in London — the single market allows EEA banks to 'branch-in'. Andrew noted that the recent fragmentation of the international banking system had been driven by concerns over sovereign creditworthiness and the difficulty of dealing with cross-border resolution when bank failure occurs. However this 'balkanisation' should not be considered inevitable. The PRA's approach towards the supervision and scope of activities that non-EEA bank branches can undertake places emphasis on recovery and resolution agreements between national authorities. For non-EEA firms the PRA will expect very clear and credible assurances from the parents of banks wishing to operate as branches and from the home state authorities. While the PRA approach seeks to limit the range of activities that these branches can undertake it still allows them to undertake safer forms of wholesale banking. This approach is applied evenly to all non-EEA jurisdictions.

Inflation targeting and the MPC's forward guidance

Spencer Dale, Executive Director and Chief Economist, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech686.pdf

In a speech at the International Journal of Central Banking Annual Conference, Spencer Dale asked how the United Kingdom's inflation-targeting regime has stood up to the extraordinary challenges posed by the recent prolonged period of high inflation, anaemic demand and weak supply. He concluded that, on balance, recent events demonstrate the value of an inflation target which afforded the MPC the credibility to loosen policy aggressively in support of the recovery. But he also conceded that the MPC could have done more to communicate that they were providing this support, thereby enhancing the legitimacy of the inflation-targeting regime. The MPC's forward guidance, framed in terms of a threshold for the unemployment rate, tackles this issue head on and in this sense enhances the United Kingdom's inflation-targeting regime to respond to the current exceptional circumstances. Its guidance also serves to emphasise that what matters for monetary policy is spare capacity and the level of economic activity, and not simply economic growth.

Solving too big to fail: where do things stand on resolution

Paul Tucker, Deputy Governor, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech685.pdf

Paul Tucker reviewed progress by the international community on addressing the problem of 'too big to fail' (TBTF) via enhanced resolution regimes. First, given the United States had the technology and major banks with a group structure that lends itself to resolution, he could not see how the US Administration could persuade Congress to bail out the biggest US banks and dealers. Europe was not far behind but needed to pass its key legislation, and many large European banking groups will need to be reorganised. Second, he described how the distinction between single point of entry and multiple point of entry resolution strategies may be the most important innovation in banking policy in decades. Few major financial groups could adopt these strategies without significant changes to their legal, organisational and financial structure. Third, he noted that all bonds could be bailed-in in a resolution scenario. That was distinct from the issue of whether the authorities should mandate a specified amount of bonded debt, issued by particular entities in a group. Fourth, jurisdictions with international banks needed to reach co-operation agreements on cross-border resolutions. Fifth, the reform programme was not just about banks: central counterparties needed to be resolvable too. His conclusion was that the authorities will have no excuse if they do not solve TBTF through resolution regimes. The necessary technology was clear; the necessary restructuring of firms was clear; and the degrees and forms of cross-border co-operation was also clear. It was a matter of: 'just do it'.

Current issues for the Prudential Regulation Authority as a General Insurance supervisor

Julian Adams, Deputy Head of the Prudential Regulation Authority and Executive Director of Insurance, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech684.pdf

In this speech, Julian Adams outlined the PRA's role in supervising insurance companies, how it has taken into account lessons from the crisis and how the PRA is applying its new supervisory approach to considering the implications for general insurers of the growth of alternative capital. Julian highlighted a number of wider lessons from the crisis that had equal relevance to the supervision of insurers — including the need to focus on potential future risks to the sustainability of a

firm's business model or solvency position, the need to be alert to changes in market structures which might impact the risks that firms run, and the need to consider risks at a system-wide level as well as risks within individual firms.

Julian went on to outline some of the ways in which the PRA expected firms to be assessing the potential implications of the growth of alternative capital for their business models and risk profiles, and ensuring that they manage appropriately the risks which might arise. He also highlighted the PRA's interest in how these trends might affect the potential build-up of system-wide risk and leverage. Julian closed by giving a brief update on the status of Solvency II negotiations and the PRA's intended use of 'early warning indicators' to supplement firms' own risk modelling approaches.

Financial markets, monetary policy and credit supply

Paul Fisher, Executive Director for Markets, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech683.pdf

Paul Fisher reviewed developments in financial markets over the past year. Markets were relatively calm until May. Volatility increased after Ben Bernanke indicated that the Federal Open Market Committee was considering tapering its asset purchases. But despite the subsequent wide-ranging sell-off, Fisher did not sense any long-lived market dysfunction. For many market participants the 'shock' was seen as a healthy correction to what had become a complacent outlook. He emphasised that monetary policy setting is about decision-making under uncertainty and the actual outcome for policy will always be dependent on how the economy, and hence the outlook, evolves.

The MPC had provided explicit guidance regarding the future path of its monetary policy instruments in August. Forward guidance is not a guarantee to hold rates fixed for a set period of time but allows the MPC to explore how much spare capacity there is in the economy before raising Bank Rate. He noted that the early reactions from businesses and the public suggest it had added to confidence and thus helped to promote the recovery.

Fisher also assessed the impact of the Funding for Lending Scheme, which he believed had successfully shifted the supply of credit to households and businesses over the past year.

The reform of international banking: some remaining challenges

Paul Tucker, Deputy Governor, October 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech682.pdf

Paul Tucker discussed three issues that standard setters and regulators will need to address as they complete the reform of international banking.

The first was that, while the international regime sets a minimum equity requirement for banks, it does not ensure that banks have in issue debt that enables an effective reconstruction in resolution: 'gone concern' loss-absorbing capacity (GLAC). The recent G20 leaders summit called on the Financial Stability Board (FSB) to produce plans in this area over the coming year. The second area, also being addressed by the FSB, is ensuring an adequate distribution of equity and GLAC across the different legal entities in a banking group. He explained that allocation is part and parcel of deciding the preferred resolution strategy for a group. Finally, and drawing attention to a discussion paper recently published by the Bank, he explored how a clear framework for stress testing banks and other key financial institutions can help micro and macroprudential regulators. It could also represent a 'quantum leap' in the public accountability of both the FPC and the PRA Board.

Bank of England polymer consultation programme

Chris Salmon, Executive Director for Banking Services and Chief Cashier, September 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech680.pdf

In a speech delivered to the Norfolk Chamber of Commerce, Chris Salmon discussed the Bank's polymer public consultation programme. He addressed three key questions relating to the consultation programme: why the Bank was only now proposing a switch to polymer; why the Bank was consulting the public; and why all central banks are not proposing to make the change. He noted that over the past few years a number of 'push' and 'pull' factors had prompted the Bank to reconsider whether paper remained the best long-term solution for our banknotes. He discussed the in-depth assessment the Bank had conducted of the merits of banknotes printed on a variety of materials. In terms of the consultation, he made it clear that there would be no point moving to polymer if the public had material misgivings. He committed to considering all the feedback received ahead of making a final decision.

Monetary policy and forward guidance in the United Kingdom

David Miles, Monetary Policy Committee member, September 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech681.pdf

In his speech at Northumbria University, Professor Miles argued that slack in the economy generated by several years of underperformance meant that monetary policy would not quickly return to normal. If the growth of GDP picked up, higher wage growth can be offset by higher productivity, limiting inflationary pressures.

He explained that forward guidance conveyed a simple message to the British public: in the absence of inflationary pressures, monetary policy would not be tightened until the recovery was sufficiently strong to make a meaningful dent in unemployment. Guidance reduced the risk that a recovery was 'smothered by the anticipation that a tightening in monetary policy is imminent'.

Miles expressed that he would be pleased to begin normalising monetary policy if growth turned out to be strong and unemployment came down significantly. But he concluded: 'What (…) a stronger path for output and confidence does not need right now is tighter monetary policy. That is what the guidance that has been given by the MPC is designed to avoid'.

Monetary strategy and prospects

Paul Tucker, Deputy Governor, September 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech679.pdf

Paul Tucker explained his thinking on monetary strategy in the context of the emerging economic recovery. He drew attention to the substantial degree of uncertainty about the amount of slack in the economy. For some time, he had been pursuing a 'probing' approach: 'provide stimulus; pause to see whether inflation expectations remain anchored; if, but only if, they are and more stimulus is needed, provide it'. The MPC's new forward guidance framework is consistent with that approach. Forward guidance can be particularly useful during a period when the recovery is beginning to take hold, where it could be very easy to come to the mistaken conclusion that monetary stimulus will soon begin to be withdrawn. Given the slack in the economy, Paul Tucker explained, the Committee is in no rush. It should not have been a complete surprise that recovery is finally under way, given various 'Keynesian' policies designed by the Bank to stimulate the economy. A resilient banking system was a precondition for a sustained and better-balanced recovery. Repair in this regard was now under way. That had required realism about asset values, expected losses and risks — not pretending, taking the medicine: policy in the spirit of Hayek. The Bank's overall policy package combined Keynes and Hayek.

Conditional guidance as a response to supply uncertainty

Ben Broadbent, Monetary Policy Committee member, September 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech678.pdf

In a speech at the London Business School, Ben Broadbent explained why uncertainty surrounding productivity means it is right to condition monetary policy on the unemployment rate. He began by observing that labour productivity has been inexplicably weak recently. Oft-cited explanations like greater pay flexibility cannot explain all of the strength in employment. On the other hand, there is evidence that slower reallocation of resources has impaired the economy's effective supply. Under such uncertainty, the unemployment rate is a more reliable indicator of spare capacity than economic growth. If unemployment falls faster — either because of weaker productivity or stronger demand — it would be right to consider tightening monetary policy. In closing, he pointed out that tighter policy will be conditional on a significant fall in unemployment and the inflation and financial stability 'knockouts', and that there is no unconditional promise to keep interest rates fixed for a particular length of time.

Why institutions matter (more than ever)

Andrew Haldane, Executive Director for Financial Stability, September 2013.

www.bankofengland.co.uk/publications/Documents/speeches/2013/speech676.pdf

In this speech, Andrew Haldane argued that the twin forces of greater integration and greater information may have increased the severity of the tail risks facing global systems. As a result, institutions such as the Bank of England matter now more than ever.

Economists through time, from Smith to Veblen to Coase to North have shown that institutions rise in importance as societies become more complex, integrated and information-rich. The financial system is no different. And responsibility for financial stability should be given to a policymaker with institutional memory, at arms-length from the political process and with a system-wide focus.

The United Kingdom's new regulatory arrangements recognise that. The Bank of England has around 320 years of history, which ought to give it the institutional memory. The FPC has operational independence from government and the ordering of its objectives leans against short-termism. And the FPC's focus is on system-wide 'macroprudential' policy.

Appendices

Contents of recent Quarterly Bulletins

The articles that have been published recently in the *Quarterly Bulletin* are listed below. Articles from December 1960 to Winter 2002 are available on the Bank's website at:

www.bankofengland.co.uk/archive/Pages/digitalcontent/historicpubs/quarterlybulletins.aspx.

Articles from Spring 2003 onwards are available at:

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

Articles

– 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

2012 Q3
– RAMSI: a top-down stress-testing model developed at the Bank of England
– What accounts for the fall in UK ten-year government bond yields?
– Option-implied probability distributions for future inflation
– The Bank of England's Real-Time Gross Settlement infrastructure
– The distributional effects of asset purchases
– Monetary Policy Roundtable

2012 Q4
– The Funding for Lending Scheme
– What can the money data tell us about the impact of QE?
– Influences on household spending: evidence from the 2012 NMG Consulting survey
– The role of designated market makers in the new trading landscape
– The Prudential Regulation Authority

2013 Q1
– Changes to the Bank of England
– The profile of cash transfers between the Asset Purchase Facility and Her Majesty's Treasury
– Private equity and financial stability
– Commercial property and financial stability
– The Agents' company visit scores
– The Bank of England *Bank Liabilities Survey*
– Monetary Policy Roundtable

2013 Q2
– Macroeconomic uncertainty: what is it, how can we measure it and why does it matter?
– Do inflation expectations currently pose a risk to the economy?
– Public attitudes to monetary policy
– Cross-border bank credit and global financial stability
– The Old Lady of Threadneedle Street
– Central counterparties: what are they, why do they matter and how does the Bank supervise them?
– A review of the work of the London Foreign Exchange Joint Standing Committee in 2012

2013 Q3
– Macroprudential policy at the Bank of England
– Bank capital and liquidity
– The rationale for the prudential regulation and supervision of insurers
– Recent developments in the sterling overnight money market
– Nowcasting world GDP and trade using global indicators
– The Natural Rate Hypothesis: an idea past its sell-by date
– Monetary Policy Roundtable

2013 Q4
– SME forbearance and its implications for monetary and financial stability
– Bringing down the Great Wall? Global implications of capital account liberalisation in China
– Banknotes, local currencies and central bank objectives
– Banks' disclosure and financial stability
– Understanding the MPC's forecast performance since mid-2010
– The financial position of British households: evidence from the 2013 NMG Consulting survey
– What can company data tell us about financing and investment decisions?
– Tiering in CHAPS
– The foreign exchange and over-the-counter interest rate derivatives market in the United Kingdom
– Qualitative easing: a new tool for the stabilisation of financial markets

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/research/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. 467 Factor adjustment costs: a structural investigation (October 2012)
Haroon Mumtaz and Francesco Zanetti

No. 468 Using Shapley's asymmetric power index to measure banks' contributions to systemic risk (October 2012)
Rodney J Garratt, Lewis Webber and Matthew Willison

No. 469 High-frequency trading behaviour and its impact on market quality: evidence from the UK equity market (December 2012)
Evangelos Benos and Satchit Sagade

No. 470 Long and short-term effects of the financial crisis on labour productivity, capital and output (January 2013)
Nicholas Oulton and María Sebastiá-Barriel

No. 471 The Bank of England's forecasting platform: COMPASS, MAPS, EASE and the suite of models (May 2013)
Stephen Burgess, Emilio Fernandez-Corugedo, Charlotta Groth, Richard Harrison, Francesca Monti, Konstantinos Theodoridis and Matt Waldron

No. 472 International capital flows and development: financial openness matters (June 2013)
Dennis Reinhardt, Luca Antonio Ricci and Thierry Tressel

No. 473 The pitfalls of speed-limit interest rate rules at the zero lower bound (June 2013)
Charles Brendon, Matthias Paustian and Tony Yates

No. 474 Not all capital waves are alike: a sector-level examination of surges in FDI inflows (June 2013)
Dennis Reinhardt and Salvatore Dell'Erba

No. 475 Policy multipliers under an interest rate peg of deterministic versus stochastic duration (June 2013)
Charles T Carlstrom, Timothy S Fuerst and Matthias Paustian

No. 476 Oil shocks and the UK economy: the changing nature of shocks and impact over time (August 2013)
Stephen Millard and Tamarah Shakir

No. 477 Non-uniform wage-staggering: European evidence and monetary policy implications (August 2013)
Michel Juillard, Hervé Le Bihan and Stephen Millard

No. 478 Capital over the business cycle: renting versus ownership (August 2013)
Peter N Gal and Gabor Pinter

No. 479 Financial factors and the international transmission mechanism (August 2013)
Abigail Haddow and Mariya Mileva

No. 480 Central counterparties and the topology of clearing networks (August 2013)
Marco Galbiati and Kimmo Soramäki

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/research/Pages/externalmpcpapers/default.aspx.

The following papers have been published recently:

No. 39 Fiscal multipliers and time preference (January 2013)
Gilberto Marcheggiano and David Miles

No 40 Is the 'Great Recession' really so different from the past? (June 2013)
Adrian Chiu and Tomasz Wieladek

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, Statistics and Regulatory Data Division, Bank of England: telephone 020 7601 4544; fax 020 7601 5395; 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 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. The *Financial Stability Report* is available 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/redbook.pdf.

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* explores topical issues relating to the Bank's core purposes of monetary and financial stability. Some articles present analysis on current economic and financial issues, and policy implications. Other articles enhance the Bank's public accountability by explaining the institutional structure of the Bank and the various policy instruments that are used to meet its objectives. 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

Publication dates for 2014 are as follows:

Quarterly Bulletin		*Inflation Report*	
Q1	14 March	February	12 February
Q2	16 June	May	14 May
Q3	16 September	August	13 August
Q4	11 December	November	12 November

ISSN 0005-5166
Printed by Park Communications Limited