Quarterly Bulletin

2011 Q4 | Volume 51 No. 4

BANK OF ENGLAND

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Foreword

The UK economy has continued to recover for much of this year following the sharp falls in output in 2008–09. But the pace of that recovery has been disappointing and there are signs that output growth has slowed in recent months. A number of the articles in this *Bulletin* consider some of the factors that have an important bearing on the recovery, both in the past and the future, including: the support to our economy provided by the large depreciation of sterling since 2007; the way in which households have adjusted their spending and saving decisions in response to changes in their personal finances; and the extent to which UK businesses have been able to use capital market finance as the supply of bank credit has tightened.

This *Bulletin* begins, as usual, by examining developments in financial markets. The *Markets and operations* article reviews developments in financial markets covering the period between the previous *Bulletin* and 25 November 2011. Financial market sentiment and functioning worsened over the review period as concerns about the substantial challenges facing the euro area intensified. Against this backdrop, most primary capital markets continued to experience low levels of activity as investors sought to reduce their exposures to risky assets. This contributed to a further deterioration in bank funding conditions. Policymakers in the United Kingdom and abroad eased monetary policy and announced a range of measures designed to mitigate risks to financial stability.

Between mid-2007 and early 2009, sterling depreciated by around 25%. This more competitive level of sterling supported the recovery by encouraging a switch towards UK-produced goods and services and so improving the United Kingdom's net trade position. But the United Kingdom's trade performance was also affected by the varying demand conditions in the United Kingdom and the rest of the world. The article in this edition of the *Bulletin* attempts to isolate the effect of sterling's depreciation on UK exports and imports. Between mid-2007 and mid-2011, the UK trade deficit as a share of GDP roughly halved. This change in net trade is broadly in line with developments following previous large sterling movements, but it disguises some significant variation across different components of trade. Sterling's depreciation does appear to have stimulated substantial switching of expenditure by overseas companies and households towards UK goods exports. But financial services exports appear to have suffered from the financial crisis and there has been little visible adjustment from exports of other services in response to the depreciation. On the imports side, UK travel services imports, which are comprised of overseas tourism — that is, overseas spending by UK residents — have fallen markedly as fewer households have gone on holidays overseas. But imports of other services and goods do not seem to have responded much to the exchange rate depreciation.

An important feature of this recovery relative to past ones — and a key reason why the pace of the recovery has been disappointing — is the weakness in household consumption. Consumption spending is estimated to have fallen by over 1% in the first half of this year alone.

To better understand the financial situation facing UK households, and the impact this is having on their spending and saving decisions, the Bank commissioned NMG Financial Services Consulting to carry out its ninth annual survey of household financial positions. The results of the latest survey are examined in this *Bulletin*. Households reported that their income available after paying tax, housing costs, bills and loan payments had fallen, continuing the trend of the past four annual surveys. Households also reported that they had been affected by the fiscal consolidation, mainly through lower income and higher taxes, and that in response they were, for example, trying to increase their labour supply through finding a new job or working longer hours. Relative to the period before the financial crisis, more households continued to report that credit conditions were tight. Households, in aggregate, did not expect to change the amount they saved. And despite the considerable pressures on household finances, most reported levels of financial distress had not deteriorated, aided by the low interest rate environment and the forbearance shown by lenders.

Although the recovery has been associated with weak bank lending to both households and companies, some larger companies have been able to use public capital markets as an alternative source of financing. The article in this edition investigates the role of public external finance and its importance for the UK economy. Although only a small number of UK companies issue public debt or equity, those that do account for around one sixth of total private sector employment and around half of total UK domestic investment. In particular, the article looks at how the amount of finance raised through public capital markets, in the form of corporate bonds and equity, increased sharply in recent years and it explores whether greater recourse to these forms of financing helped some large UK companies manage the impact of the financial crisis. The evidence suggests that in the absence of public external finance, spending decisions of UK companies might have been more significantly affected, and they may have had to make sharper cuts in employment and investment.

Derivatives play a key role in the financial system as hedging instruments, allowing businesses and financial institutions to reduce their exposures to different types of risk. Currently, derivative instruments, such as interest rate swaps, are mainly traded in over-the-counter (OTC) markets, where clients trade bilaterally with banks. As part of a G20 commitment to improve transparency and mitigate systemic risks in these markets, many OTC derivatives will be required to be traded on exchanges or electronic platforms by the end of 2012. The article in this edition of the *Bulletin* examines a variety of different ways in which OTC derivatives can be traded. It highlights the trade-offs that can arise between increasing transparency and/or widening access on the one hand, and maintaining liquidity on the other. The article also considers evidence that suggests that liquidity provision is more robust when market participants have a choice between trading platforms.

Spencer Dale
Chief Economist and Executive Director — Monetary Analysis and Statistics.

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

Contents

Recent economic and financial developments

Research and analysis

Speeches

Appendices

The contents page, with links to the articles in PDF, is available at
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Author of articles can be contacted at
forename.surname@bankofengland.co.uk

The speeches contained in the *Bulletin* can be found at
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Except where otherwise stated, the source of the data used in charts and tables is the Bank of England or the Office for National Statistics (ONS). All data, apart from financial markets data, are seasonally adjusted.

Recent economic and financial developments

Markets and operations

This article reviews developments in sterling financial markets, including the Bank's official operations, between the 2011 Q3 *Quarterly Bulletin* and 25 November 2011.[1] The article also summarises market intelligence on selected topical issues relating to market functioning.

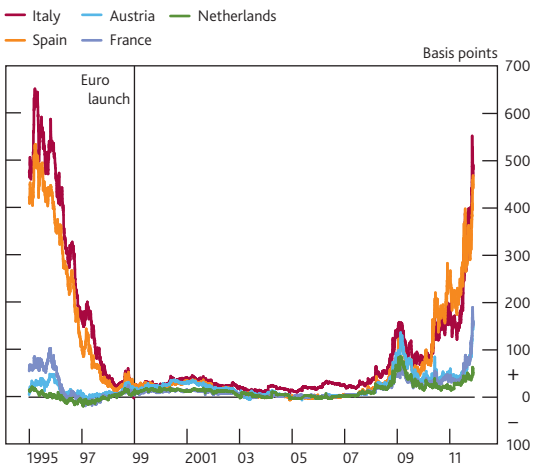
Sterling financial markets

Overview

Financial market sentiment and functioning continued to deteriorate over the review period amid intensifying concerns about a potentially disorderly resolution to the fiscal challenges and external imbalances facing several euro-area countries, related banking sector vulnerabilities and the macroeconomic outlook.

Fiscal developments remained a key influence on financial markets. In the euro area, concerns about the sustainability of fiscal and external positions and the implications for banking sectors intensified, leading to strains within financial markets. On 27 October, the European authorities announced a package of measures designed to address those concerns. These measures only provided temporary respite to financial markets, with spreads between the yields of sovereign bonds of several euro-area countries and those of German government bonds rising to levels last experienced prior to the launch of the euro in 1999 (**Chart 1**). These developments continued to interact with, and were compounded by, concerns about the sustainability of the global economic recovery.

Chart 1 Selected European ten-year government bond spreads[a]



Sources: Bloomberg and Bank calculations.

(a) Spreads over ten-year German government bond yields.

Against this backdrop, most primary capital markets continued to experience low levels of activity as investors sought to reduce their exposures to risky assets. This contributed to a further deterioration in bank funding conditions.

Policymakers in the United Kingdom and abroad reacted to the deteriorating macroeconomic outlook by easing monetary policy. Subsequent to the review period a range of policy measures was announced to support financial stability. A number of central banks, including the Bank, announced co-ordinated actions to enhance their capacity to provide liquidity support in overseas currencies. The Bank also announced a new contingency sterling liquidity facility — the Extended Collateral Term Repo Facility. And the Bank's Financial Policy Committee agreed recommendations to mitigate risks to financial stability in the current environment.[2] On 8–9 December, European leaders met to discuss new measures to address the ongoing challenges facing the euro area.

Monetary policy and short-term interest rates

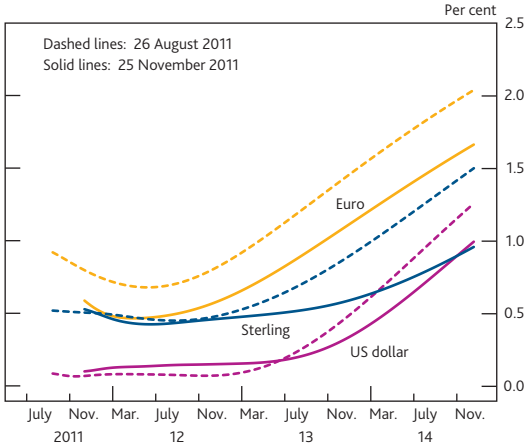
The Bank of England's Monetary Policy Committee maintained Bank Rate at 0.5% and voted on 6 October to increase the size of its asset purchase programme, financed by the issuance of central bank reserves, by £75 billion to a total of £275 billion. The Committee judged that the deterioration in the economic outlook had made it more likely that inflation would undershoot the 2% target in the medium term without further monetary stimulus. The asset purchase programme is described in the box on pages 282–83.

A Reuters poll of economists released after the end of the review period showed that all respondents expected further asset purchases, with a median expectation of £75 billion. Respondents expected an extension to the programme to be announced in 2012 Q1. The same poll indicated that expectations of the first rise in Bank Rate continued to be pushed further into the future; the median expectation was

(1) The data cut-off for the previous *Bulletin* was 26 August 2011.
(2) The recommendations of the Financial Policy Committee can be found at www.bankofengland.co.uk/publications/fsr/2011/fsrsum1112.pdf.

for no increase in Bank Rate over the survey horizon, which ended in the middle of 2013. Consistent with this, forward sterling overnight index swap (OIS) rates fell at longer maturities (**Chart 2**).

Chart 2 Instantaneous forward interest rates derived from OIS contracts[a]

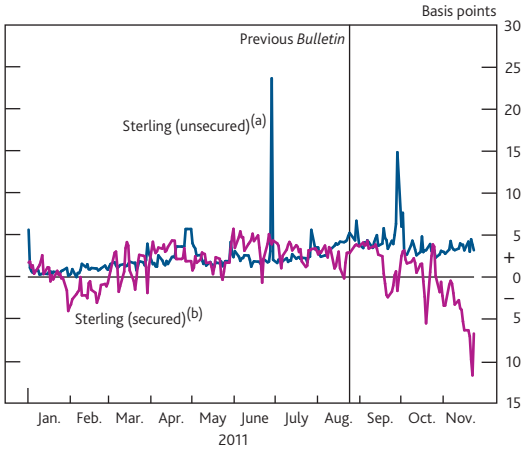


Sources: Bloomberg and Bank calculations.

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

At the very short end of the money market curve, sterling unsecured overnight interest rates traded slightly above Bank Rate during the review period, with a notable spike at the end of September (**Chart 3**). Contacts attributed this to banks' reluctance to lend on an unsecured basis at the end of a reporting period.

Chart 3 Spread to Bank Rate of sterling overnight interest rates



Source: Reuters.

(a) Spread of weighted average unsecured overnight rate to Bank Rate.
(b) Spread of weighted average secured overnight rate to Bank Rate.

Having traded above Bank Rate for much of 2011, sterling secured overnight interest rates fell below Bank Rate towards the end of the review period (**Chart 3**). Contacts noted that one contributing factor had been cash lenders increasingly seeking the protection provided by lending secured against high-quality collateral in response to ongoing developments in the euro area. This had increased the demand on the pool of available collateral, enabling borrowers who could provide that collateral to borrow at lower interest rates. Contacts noted a number of reasons, including banks' reluctance to increase the size of their balance sheets, as to why borrowers with access to reserves accounts at the Bank had not fully exploited the opportunity to borrow cash secured and deposit it on their reserves account at Bank Rate.

Elsewhere, on 3 November, the Governing Council of the European Central Bank (ECB) decided to cut its main policy rate by 25 basis points to 1.25%. In October, the ECB had announced a second programme of covered bonds purchases totalling €40 billion to contribute to easing funding conditions for credit institutions and enterprises. The ECB also extended its liquidity provision to euro-area banks with the introduction of two longer-term refinancing operations. Purchases of debt securities continued under the Securities Markets Programme.

In the United States, the Federal Open Market Committee (FOMC) decided at its meeting in mid-September to extend the average maturity of its holdings of securities by announcing a programme to sell US$400 billion of shorter-term Treasury securities and use the proceeds to buy longer-term Treasury securities. The FOMC also announced that it would reinvest principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities.

Long-term interest rates

Over the review period, concerns about the sustainability of several euro-area countries' fiscal and external positions intensified, and spread beyond the most vulnerable Member States to previously less-affected countries. These concerns were reflected in the further widening of the spread between the sovereign bond yields of a number of euro-area countries and those of Germany (**Chart 1**). On 27 October, the European authorities announced a package of measures designed to address those concerns. But these measures only temporarily alleviated some of the tensions in financial markets.

According to contacts, investors sought refuge in sovereign bonds that were perceived as more liquid and/or safer, including those of the United States and the United Kingdom. Contacts thought that this, together with the lowering of policy rate expectations, had contributed to US and UK government bond yields falling across much of the yield curve (**Chart 4**).

In the United Kingdom, the expansion of the asset purchase programme also contributed to the fall in gilt yields. But contacts noted that it was difficult to disentangle this from other factors that affected gilt yields over the period.

Asset purchases[1]

On 6 October, the Monetary Policy Committee (MPC) voted to increase the size of its asset purchase programme, financed by the issuance of central bank reserves, by £75 billion to £275 billion.[2] The MPC agreed that the asset purchases would be of conventional gilts, conducted over a four-month period, and spread evenly across residual maturities over three years. As of 24 November, outstanding asset purchases financed by issuance of central bank reserves — in terms of the amount paid to sellers — were £235 billion.

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

Table 1 summarises asset purchases by type of asset.

Gilts

Following the MPC's decision on 6 October to purchase an additional £75 billion of gilts over the subsequent four months, the Bank announced that gilt purchases would resume on 10 October, and that the Bank would normally offer to purchase conventional gilts with a residual maturity of 3–10 years on Mondays, of greater than 25 years on Tuesdays and of 10–25 years on Wednesdays. The Bank further announced that the size of the auctions would initially be £1.7 billion, although the scale of the programme would be kept under review by the MPC, and that the range of gilts eligible for purchase would remain unchanged.

As of 24 November, the Bank had purchased £35.7 billion in terms of the amount paid to sellers, split equally across the three maturity buckets. The total amount of gilts purchased since the start of the asset purchase programme in March 2009 in terms of the amount paid to sellers was £234 billion, of which £98.6 billion of purchases had been undertaken in the 3–10 year residual maturity range, £98.2 billion in the 10–25 year residual maturity range and £37.2 billion with a residual maturity greater than 25 years (**Chart A**).

Cover in the auctions varied, but averaged 3.2 in the 3–10 year auctions, 2.2 in the 10–25 year auctions and 1.6 in the auctions for gilts with a maturity greater than 25 years.[4]

In line with previous Asset Purchase Facility (APF) gilt purchases, the Bank continued to exclude gilts in which the Bank holds a large proportion (more than 70%) of the free float (the total issue size of the gilt minus government holdings).[5]

Gilt lending facility[6]

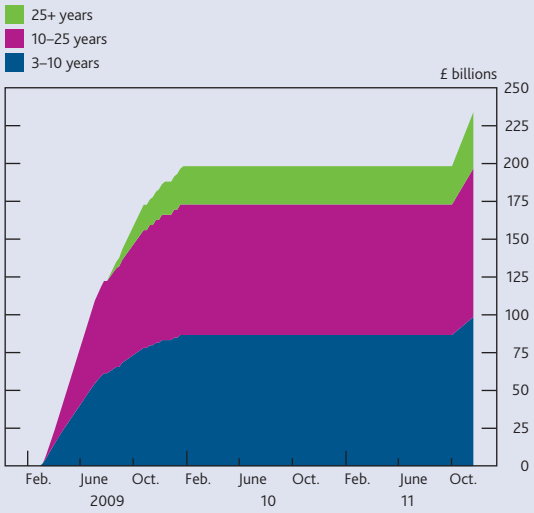
The Bank continued to offer to lend some of its gilt holdings via the DMO in return for other UK government collateral. In

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

Week ending[a]	Commercial paper	Secured commercial paper	Gilts	Corporate bond		Total[b]
				Purchases	Sales	
25 August 2011[c][d]	0	30	198,275	1,115		199,420
1 September 2011	0	0	0	0	0	0
8 September 2011	0	0	0	15	18	-3
15 September 2011	0	0	0	9	0	9
22 September 2011	0	25	0	9	51	-17
29 September 2011	0	0	0	3	0	3
6 October 2011	0	0	0	9	3	6
13 October 2011	0	0	5,100	22	11	5,111
20 October 2011	0	0	5,100	0	28	5,072
27 October 2011	0	20	5,100	0	42	5,078
3 November 2011	0	0	5,100	0	131	4,969
10 November 2011	0	0	5,100	2	54	5,048
17 November 2011	0	0	5,100	16	0	5,116
24 November 2011	0	0	5,100	9	7	5,102
Total financed by a deposit from the DMO[d][e]	–	20	–	195		215
Total financed by central bank reserves[d][e]	–	–	233,973	667		234,640
Total asset purchases[d][e]	–	20	233,973	862		234,855

(a) Week-ended amounts are for purchases in terms of the proceeds paid to counterparties, and for sales in terms of the value at which the Bank initially purchased the securities. All amounts are on a trade-day basis, rounded to the nearest million. Data are aggregated for purchases from the Friday to the following Thursday.
(b) Weekly values may not sum to totals due to rounding.
(c) Measured as amount outstanding as at 25 August 2011.
(d) In terms of proceeds paid to counterparties less redemptions at initial purchase price on a settled basis.
(e) Data may not sum due to assets maturing over the period.

Chart A Cumulative gilt purchases[a] by residual maturity[b]



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

the three months to 30 September 2011, a daily average of £2,623 million of gilts was lent as part of the gilt lending facility. This was broadly in line with the average of £2,371 million in the previous quarter.

Corporate bonds

The Bank continued to offer to purchase and sell corporate bonds via the Corporate Bond Secondary Market Scheme, with purchases financed by the issue of Treasury bills and the DMO's cash management operations. The Scheme continues to serve a useful role as a backstop, particularly during periods of market uncertainty.

Sales of corporate bonds increased during the review period, with the Bank being a net seller of corporate bonds. As of 24 November the Bank's portfolio totalled £862 million, compared to £1,115 million at the end of the previous review period. The increase in net sales reflected a small number of larger sale operations, including the largest amount sold since the start of the Scheme on 28 October (£131 million). Contacts attributed the larger sale operations to market makers being less willing to hold inventory of corporate bonds in current volatile conditions, and using Bank operations to source corporate bonds in response to end-investor demand.

Commercial paper

The commercial paper (CP) facility remained unused over the review period. It closed on 15 November 2011, in line with the Bank's provision of twelve months' notice of its intention to withdraw this scheme on 15 November 2010, reflecting a sustained improvement in the sterling commercial paper market.

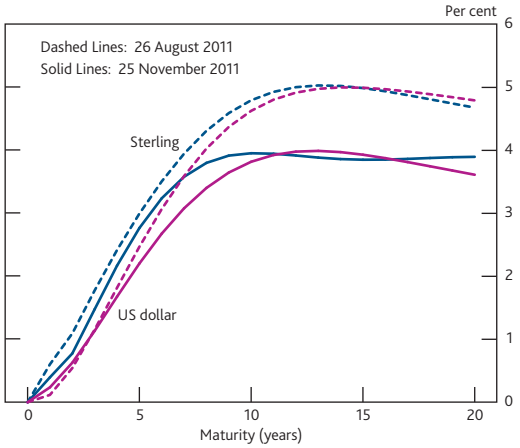
Average spreads on sterling-denominated CP over the review period were broadly stable and remain well below the levels seen in early 2009.

Secured commercial paper facility

The Bank continued to offer to purchase secured commercial paper (SCP) backed by underlying assets that are short term and provide credit to companies or consumers that support economic activity in the United Kingdom.[7] The Bank announced on 15 November 2010 that it had made a programme eligible for this facility. This programme has subsequently issued SCP to the APF.

(1) The data cut-off for this box is 24 November 2011, unless otherwise stated. For further discussion on asset purchases see the *Asset Purchase Facility Quarterly Report* available at www.bankofengland.co.uk/publications/other/markets/apf/quarterlyreport.htm.
(2) For further information, see the 6 October Market Notice, available at www.bankofengland.co.uk/markets/marketnotice111006.pdf.
(3) The APF was initially authorised to purchase private sector assets financed by Treasury bills and the DMO's cash management operations. Its remit was extended to enable the Facility to be used as a monetary policy tool on 3 March 2009. All purchases of assets between 6 March 2009 and 4 February 2010 were financed by central bank reserves. All purchases of private sector assets since 4 February 2010 have been financed by the issuance of Treasury bills and the DMO's cash management operations. All purchases of gilts since 10 October 2011 have been financed by central bank reserves. The Chancellor's letter is available at www.hm-treasury.gov.uk/d/chx_letter_061011.pdf.
(4) Further details of individual operations are available at www.bankofengland.co.uk/markets/apf/gilts/results.htm.
(5) The 8% 2021 gilt was excluded from all operations over the period for this reason.
(6) For more details on the gilt lending facility see the box 'Gilt lending facility' in the *Bank of England Quarterly Bulletin*, Vol. 50, No. 4, page 253.
(7) The SCP facility is described in more detail in the Market Notice available at www.bankofengland.co.uk/markets/marketnotice090730.pdf.

Chart 4 International nominal government bond forward yield curves[a]

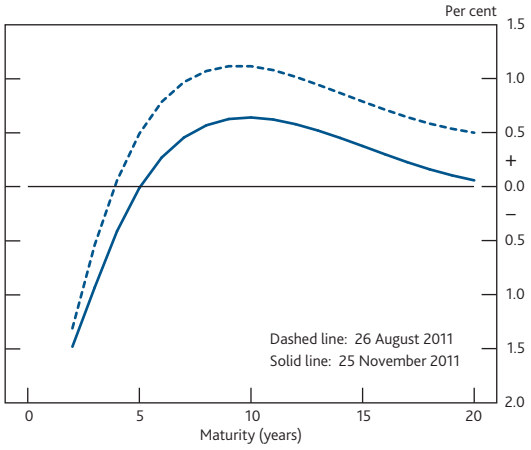


Source: Bank calculations.

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

The fall in nominal gilt yields reflected changes in both real yields and breakeven inflation rates. Forward real interest rates fell across the yield curve, with negative forward yields extending to horizons out to five years (**Chart 5**). Having fallen earlier in the review period, medium-term breakeven inflation rates — derived as the difference in the yield of conventional and index-linked gilts — ended the period little changed (**Chart 6**). A comparable measure of implied inflation derived from inflation swaps — which contacts noted was less affected by factors specific to the gilt market — was little changed throughout the review period.

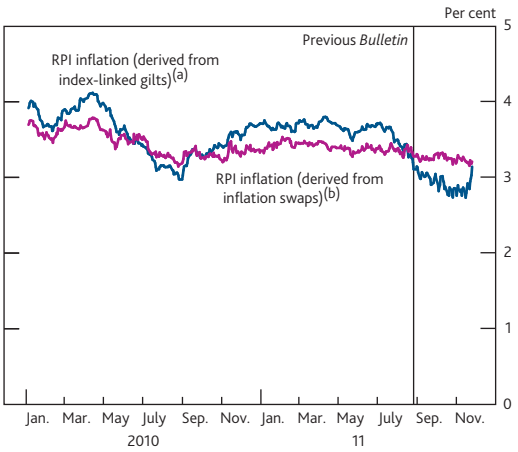
Chart 5 UK forward real yield curve[a]



Source: Bank calculations.

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

Chart 6 UK implied five-year RPI inflation rate, five years forward



Source: Bank calculations.

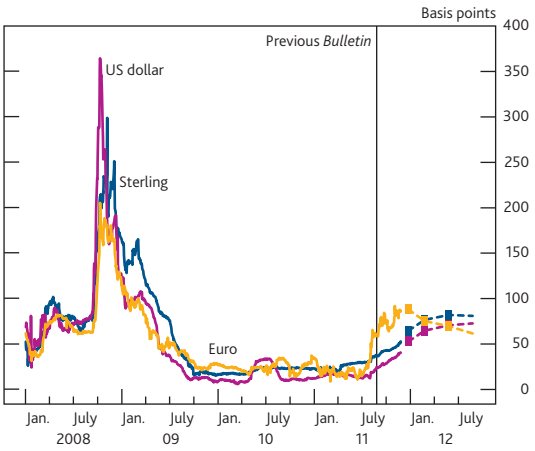
(a) Derived from the Bank's government liability curve.
(b) Derived from the Bank's inflation swap curve.

Bank funding markets

Bank funding market conditions continued to deteriorate over the review period, with strains in both short-term and longer-term public funding markets. Contacts attributed this largely to the implications that euro-area fiscal developments might have for banking sector balance sheets, through both direct and indirect sovereign debt exposures.

Short-term interbank funding markets became harder to access with tenors falling and investors differentiating more between institutions. The spread of average short-term interbank borrowing rates across banks relative to OIS rates rose across the major currencies (**Chart 7**). The spread was highest for the euro, which contacts attributed to the relative vulnerability of euro-area banks to the fiscal challenges and

Chart 7 International three-month spot and forward Libor-OIS spreads[a][b]



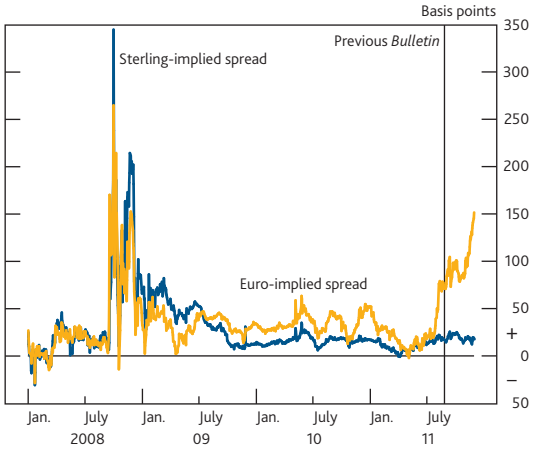
Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Three-month Libor-OIS spreads derived from Libor fixings and OIS rates.
(b) Forward spreads derived using data as at 25 November. The squares are implied forward spreads using forward Libors derived from forward rate agreements, and forward OIS rates derived from the OIS curve.

external imbalances facing several euro-area countries. Forward spreads implied by derivatives settling on Libor remained consistent with market participants anticipating that short-term bank funding costs would remain elevated in the months ahead. Both spot and forward Libor-OIS spreads remained, however, well below the levels reached in late 2008.

For some European banks, funding conditions were particularly strained in US dollar markets. The difference between the cost of raising US dollar funding by borrowing in euro and swapping via the foreign exchange market and the cost of direct US dollar borrowing rose sharply, to around 150 basis points (**Chart 8**). At the same time, US money market mutual funds cut exposures to European banks and reduced the average maturity of remaining funding.

Chart 8 Spread of foreign exchange implied cost of three-month US dollar funding over US dollar Libor(a)



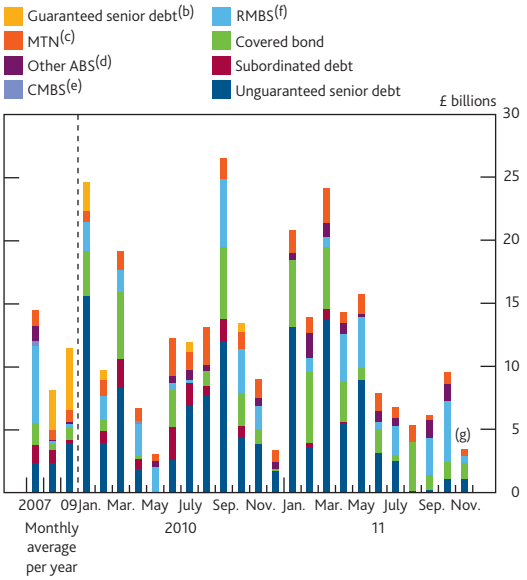
Sources: British Bankers' Association, Reuters and Bank calculations.

(a) Spread of three-month US dollar Libor implied from foreign exchange forwards over actual three-month US dollar Libor. For more details on the construction of these measures, see *Bank of England Quarterly Bulletin*, Vol. 48, No. 2, page 134, Chart 26 and *BIS Quarterly Review*, March 2008, pages 73–86.

On 15 September, the Bank of England, the European Central Bank, the Federal Reserve, the Bank of Japan and the Swiss National Bank announced additional US dollar liquidity provision operations. After the cut-off date for this article, this was supplemented by a range of measures that were announced as part of co-ordinated central bank action to address pressures in global money markets. These measures are described in more detail in the box on pages 286–88.

Conditions in longer-term unsecured debt markets remained difficult for the major UK banks, with only sporadic issuance in September, a traditionally busy month for bank funding. Contacts attributed this to the increasing concern about the implications for banks of the ongoing challenges facing several euro-area countries. While a few higher-rated European banks did issue senior unsecured term debt, they typically had to pay rates above those for similar, and often larger, transactions in 2010. Contacts reported that they expected the cost of unsecured funding to remain elevated for the foreseeable future. There was greater activity in secured term funding markets, with several UK banks accessing the market. But total public unsecured and secured issuance during the review period was well below levels seen earlier in the year (**Chart 9**).

Chart 9 Term issuance by the major UK lenders in public markets(a)



Sources: Bank of England, Dealogic and Bank calculations.

(a) Includes debt issued by Banco Santander, Bank of Ireland, Barclays, Co-operative Financial Services, HSBC, Lloyds Banking Group, National Australia Bank, Nationwide, Northern Rock and Royal Bank of Scotland. Term issuance refers here to securities with an original contractual maturity or earliest call date of at least 18 months. It includes subordinated lower Tier 2 and Tier 3 capital instruments with debt features.
(b) Senior debt issued under HM Treasury's Credit Guarantee Scheme.
(c) Medium-term notes.
(d) Asset-backed securities.
(e) Commercial mortgage-backed securities.
(f) Residential mortgage-backed securities.
(g) Data are up to 25 November 2011.

At the end of the review period, the major UK banks were already very close to meeting their wholesale term funding targets for 2011, following strong issuance in the first half of the year. But contacts noted that pre-funding for 2012 had been difficult in the prevailing climate, with some banks expected to rely more on secured markets.

Major UK and continental European banks' credit default swap (CDS) premia — one indicator of longer-term wholesale funding costs — rose sharply over the review period, reaching historically high levels (**Chart 10**). US banks' CDS premia also rose over the review period, reaching their highest levels since early 2009, but remained below the levels that prevailed at the time of the collapse of Lehman Brothers.

Corporate capital markets

Equity prices were volatile during the review period, but the FTSE All-Share index ended the period little changed. Contacts thought that movements in equity prices mainly reflected developments in the euro area, with the Euro Stoxx index

Operations within the sterling monetary framework and other market operations

The level of reserves continued to be determined by (i) the stock of reserves injected via the Asset Purchase Facility (APF), (ii) the level of reserves supplied by long-term repo open market operations (OMOs) and (iii) the net impact of other sterling ('autonomous factor') flows across the Bank's balance sheet. This box describes the Bank's operations within the sterling monetary framework over the review period, and other market operations. The box on pages 282–83 provides more detail on the APF.

Operational Standing Facilities

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

Indexed long-term repo OMOs

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

The Bank offered £5 billion via three-month ILTR operations on both 13 September and 11 October, and £2.5 billion via a six-month operation on 15 November (**Table 1**).

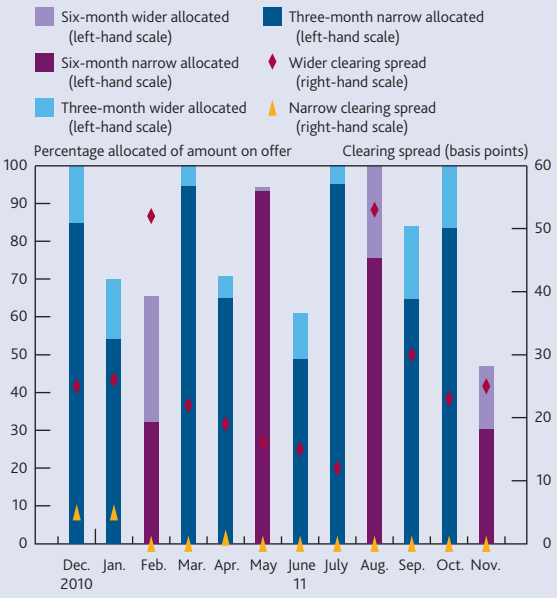
The stop-out spread — the difference between clearing spreads for wider and narrow collateral — is an indicator of potential stress in the market. It reached a new high for three-month operations in the September ILTR, rising to 30 basis points. It subsequently fell to 23 basis points in the October operation, a level slightly higher than the average in previous three-month operations. The cover ratio — also a potential indicator of stress in the market — rose, from 0.96 in September, to 1.64 in October, the highest cover ratio in any three-month ILTR operation to date (**Chart A**). The elevated stop-out spread in the September operation, and the higher cover in the October operation, were consistent with an increase in the demand for three-month funding in the ILTR, consistent with a worsening in financial market sentiment.

Table 1 Indexed long-term repo operations

	Total	Collateral set summary	
		Narrow	Wider
13 September 2011 (three-month maturity)			
On offer (£ millions)	5,000		
Total bids received (£ millions)[a]	4,803	3,245	1,558
Amount allocated (£ millions)	4,203	3,245	958
Cover	0.96	0.65	0.31
Clearing spread above Bank Rate (basis points)		0	30
Stop-out spread (basis points)[b]	30		
11 October 2011 (three-month maturity)			
On offer (£ millions)	5,000		
Total bids received (£ millions)[a]	8,220	6,955	1,265
Amount allocated (£ millions)	5,000	4,185	815
Cover	1.64	1.39	0.25
Clearing spread above Bank Rate (basis points)		0	23
Stop-out spread (basis points)[b]	23		
15 November 2011 (six-month maturity)			
On offer (£ millions)	2,500		
Total bids received (£ millions)[a]	1,268	760	508
Amount allocated (£ millions)	1,170	760	410
Cover	0.51	0.30	0.20
Clearing spread above Bank Rate (basis points)		0	25
Stop-out spread (basis points)[b]	25		

(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.

Chart A ILTR allocation and clearing spreads



In contrast, the six-month operation in November recorded the lowest cover in any operation to date (0.51), and a below-average stop-out spread relative to other six-month ILTR operations, at 25 basis points. Although the operation coincided with elevated market stress, the results were not indicative of heightened demand for six-month liquidity via the ILTR.

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

Discount Window Facility

The Discount Window Facility (DWF) provides liquidity insurance to the banking system by allowing eligible banks to borrow gilts against a wide range of collateral. On 4 October 2011, the Bank announced that the average daily amount outstanding in the 30-day DWF between 1 April and 30 June 2011 was £0 million. The Bank also announced that the average daily amount outstanding in the 364-day DWF between 1 April and 30 June 2010 was £0 million.

Extended Collateral Term Repo Facility

After the end of the review period, on 6 December 2011, the Bank announced the introduction of a new contingency liquidity facility, the Extended Collateral Term Repo (ECTR) Facility. The ECTR Facility is designed to mitigate risks to financial stability arising from a market-wide shortage of short-term sterling liquidity. It gives the Bank additional flexibility to offer sterling liquidity in an auction format against the widest range of collateral. Operations under the Facility will be announced at the discretion of the Bank in response to actual or prospective market-wide stress. The operations would offer sterling for 30 days against collateral pre-positioned for use in the Bank's DWF. All firms registered for access to the Bank's DWF would be eligible for ECTR operations.

The ECTR forms part of the sterling monetary framework and has been reflected in an update to the Bank's *Red Book*.(1)

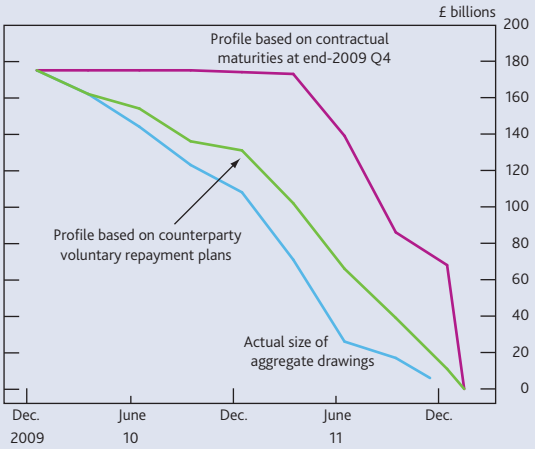
Other operations

Special Liquidity Scheme

The Special Liquidity Scheme (SLS) was introduced in April 2008 to improve the liquidity position of the banking system by allowing banks and building societies, for a limited period, to swap their high-quality mortgage-backed and other private sector securities for UK Treasury bills for up to three years. The Scheme was designed to finance part of the overhang of illiquid assets on banks' balance sheets by exchanging them temporarily for more easily tradable assets.

When the drawdown period for the SLS closed at the end of January 2009, £185 billion of UK Treasury bills had been lent under the SLS. In order to prevent a refinancing 'cliff', the Bank held bilateral discussions with all users of the Scheme to ensure that there were funding plans in place to reduce their use of the Scheme in a smooth fashion. The impact of these expected repayment plans are shown in aggregate in **Chart B**), along with the repayment profile based on counterparties' contractual repayment obligations, and the profile of actual repayments to date. Despite difficult market conditions, participants continued to make repayments over the quarter: by end-November 2011, £179 billion had been repaid, compared with £168 billion at end-August 2011.

Chart B Aggregate SLS repayment profiles



US dollar repo operations

From 11 May 2010 the Bank reintroduced weekly fixed-rate tenders with a seven-day maturity to offer US dollar liquidity, in co-ordination with other central banks, in response to renewed strains in the short-term funding market for US dollars at this time. As of 25 November 2011, there had been no use of the Bank's facility.

On 15 September 2011, the Bank announced, in co-ordination with the ECB, Swiss National Bank, the Federal Reserve, and the Bank of Japan, that it would be conducting three US dollar tenders, each at a term of approximately three months covering the end of the year. There was no use of the Bank's facility in the first two tenders on 12 October and 9 November.

After the end of the review period, the Bank announced, in co-ordination with the Bank of Canada, Bank of Japan, the ECB, Swiss National Bank, and the Federal Reserve, that the authorisation of the existing temporary US dollar swap arrangements had been extended to 1 February 2013, and that the 84-day US dollar tenders would continue until this time and that the seven-day operations would continue until further notice. It also announced that the central banks had agreed to lower the pricing on the US dollar swap arrangements by 50 basis points so that the new rate would be the US dollar overnight index swap rate plus 50 basis points and that this pricing would be applied to all operations conducted from 5 December 2011. As a contingency measure, the six central banks agreed to establish a network of temporary bilateral liquidity swap arrangements so that liquidity could be provided in each jurisdiction in any of their currencies should market conditions so warrant. These bilateral swap lines will be available until 1 February 2013.

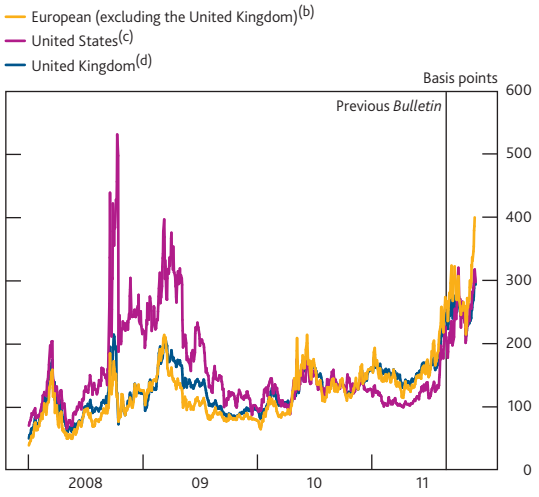
Bank of England balance sheet: capital portfolio

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

The portfolio currently includes around £3.4 billion of gilts and £0.5 billion of other debt securities. Over the period between 27 August 2011 and 25 November 2011, gilt purchases were made in accordance with the quarterly announcements on 1 July 2011 and 3 October 2011.

(1) Further details are available at www.bankofengland.co.uk/markets/money/ectr/index.htm.

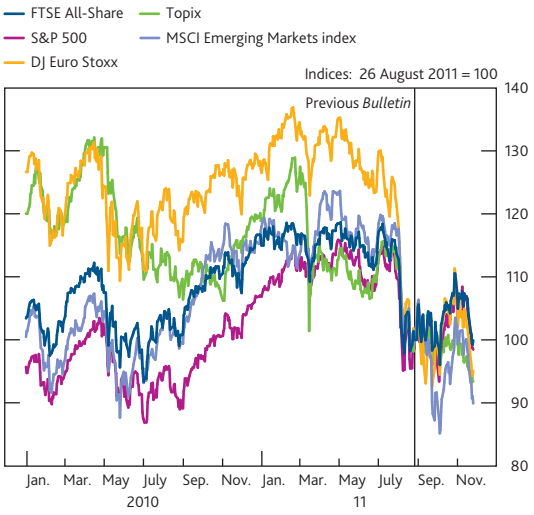
Chart 10 Selected international banks' CDS premia(a)



Sources: Markit Group Limited and Bank calculations.

(a) Unweighted averages of five-year, senior CDS prices.
(b) Average of Banco Santander, BBVA, BNP Paribas, Crédit Agricole, Credit Suisse, Deutsche Bank, Société Générale, UBS and UniCredit.
(c) Average of Bank of America, Citi, Goldman Sachs, JPMorgan Chase & Co. and Morgan Stanley.
(d) Average of Barclays, HSBC, Lloyds Banking Group, Nationwide, Royal Bank of Scotland and Santander UK.

Chart 11 International equity indices(a)(b)



Sources: Bloomberg and Bank calculations.

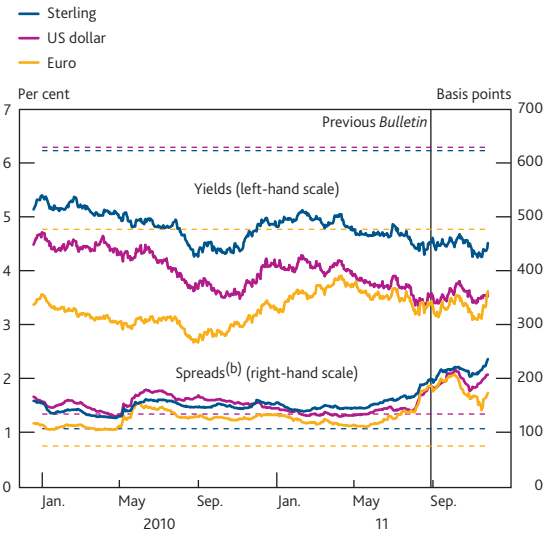
(a) Indices are quoted in domestic currency terms, except for the MSCI Emerging Markets index, which is quoted in US dollar terms.
(b) The MSCI Emerging Markets index is a capitalisation-weighted index that monitors the performance of stocks in emerging markets.

around 5% below its level at the start of the review period (**Chart 11**). Some of the largest falls were in the financial sector. Contacts reported that perceptions of a deteriorating macroeconomic outlook also weighed on equity prices more generally.

Yields of investment-grade non-financial sterling and US dollar-denominated corporate bonds were little changed over the review period (**Chart 12**). But their spreads relative to sovereign bonds rose. Contacts attributed this to euro-area developments and market makers being less willing to hold inventory in volatile markets. Yields on investment-grade non-financial euro-denominated corporate bonds rose, albeit by less than sovereign bond yields.

Following muted activity over the summer, gross investment-grade corporate bond issuance by UK private non-financial corporations (PNFCs) picked up during the review period, with contacts reporting investor appetite for high-quality corporate bonds. But new issue premia reached

Chart 12 International investment-grade, non-financial corporate bond yields and spreads(a)



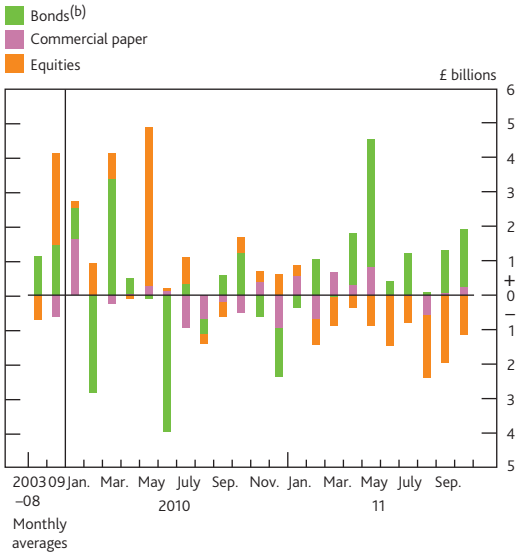
Sources: Bank of America/Merrill Lynch and Bank calculations.

(a) Dashed lines: 1997–2007 averages.
(b) Option-adjusted spreads over government bond yields.

historically high levels despite yields in secondary markets remaining low (**Chart 12**). This made it harder for less established issuers to come to the market. There was increased activity in the Bank's Corporate Bond Secondary Market Scheme (see the box on pages 282–83).

Net equity issuance remained negative, with August and September share buybacks at the highest level since January 2008 (**Chart 13**). Contacts mainly attributed the negative net issuance to the volatile conditions prevailing in secondary markets.

Chart 13 Net capital market issuance by UK PNFCs(a)



(a) Non seasonally adjusted.
(b) Includes stand alone and programme bonds.

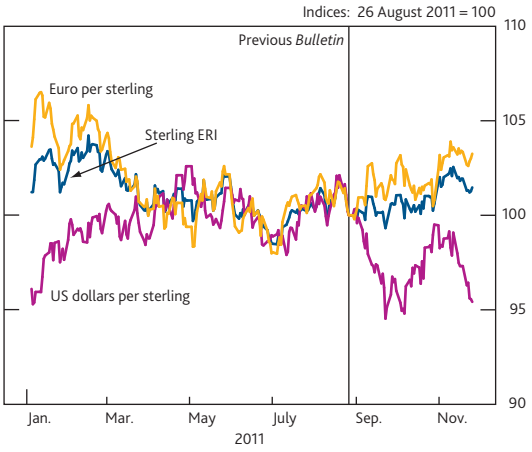
Some contacts noted the emergence of new non-bank lenders to corporates. But small and medium-sized enterprises without access to capital markets continued to have difficulty raising finance. After the end of the review period, in the Autumn Statement, the Government announced a package of interventions designed to ease the flow of credit to businesses that do not have ready access to capital markets.

Foreign exchange

The sterling exchange rate index (ERI) has remained within a relatively narrow range since early 2009. Over the review period, the sterling ERI appreciated slightly with sterling's appreciation against the euro more than offsetting its depreciation against the US dollar on a trade-weighted basis (**Chart 14**).

According to contacts, recent exchange rate movements have been influenced by changes in risk premia, particularly for the euro-sterling bilateral exchange rate. Most market participants thought that sterling's appreciation against the euro over the review period reflected the intensification of concerns around the challenges facing some euro-area countries.

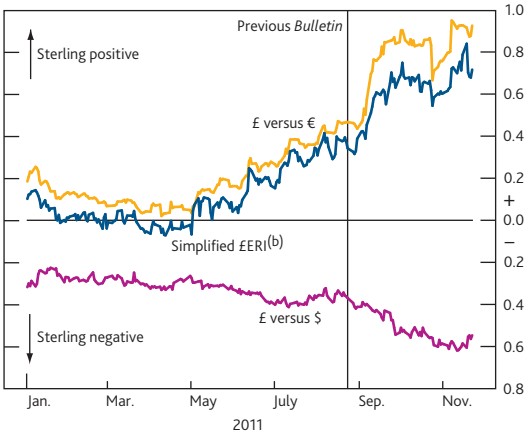
Chart 14 Sterling ERI and bilateral exchange rates



Sources: Bloomberg and Bank calculations.

Information derived from option prices suggested that market participants have placed a greater weight on sterling appreciating. According to these data, investors were willing to pay a higher price to buy protection against an unexpectedly large depreciation of the euro against sterling (**Chart 15**).

Chart 15 Three-month option-implied skewness of foreign exchange returns(a)



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

(a) Returns are defined as the logarithmic difference between the current forward rate and the spot rate at the maturity date of the contract.
(b) The simplified sterling ERI places 70% weight on the euro-sterling bilateral exchange rate and 30% weight on the US dollar-sterling bilateral exchange rate.

Since the previous *Bulletin*, both the Bank of Japan and Swiss National Bank have intervened in foreign exchange markets to prevent their currencies from appreciating further.

Market intelligence on developments in market structure

In discharging its responsibilities to maintain monetary stability and contribute to financial stability, the Bank gathers information from contacts across a wide spectrum of financial

markets. This intelligence helps inform the Bank's assessment of monetary conditions and possible sources of financial instability and is routinely synthesised with research and analysis in the *Inflation Report* and the *Financial Stability Report*. More generally, regular dialogue with market contacts provides valuable insights into how markets function, providing context for policy formulation, including the design and evaluation of the Bank's own market operations. And the Bank conducts occasional market surveys to gather additional quantitative information on certain markets.

Based on intelligence of this kind, this section describes the evolution of high-frequency trading in the foreign exchange market.

High-frequency trading in foreign exchange markets

The foreign exchange (FX) market has evolved rapidly in recent years. Innovations in the use of technology have altered the way transactions are initiated, executed, risk-managed and settled, engendering a shift away from human to automated computer management of those processes. This section describes one recent aspect of this evolution, namely the emergence of so-called high-frequency trading (HFT). The remainder of this section explores how HFT in FX markets evolved, the strategies and models employed and its potential impact on the FX market.(1) In so doing, it draws on the knowledge gained from the Bank's participation in the FX market and on intelligence gathered from discussions with market contacts at banks, intermediaries, corporates and HFT firms themselves.(2)

Automated trading

The transition in the FX market from a largely telephone-based environment to electronic trading began in the early 1990s with the emergence of the Reuters and Electronic Broking Services interbank dealing platforms. From around the turn of the century, advances in technology allowed traditional market makers (banks) to distribute FX prices with speed and efficiency via new, electronic means to their clients and end-users such as corporates and investors. Technology also helped standardise processes for communicating and settling transactions, thereby improving efficiency. These developments led to higher trading volumes and attracted new participants and dealing venues and enabled end-users to transact on price terms much closer to those available in the interbank market.

By 2005, market conditions were set for the proliferation of automated trading among the majority of FX market participants. Banks were improving their automated distribution of price quotes and began to automate further their risk management processes. Professional investors utilised new tools to better execute trades and settle risks, while corporates and, later, retail end-users all benefited from the market's ease of access and narrow bid-offer spreads.

These factors supported more 'incremental' trading: participants transacting smaller sizes and at higher frequency.

The use of algorithms

Automated trading has allowed greater use of algorithms: pre-programmed computer instructions that replicate a manual process. According to contacts, these algorithms can serve a number of purposes. This includes ensuring that orders are executed at the best available price: for example, banks and others may use aggregators that combine multiple price sources such that, when a manual trader deals, the algorithm in the aggregator optimises the execution. Similarly, large investors may use algorithmic tools to transact large flows automatically based on pre-selected parameters, for example in order to avoid generating market volatility, using specified time intervals to drip feed a large order into the market. In addition, contacts noted that banks may use algorithms in models to offset risk by automatically dealing in the market.

High-frequency trading

Not all algorithmic traders are high-frequency traders, but the business model of HFT firms means that HFT firms all use algorithmic trading tools.

These firms focus on analysing large quantities of data, risking their own capital in executing large numbers of low-value transactions. In so doing, even small profits on individual trades will cumulate up given the volume of transactions. Contacts report that HFT firms typically hold risk for a very short time, frequently less than one second. More recently, however, some HFT firms have reportedly broadened their activities, holding some risk beyond that timeframe. As they have done so, it has become increasingly difficult to distinguish trades generated by HFT firms from those originated by other participants in the market.

All HFT firms use prime brokerage arrangements that are usually provided by major banks. This provides HFT firms with direct access to a broad range of prices and counterparties. These prime brokerage relationships also assist with the typically high volume of trade confirmation and settlement processes.

Contacts report that as these HFT firms emerged they quickly employed sophisticated technology that enabled them to trade faster than many of the larger incumbents. This led to a technology race in the wider FX market for sophistication, efficiency and high speed (referred to as 'low latency'). For example, contacts noted that with optimum connectivity, including the appropriate location of hardware,

(1) For a discussion of high-frequency trading in equity markets, see Haldane, A (2011), 'The race to zero', available at www.bankofengland.co.uk/publications/speeches/2011/speech509.pdf.
(2) For a more detailed discussion, see BIS Markets Committee (2011), 'High frequency trading in the foreign exchange market', available at www.bis.org/publ/mktc05.htm.

communicating messages to trading venues can occur in less than ten milliseconds.

The strategies employed by HFT firms are changing all the time. Early strategies were formed around so-called latency arbitrage: exploiting differences in prices among trading venues that arose from differences in the speed with which providers changed prices. More recently, some contacts have noted that trading models may take the form of correlation trading, either within the FX market or across different asset markets. Some HFT firms reportedly also use statistical arbitrage models that identify trading strategies based on observed statistical relationships. Contacts reported that many firms routinely employ multiple models in parallel. Some models are reported to require regular enhancements or are even redundant in weeks or months.

Effects on market functioning

Within the market, views differ on the benefits of HFT activity for the FX market as a whole. According to some participants, the presence of HFT firms leads to improved pricing — through narrower bid-offer spreads — and better technology standards across the industry.

There is debate, however, about the degree to which HFT firms add liquidity to the market. HFT firms can act as market makers, thus providing liquidity, but some consider that holding periods of less than one second mean that such liquidity is illusory. In particular, they note a risk that, in times of market stress, HFT firms may withdraw from the market, thereby aggravating any deterioration in liquidity. Others maintain, however, that in a fragmented marketplace such as FX, HFT firms help to arbitrage away differences among venues, playing a role in restoring equilibrium. And, while HFT firms may neither add nor subtract from liquidity, they can increase the efficiency by which liquidity is transferred around the FX system.

The emergence of HFT firms over the past five years is an example of the rapid evolution of the FX market. The Bank continues to draw on its market intelligence contacts in order to monitor developments in not only the HFT sector but also in algorithmic trading more generally.

Research and analysis

Understanding recent developments in UK external trade

By Kishore Kamath of the Bank's Structural Economic Analysis Division and Varun Paul of the Bank's International Economic Analysis Division.[1]

The sterling effective exchange rate depreciated by around 25% between mid-2007 and early 2009. That has encouraged a shift towards UK exports and away from imports, contributing to a significant narrowing in the United Kingdom's real trade deficit. This article explains these developments in more detail. It shows that the depreciation has induced considerable switching of expenditure by overseas companies and households towards UK goods exports, and by UK residents away from travel services imports. But financial services exports appear to have suffered from the financial crisis. And there seems to have been less of a response to the exchange rate depreciation in other services exports and non-travel imports. Looking ahead, both the level of sterling and developments in the rest of the world are likely to be crucial to the United Kingdom's trade performance.

Introduction

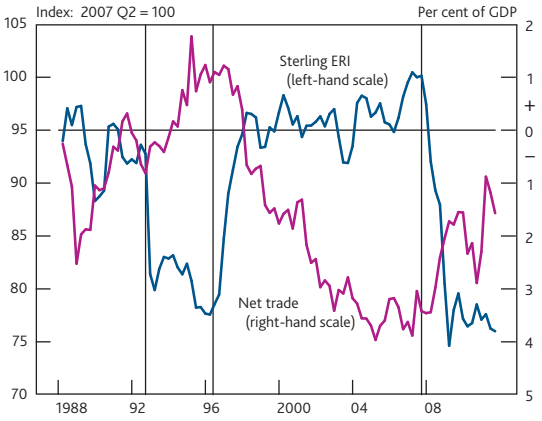
Between mid-2007 and early 2009, the sterling effective exchange rate index (ERI) depreciated by around 25%. Since then it has remained broadly flat (**Chart 1**).[2] By making UK exports more competitive and imports into the United Kingdom less affordable, weaker sterling should boost export volumes and reduce import volumes (known as 'expenditure switching'). Such an increase in net trade (exports less imports) would boost UK GDP.

Four years after the depreciation began, a large part of the trade response to the lower level of sterling should have been completed. And indeed, between 2007 Q2 (the quarter before the depreciation began) and 2011 Q3, the net trade deficit roughly halved from 3.0% to 1.6% of GDP (**Chart 1**). In fact, the deficit in 2011 Q1 (0.9%) was the smallest since 1998.[3]

As well as the relative prices of traded goods and services, demand conditions in the United Kingdom and abroad will have affected net trade. Empirical estimates suggest that the impact of changes in demand on trade is typically stronger than the effect of changes in prices. In the 2008–09 recession, UK GDP and UK-weighted world GDP[4] fell considerably (**Chart 2**). Although they have recovered, UK GDP rebounding by less, these changes will have significantly reduced the demand for UK imports and exports respectively.

The aim of this article is to describe recent developments in net trade, and to assess the impact from sterling's depreciation.[5] In doing so, it examines disaggregated data on exports and imports of both goods and services. Different

Chart 1 Sterling ERI and UK real net trade[a]

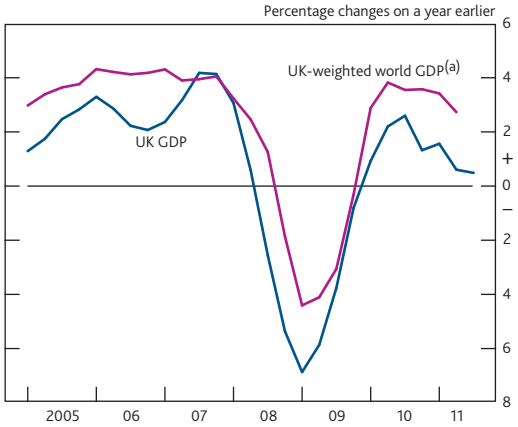


Sources: ONS and Bank calculations.

(a) The vertical lines mark the beginning of the major nominal exchange rate movements that began in 1992 Q3, 1996 Q2 and 2007 Q3. In 1992 Q3 sterling exited the Exchange Rate Mechanism, and by 1993 Q1 had depreciated by around 15%. In 1996 Q2 sterling started to appreciate, and by 1998 Q1 had increased by about 25%.

(1) The authors would like to thank Binod Bhoi for his help in producing this article.
(2) The sterling effective exchange rate is weighted by 2009 UK trade shares. See Astley, Smith and Pain (2009) for a discussion of the possible reasons for the depreciation.
(3) This article takes at face value the quarterly ONS chained-volume trade data up to 2011 Q3 published in the *UK Trade* September 2011 release on 9 November 2011. (Updating for the *UK Trade* October 2011 release on 9 December makes very little difference.) Throughout, the article excludes the estimated impact of missing trader intra-community (MTIC) fraud. Both trade volumes and prices data are volatile and prone to revision, more so than other components of demand. The improvement in net trade is much larger following the recent revisions in the 2011 *Blue Book*: prior to that, the deficit was estimated at 2.0% in 2011 Q1.
(4) UK-weighted world GDP weights together 52 countries' GDP using 2010 UK export shares from the 2011 *Pink Book*. These countries account for 90% of UK exports.
(5) This article focuses on the real trade balance. Nominal net trade improved roughly as much as real net trade in the first two years after the depreciation; since then it has been weaker.

Chart 2 UK GDP and UK-weighted world GDP



Sources: ONS and Bank calculations.

(a) The last observation is 2011 Q2, since many countries' GDP data for 2011 Q3 are not yet available. See footnote (4) on page 294 for a description of UK-weighted world GDP.

subsectors have been affected by distinct shocks, and so their developments have been very different. The article tries to control for demand movements by considering export and import shares — that is, exports relative to world demand and imports relative to domestic demand.

The first section of the article discusses how UK exports have performed since 2007. It considers export price developments, before examining the impact on export shares for both goods and services. The next section analyses import developments, including a particular focus on travel imports and barriers to switching away from other imports. The article concludes by drawing together the implications for net trade.

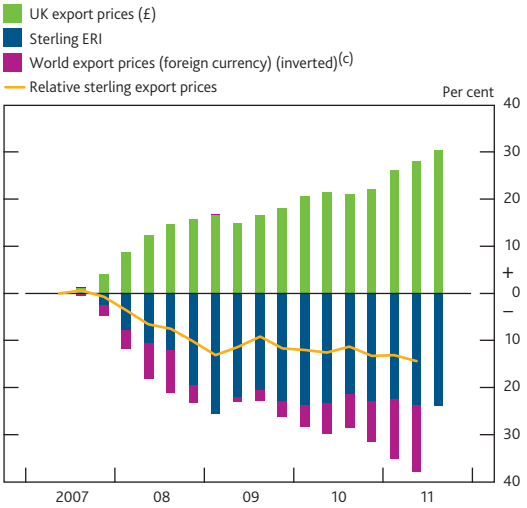
Export developments

The volume of goods and services that the UK economy exports is determined primarily by the level of foreign demand and the price of UK exports relative to prices in other countries. A depreciation of sterling should make UK goods and services relatively cheaper abroad. And foreign companies and households should respond to that price change by increasing their demand for UK exports.

Export prices

Between 2007 Q2 and 2011 Q2, UK exporters' sterling export prices rose by nearly 30% (green bars in **Chart 3**).(1) But world export prices in sterling terms increased by more (the magenta bars (inverted) and blue bars together). Overall, relative export prices — the sterling price of UK exports relative to world exports (in sterling terms) — have fallen by around 15%.(2) In other words, *compared to before the depreciation*, UK exports are now 15% cheaper relative to their competitors. The response of relative export prices has been similar to that in previous episodes of large exchange rate movements (**Chart 4**).

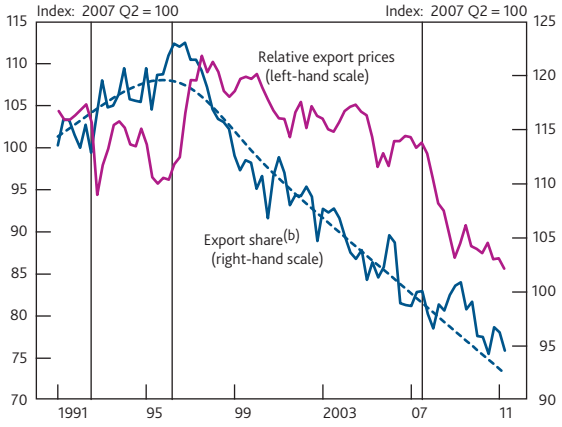
Chart 3 Cumulative changes in relative sterling export prices and its components since 2007 Q2(a)(b)



Sources: ONS and Bank calculations.

(a) Relative sterling export prices are UK export prices in sterling divided by world export prices in sterling. World export prices in sterling are world export prices in foreign currency divided by the sterling ERI. So higher world export prices reduce relative sterling export prices.
(b) The bars represent percentage changes for the individual series. The orange line represents the percentage change in relative sterling export prices. The latter is only approximately equal to the sum of the percentage changes for the individual series, since they are large numbers.
(c) The world export price series weights together 45 countries' export prices and the oil price using UK trade shares from the *Pink Book*. These countries account for 84% of UK exports. The last observation is 2011 Q2, since many countries' data for 2011 Q3 are not yet available.

Chart 4 UK export market share and relative export prices(a)



Sources: ONS and Bank calculations.

(a) The last observations are 2011 Q2.
(b) UK exports relative to UK-weighted world trade. See footnote (1) on page 296 for a description of UK-weighted world trade. The dashed blue line is a pre-depreciation trend line, based on a Hodrick-Prescott (HP) filter estimated from 1991 Q1 to 2007 Q2.

The United Kingdom's export market share

Since 2008, world GDP has fallen and recovered sharply (**Chart 2**), which can make it hard to isolate the expenditure-switching effects of the depreciation. A closer measure of UK export demand would be UK-weighted world

(1) Companies can set prices for the goods and services they export in either their home currency or in the currency of the foreign destination. This can affect the observed price response in the short run. See MacCoille, Mayhew and Turnbull (2009) for more discussion of the currency of invoicing.
(2) Excluding oil from both UK export prices and world export prices reduces the change in both series by around 5 percentage points over the whole period, so the movement in *relative* sterling export prices is unaffected.

trade. This weights together the imports of all countries in the world according to their importance in UK exports. It has been even more volatile over this period.(1) In order to control for these large fluctuations in demand, it helps to look at the United Kingdom's export market share: that is, UK exports as a share of UK-weighted world trade.

The United Kingdom's export share has been on a secular decline since 1996 (**Chart 4**). That is likely to reflect two factors. First, the increased global presence of low-cost emerging market economies such as China and India competing with UK exporters. Second, the significant appreciation of sterling in 1996, which made UK exporters less competitive. Since the depreciation, the United Kingdom's export share has improved slightly relative to its pre-depreciation trend.

It is possible to estimate the relationship between UK export volumes, UK-weighted world trade and relative export prices, as other authors have done. Exports are typically observed to be more sensitive to demand movements than to relative price changes. Demand elasticities are usually found to be unitary, so a 10% increase in demand leads to a 10% rise in exports. Estimates for the price elasticity of exports — or equivalently, the export share — typically range from -0.1 to -0.7, with an average of -0.4 (**Table A**). That is, a 10% reduction in relative UK export prices on average leads to a 4% increase in the UK export share, relative to trend. The wide range reflects uncertainties about the precise magnitude of this channel.

Table A Estimates of the elasticity of export volumes to relative export prices(a)

Barrell, Choy and Kirby (2006)	-0.1
Wren-Lewis and Driver (1998)	-0.3
Pain *et al* (OECD) (2005)	-0.6
Barrell, Dury and Pain (NiGEM) (2001)	-0.7
Average	-0.4

(a) These are estimates of the long-run elasticities. The sample periods used vary across studies, but none include the recent depreciation.

The equivalent observed price elasticity following the recent depreciation appears to be lower than these estimates (**Chart 4**). That is, the export share has increased by less than the fall in relative export price would suggest, based on past behaviour.

To understand why exports have been relatively weak, it is necessary to consider goods and services exports separately. By using detailed national accounts data from the United Kingdom's biggest trading partners, a measure for world trade in goods and world trade in services can be constructed. The aggregate export share can then be decomposed into the United Kingdom's export market shares of goods and services (**Chart 5**).

Chart 5 UK export market shares(a)

Sources: ONS and Bank calculations.

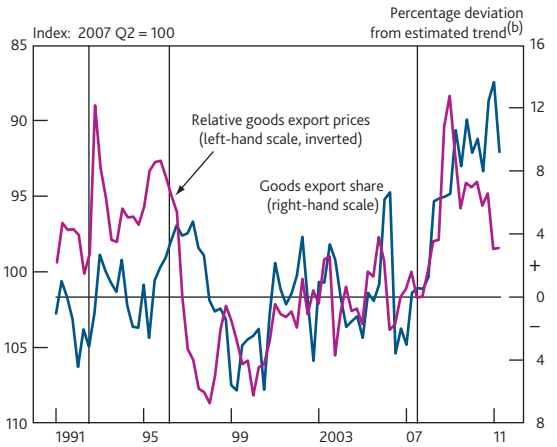
(a) UK goods (services) exports divided by imports of goods (services) in Canada, France, Germany, Italy, Japan and the United States, weighted using UK 2010 goods (services) export shares from the 2011 *Pink Book*. The last observations are 2011 Q2.

Goods exports

The goods export market share fell between 1997 and 2007 (**Chart 5**), with a particularly pronounced decline following sterling's appreciation in 1996. Since the depreciation in 2007, the share has been broadly flat. That suggests that weaker sterling has arrested the slide in the United Kingdom's share of goods trade with its major trading partners.

Chart 6 shows the deviation from an estimated trend in the goods export share and compares it to the relative export price for goods (magenta line, inverted). It shows that following the depreciation, relative export prices fell significantly (although some of that has reversed recently). The improvement in the

Chart 6 UK goods export market share and relative goods export prices(a)



Sources: ONS and Bank calculations.

(a) UK goods exports (export prices) divided by imports of goods (export prices of goods) in Canada, France, Germany, Italy, Japan and the United States, weighted using UK 2010 goods export shares from the 2011 *Pink Book*. The last observations are 2011 Q2.
(b) The trend in the goods export share is based on an HP filter estimated from 1991 Q1 to 2007 Q2.

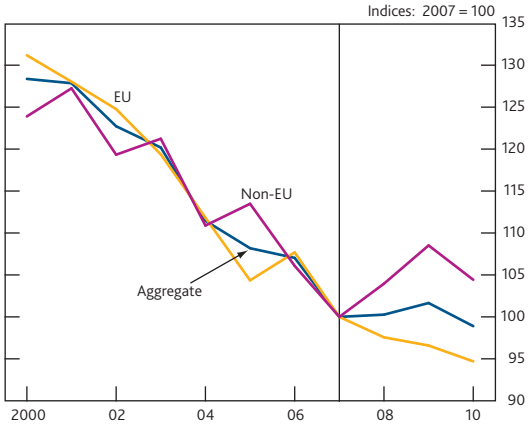
(1) The proxy for world trade used here weights together 52 countries' imports using 2010 UK export shares from the 2011 *Pink Book*. These countries account for 90% of UK exports. Domit and Shakir (2010) outline possible reasons for the collapse in world trade.

goods export share is, if anything, stronger than the past relationship would suggest. That implies there has been substantial expenditure switching in goods exports. That broad finding is robust to using alternative trends for the goods export share.

As with aggregate exports, there have been large swings in most categories of goods exports associated with the collapse and subsequent rebound in world trade. But it is not possible to accurately assess which components of goods exports have benefited most from the lower exchange rate, because it is difficult to obtain sectoral data on the relative export price or overseas demand.

But one way to split the data further is by region — for example, exports to the European Union (EU) and those to the rest of the world (non-EU). These regions accounted for 54% and 46% of the United Kingdom's goods exports respectively in 2010. The improvement in the UK goods export market share since 2007 appears to be almost entirely a non-EU phenomenon (**Chart 7**). The export share with EU countries has continued to decline, albeit at a slower pace than prior to the depreciation. The divergent behaviour in export shares has occurred despite sterling depreciating by a broadly similar amount against the United Kingdom's main trading partners.

Chart 7 UK goods export market share in the EU and non-EU[a]



Sources: ONS and Bank calculations.

(a) UK goods exports divided by imports of goods in the other 26 EU countries, and in 35 non-EU countries (accounting for 86% of goods exports to the non-EU), weighted using UK 2010 goods export shares from the 2011 *Pink Book*. Data are only available in annual terms.

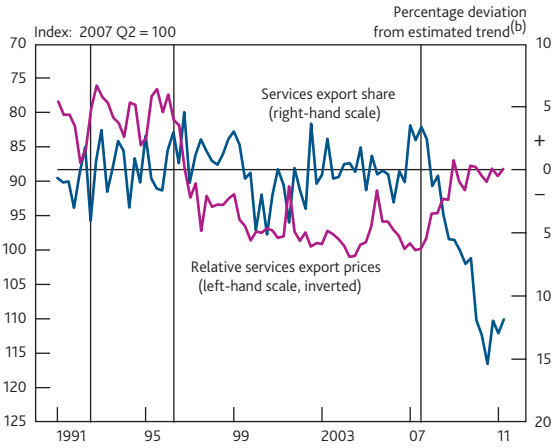
A proxy for relative goods export prices to the two regions suggests, however, that UK exporters' relative prices to the non-EU have fallen by more than those to the EU. That may have contributed to the relatively better performance of UK exports to the non-EU. One explanation for this could be that exporters to high growth areas have used the depreciation as an opportunity to expand market share. This is consistent with evidence from the Bank of England's Agents: they found that Asian demand has been an important driver of recent export growth.[1] And the United Kingdom's loss of market share in the EU could itself reflect increased competition from emerging economies.

In summary, goods exports appear to have been boosted significantly by the depreciation.

Services exports

Exports in the services sector (which account for 40% of total UK exports), have performed rather differently to goods exports. The United Kingdom's services export market share rose fairly steadily between 1991 and 2007 (**Chart 5**). But from its peak in 2007 Q4, the share fell significantly, and has only recently recovered its pre-depreciation level. Given the sizable fall in the relative price of services exports (magenta line (inverted), **Chart 8**), it appears surprising that the export share has fallen at all relative to its pre-depreciation trend — let alone by so much.

Chart 8 UK services export market share and relative services export price[a]



Sources: ONS and Bank calculations.

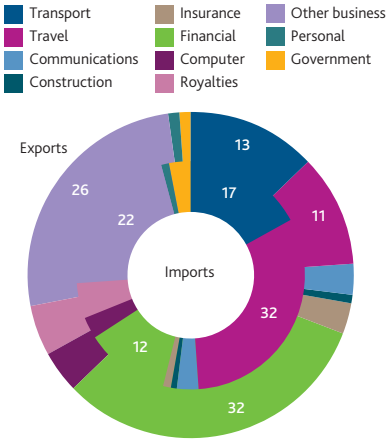
(a) UK services exports (export prices) divided by imports of services (export prices of services) in Canada, France, Germany, Italy, Japan and the United States, weighted using UK 2010 services export shares from the 2011 *Pink Book*. The last observations are 2011 Q2.
(b) The trend in the services export share is based on an HP filter estimated from 1991 Q1 to 2007 Q2.

But services trade is generally less sensitive to the exchange rate and prices than goods trade. The main reason for that is generally thought to be that services exporters compete on the basis of product quality (and reputation) rather than price, with a rise in relative prices sometimes indicating higher quality.[2] The relationship between the deviation of the United Kingdom's services export market share from its trend, and the relative services export price (**Chart 8**), is not as close as that for goods.

(1) Even within the EU, however, there has been a divergence — with stronger growth to Eastern Europe. For more details, see Bank of England (2011a).
(2) See Pain and van Welsum (2004). Pain *et al* (2005) and Wren-Lewis and Driver (1998). Other reasons are that intra-firm trade in services is likely to be less affected by exchange rate fluctuations, given the scope for multinationals to engage in transfer pricing. And, although aggregate services trade may be relatively price inelastic, different types of services exports have a wide range of price responsiveness.

Financial services can probably account for why the United Kingdom's services export share has not continued to increase since the depreciation. Disaggregated data on services export volumes show that financial services account for around a third of UK services exports (**Chart 9**). And their share in GDP fell by 1 percentage point between their peak and trough, while other services exports continued to increase (**Chart 10**). A box on page 299 considers developments in financial services exports in more detail.

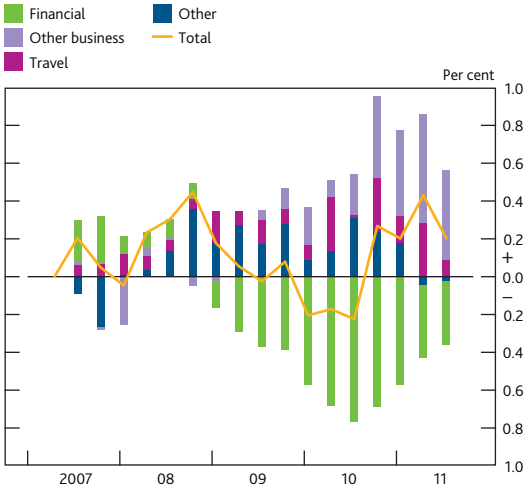
Chart 9 Breakdowns of services exports and imports volumes(a)(b)



Sources: ONS and Bank calculations.

(a) Shares are for 2008, the National Accounts reference year.
(b) Shares are only labelled for those sectors whose shares are above 10%.

Chart 10 Cumulative changes in services exports and its components as a share of GDP since 2007 Q2



Sources: ONS and Bank calculations.

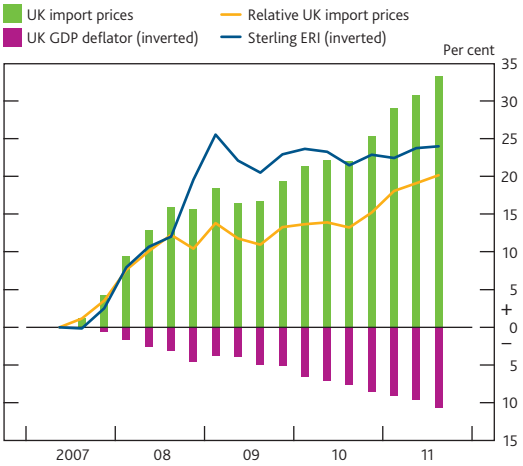
Import developments

Analogous to exports, the quantity of goods and services imported into the United Kingdom depends on aggregate demand in the UK economy and the price of foreign imports relative to domestic products. A lower level of sterling should make goods and services from abroad more expensive and UK companies and households should respond to this price change by demanding fewer imports.

Import prices

By 2011 Q3, import prices were over 30% higher than in 2007 Q2 (green bars, **Chart 11**). That is a broadly similar increase to that of export prices (**Chart 3**) — the UK terms of trade have been relatively stable.(1) Over that time, the prices of domestically produced alternatives (as measured by the GDP deflator) have risen by around 10% (magenta bars). So relative import prices have risen by roughly 20% (orange line).

Chart 11 Cumulative changes in sterling ERI and relative import prices since 2007 Q2(a)(b)



Sources: ONS and Bank calculations.

(a) Relative UK import prices are UK import prices relative to the UK market price GDP deflator.
(b) The bars represent percentage changes for the individual series. The orange line represents the percentage change in relative UK import prices. The latter is only approximately equal to the sum of the percentage changes for the individual series, since they are large numbers.

Import penetration

Demand for imports rebounded sharply as aggregate demand recovered following the recession (**Chart 2**). A closer measure of UK import demand is import-weighted total final expenditure (TFE). That weights together the components of aggregate UK demand by their estimated import intensities from the 2005 ONS Input-Output tables.(2) As with exports, empirical estimates suggest that imports are more sensitive to movements in demand than to relative prices. So in order to detect expenditure switching, it is best to control for these movements in demand by considering import penetration: that is, imports as a share of import-weighted TFE.

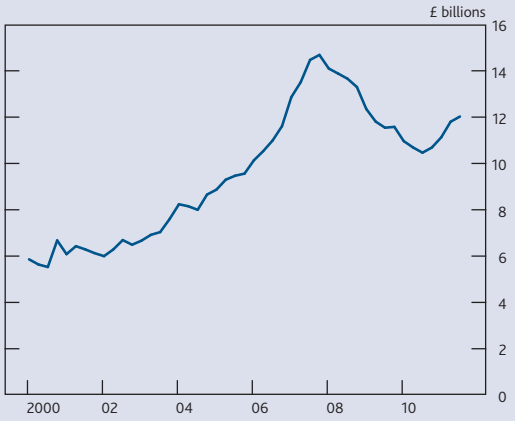
In the decade leading up to 2007, import penetration steadily rose (blue line in **Chart 12**) and relative import prices fell (magenta line, inverted). That reflects the fact that global integration and competition from low-cost economies lowered the price of imports to all advanced economies and led to an increase in the share of imports in final expenditure.(3) It may

(1) See MacCoille, Mayhew and Turnbull (2009).
(2) For instance, some expenditure components such as investment are more reliant on imports than others, such as government spending.
(3) For instance, see Buisán, Learmonth and Sebastiá-Barriel (2006), MacCoille (2008), Hooper, Johnson and Marquez (2000) and Pain *et al* (2005).

Developments in financial services exports

Financial services export volumes accounted for a third of UK services exports (**Chart 9**), or 4% of GDP, in 2008. Between their peak in 2007 Q4 and their trough in 2010 Q3, they fell by 29% or 1.0 percentage points of GDP (**Chart A**). Since then they have recovered somewhat. Over the longer period of comparison in **Chart 10** (2007 Q2 to 2011 Q3), they have fallen by 11% or 0.3 percentage points of GDP. This box outlines what financial services exports are and tries to explain why they fell so significantly.(1)

Chart A Financial services exports(a)



(a) Chained-volume measures (reference year 2008).

Defining financial services exports

The ONS publishes the breakdown of nominal financial services exports in the *Pink Book*. Monetary financial institutions, such as banks, represent the largest part (63%) of financial services exports. Securities dealers (18%), fund managers (9%) and other institutions (9%) make up the rest.

For monetary financial institutions and securities dealers, three broad types of financial services exports are published, each accounting for about a third of export values in 2008. First, commissions and fees, which are explicit charges relating to transactions. Second, spread earnings, which are margins on buying and selling transactions. Third, financial intermediation services indirectly measured, the value of the services provided by financial intermediaries (such as banks) for which no explicit charges are made; instead they are paid for as part of the margin between rates applied to savers and borrowers.

Understanding the fall in financial services exports

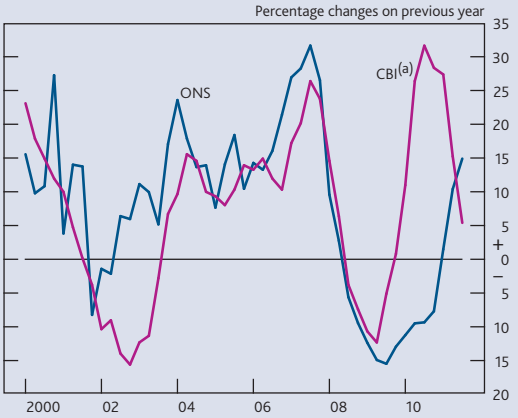
Although the breakdown of financial services export volumes is not available from the ONS, the split of nominal financial services exports indicates that the significant drop has been broadly based across its components.

The large fall in financial services exports seems plausible for many reasons. The financial nature of the crisis, banking sector deleveraging, and anecdotal evidence of financial institutions withdrawing from activities abroad are all consistent with lower financial services exports. And financial services exports have fallen in other countries, implying a fall in the global demand for financial services trade.

Nevertheless, there are challenges associated with measuring financial services exports, both conceptually — what should count as value added — and because of the difficulty of measuring them. For example, some services are not charged for explicitly. For a full discussion, see Burgess (2011).

Reflecting these difficulties, financial services exports as measured by the ONS are uncertain. While large revisions are relatively rare and typically reflect methodological changes, evidence from the *CBI Financial Services Survey* — although supportive of the initial large drop in exports (**Chart B**) — suggests a somewhat earlier and stronger recovery.

Chart B Financial services exports: ONS and *CBI Financial Services Survey*



Sources: ONS and Bank calculations.

(a) Volume of business with overseas customers from *CBI Financial Services Survey*, percentage balance. Four-quarter moving average, adjusted to have the same mean and variance as the ONS series over the period 2000–11.

Implications of weaker financial services exports

The United Kingdom specialises in financial services. For example, they make up a 21 percentage point bigger share of UK services exports than imports (**Chart 9**).(2) That is, even though financial services imports also fell markedly (by 26% from peak to trough, similar to the fall in exports), the financial crisis disproportionately affected UK *net* trade.

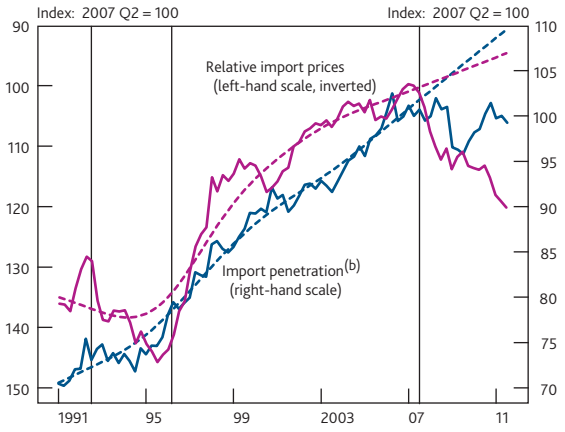
And the sector accounts for a bigger proportion of exports than in other countries (Chart 2 of Burgess (2011)). Therefore, even though other countries' financial services exports were also reduced by the crisis, the sector has dragged on the United Kingdom's services export and aggregate export *shares*.

Finally, it is likely that most of the fall in demand for UK financial services output in 2009 was due to exports.(3)

(1) It is heavily based on the boxes on pages 237 and 240 in Burgess (2011).
(2) In terms of total UK exports and imports, the difference is 10 percentage points. For example, see Chart 13 of Astley, Smith and Pain (2009).
(3) See Chart 6 of Burgess (2011), which is based on data prior to the *Blue Book*.

also, in part, reflect sterling's appreciation in 1996. Since the recent depreciation, the directions of both variables have reversed, although the large swing in import penetration, in part, reflects the large fall and subsequent recovery in world goods trade during and after the recession.

Chart 12 UK import penetration and relative import prices(a)

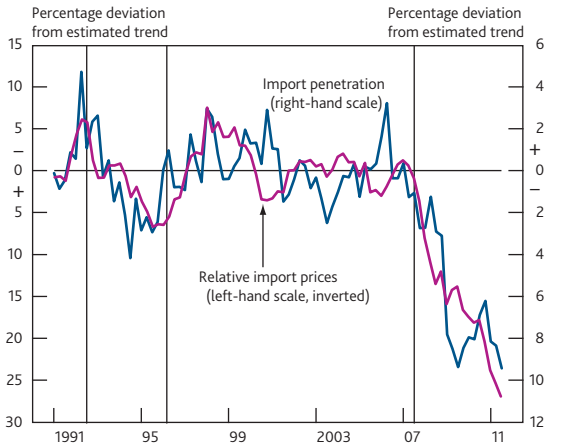


Sources: ONS and Bank calculations.

(a) The dashed lines are pre-depreciation trend lines, based on HP filters estimated from 1991 Q1 to 2007 Q2.
(b) Imports as a proportion of import-weighted TFE. Import-weighted TFE is calculated by weighting household consumption (including non-profit institutions serving households), whole-economy investment (excluding valuables), government spending, stockbuilding (excluding the alignment adjustment), and exports, by their respective import intensities. Import intensities are estimated using the *United Kingdom Input-Output Analytical Tables 2005*.

Chart 13 shows, for both aggregate import penetration and relative import prices, the deviations from the estimated trend lines in **Chart 12**. It suggests that, relative to their trends, the share of imports in final expenditure has fallen by around 9 percentage points, and relative import prices have risen by around 27%. That is broadly consistent with the historical relationship between the two variables, and with estimates in the academic literature (**Table B**), which on average predict a 4% fall in import volumes or import penetration for every 10% increase in the relative price of imports.

Chart 13 Deviations from trend in UK import penetration and relative import prices(a)



Sources: ONS and Bank calculations.

(a) The deviation from trend in import penetration (relative import prices) is the difference between the two blue (magenta) lines in **Chart 12**. The scales of the axes are such that they equalise the means and variances of the two variables over the period on the chart, to enable movements in them to be compared quantitatively. The ratio of the scales, 0.4, therefore indicates a proxy for the elasticity over this period — in line with the estimates in **Table B**.

Table B Estimates of the elasticity of import volumes to relative import prices(a)(b)

Barrell, Choy and Kirby (2006)	-0.2
Wren-Lewis and Driver (1998)	-0.3
Pain *et al* (OECD) (2005)	-0.3
Barrell, Dury and Pain (NiGEM) (2001)	-0.4
Hooper, Johnson and Marquez (2000)	-0.6
Crane, Crowley and Quayyum (2007)	-0.6
Average	-0.4

(a) These are estimates of the long-run elasticities. The sample periods used vary across studies, but none include the recent depreciation.
(b) The estimated elasticity of import volumes to changes in import demand is, as with exports, generally found to be unitary.

It is important to recognise that — as with exports — different components of imports have developed differently. While goods imports rebounded sharply in the recovery, services imports remain much weaker. Unlike in services exports, financial services account for a relatively small share of services imports (**Chart 9**). Travel services, on the other hand, make up nearly a third of services imports, so they are an important sector to consider. Indeed, travel services account for all of the weakness in services import volumes (**Chart 14**), and therefore likely much of the import *share* too. That indicates that there has been relatively little expenditure switching in other types of imports.

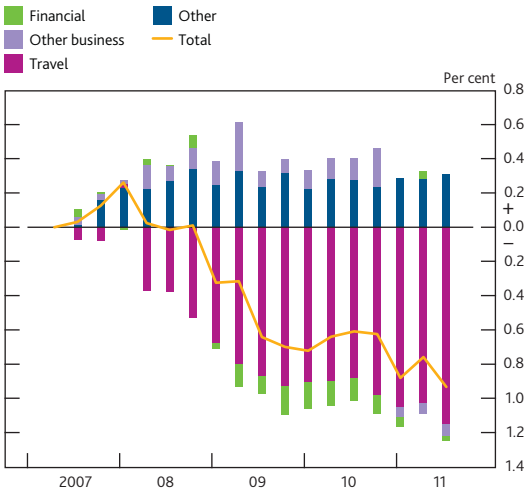
Imports of travel services

Travel imports have fallen significantly: as a share of GDP they have declined by more than 1 percentage point since 2007 Q2 (**Chart 14**). The volume of travel services that are imported represents overseas tourism by UK residents. So the decline reflects less real spending overseas by UK households, in sterling terms.(1) Tourists from the United Kingdom converting sterling into foreign currency experienced a sharp fall in their purchasing power. As a result, they may have chosen to spend more on domestic tourism, or taken fewer holidays overall — the 'staycation' effect.

The speed and extent of switching in travel imports could reflect a number of factors. First, pass-through of the exchange rate is likely to be quick: for the part of travel imports that is made up of actual spending overseas, there is instant and complete pass-through of the depreciation as UK residents experience an immediate fall in the purchasing power of sterling. Second, it may be relatively quick and easy to stop going overseas since they are less likely to be locked into long-term contracts than for other types of imports. And foreign holidays are often considered a luxury, so can be cut

(1) The ONS publishes a split of nominal travel imports into personal and business travel. Personal (household) travel makes up the vast majority of the level of travel imports, and so accounts for most of the fall since 2007.

Chart 14 Cumulative changes in services imports and its components as a share of GDP since 2007 Q2



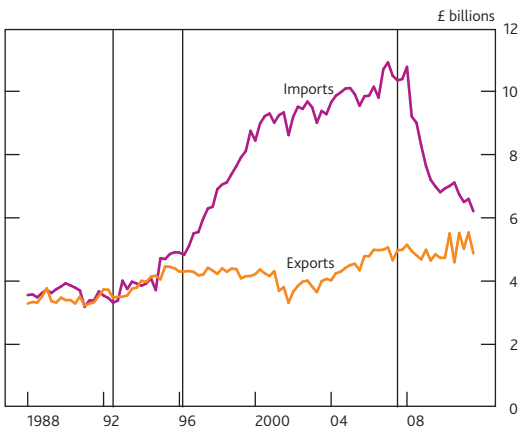
Sources: ONS and Bank calculations.

back if necessary. Finally, domestic alternatives — although they may not be perfect substitutes — do already exist.

Some of the fall in travel imports may of course be explained by the fall in aggregate demand. But the same picture emerges even after controlling for demand (by looking at travel imports as a share of domestic consumption). Unlike aggregate imports, travel imports have not rebounded with demand. And the fact that travel imports also accelerated rapidly after the 1996 appreciation (**Chart 15**) adds weight to the notion that the large movements in travel imports are driven by expenditure switching.

Travel exports (spending in the United Kingdom by overseas residents), by contrast, appear to have been much less responsive to the sterling depreciation. That may be because weaker demand abroad has offset the boost from expenditure switching.(1)

Chart 15 Travel services exports and imports(a)



Sources: ONS and Bank calculations.

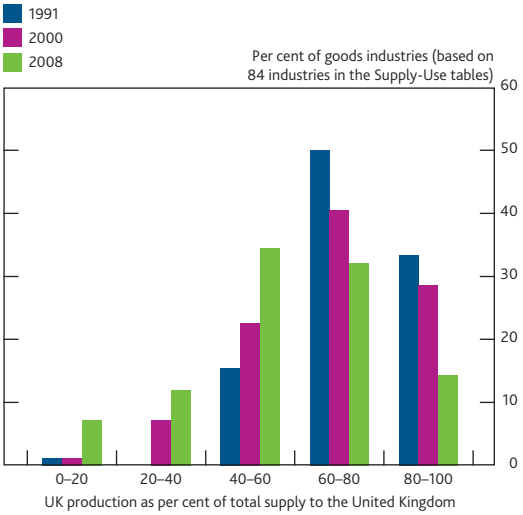
(a) Chained-volume measures (reference year 2008). Prior to 1996 there are no travel services trade data. The series splice on the (very similar) tourist expenditure data from *Consumer Trends*.

Reasons for the resilience of non-travel imports

Although in aggregate, there has been roughly as much expenditure switching away from imports as might have been expected, it is surprising how little appears to have come from non-travel imports. This section considers two reasons why there may have been a limited response to the depreciation (thus far) from other sectors. First, a long-running structural shift in production away from the United Kingdom; second, the effect of the United Kingdom's absolute price level still being higher than other countries.

As a consequence of trade specialisation (including outsourcing), there may now be fewer domestic alternatives to the goods and services the United Kingdom imports. That would make it harder for UK firms and households to switch their expenditure away from imports as import prices rise. **Chart 16** shows the share of inputs to a given goods industry supplied by UK firms. In 1991, UK producers supplied over 60% of the inputs in over 80% of the industries in the United Kingdom (the two blue bars on the right). Since then, the distribution has shifted to the left: in 2008 UK companies supplied more than 60% of the UK market in under half the United Kingdom's industries (the two green bars on the right). And there are now considerably more industries with very little UK presence.(2)

Chart 16 UK production as a proportion of total supply to the United Kingdom, by goods industry



Sources: ONS and Bank calculations.

Declining domestic presence in certain industries is a long-run structural trend. It may take time for UK firms to set up production capabilities in areas in which they are currently not

(1) There is little available literature on the price elasticity of travel trade. But Deardorff *et al* (2000) and Hung and Viana's (1995) findings for the United States are broadly consistent with recent UK developments. They show that US travel imports are more responsive to a given change in relative prices than other services imports, and (at least in the short run) than travel exports.

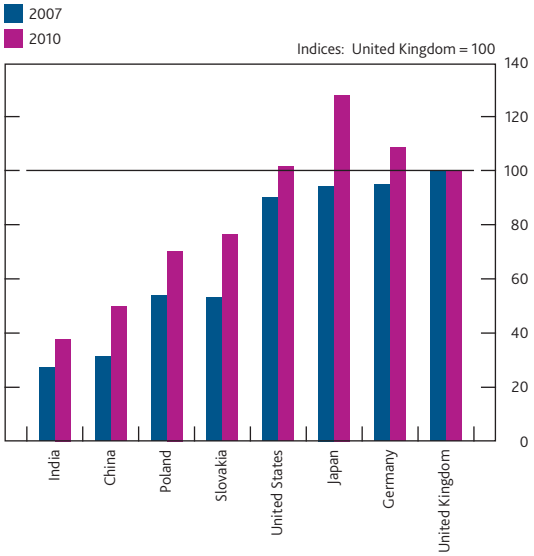
(2) A lack of domestic alternatives has repeatedly been cited by contacts of the Bank of England's Agents. Nevertheless, overall the Agents have observed an increased pace towards sourcing of UK production, partly due to the depreciation. See Bank of England (2011b).

active, which suggests that expenditure switching may be delayed, if it happens at all. It will be held back by any uncertainty over the exchange rate and by tighter credit conditions. And this process may even boost imports further in the short run if some of the capital goods required to expand production need to be imported.

A second explanation for limited expenditure switching could be that the absolute price level of imported goods and services from countries such as China remains lower. That is, despite the large rise in import prices following sterling's depreciation, there may still be little incentive for households and firms to switch to domestic alternatives.

In 2007, the UK aggregate price level was considerably higher than many of its trading partners, in purchasing power parity (PPP) terms (**Chart 17**). Ideally, this chart would compare just the price of traded goods and services, but such data are not available. The depreciation will have increased the price level of other countries in sterling terms by around 25% (although it will have also raised the absolute UK price level through higher imported input costs).

Chart 17 Relative GDP deflators[a]



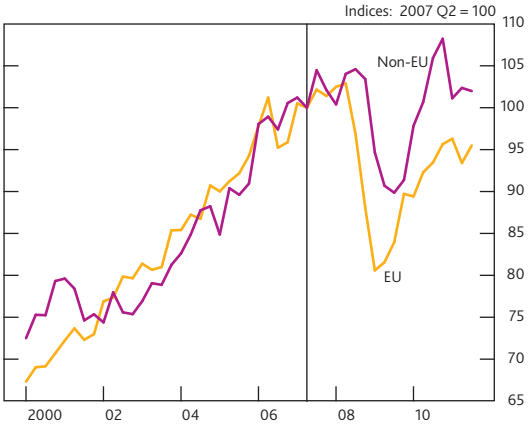
Sources: Penn World Table and Bank calculations.

(a) PPP-adjusted price levels.

Chart 17 shows that, even after the depreciation, a large price differential likely remains with some emerging economies such as India and China. But the price differential relative to the United Kingdom's major European trading partners (such as Germany) may have narrowed significantly or been eliminated.

Goods import volumes into the United Kingdom from the EU have been notably weaker than those from the rest of the world since 2008 (**Chart 18**). That may be tentative evidence that price levels do matter for the degree of expenditure switching. As these low-cost emerging economies are now more integrated in world markets, that headwind to expenditure switching is more significant than it would have been 20 years ago. That implies that there may be less (rather than slower) expenditure switching than past relationships would suggest.[1]

Chart 18 UK goods imports from the EU and non-EU



Sources: ONS and Bank calculations.

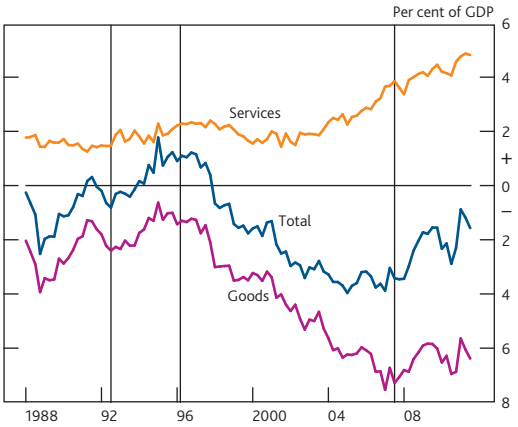
Overall impact on net trade

This article has considered movements in the major components of exports and imports since sterling's 25% depreciation from mid-2007. It has done so in the context of changes in demand and relative prices as well as their prior trends. This section brings together the implications for aggregate net trade, and compares the response to that in previous episodes involving significant movements in sterling.

Recent developments in UK net trade

In the decade to 2007, real net trade declined as a share of GDP (**Chart 19**), due to developments in the goods balance. That is likely to have reflected two factors: first, the impact of

Chart 19 Net trade: total, goods and services



Sources: ONS and Bank calculations.

(1) One caveat is that the non-EU data include some advanced economies, such as the United States and other OECD countries.

globalisation felt by many advanced economies, as low-cost economies increased their share of world trade; and second, a loss of UK competitiveness following sterling's appreciation in 1996.

This article has examined the disaggregated data in order to uncover the stories behind the recent movements in net trade. It has argued that since sterling's depreciation in 2007–09: (i) UK goods exports have boosted net trade (magenta bars in **Chart 20**); (ii) although the fall in goods imports provided a temporary boost during the recession, they have not contributed positively overall (grey bars); (iii) the fall in financial services exports has been a drag on services exports (green bars); and (iv) the reduction in services imports, accounted for by travel, has boosted net trade (orange bars).

Chart 20 Cumulative changes in net trade and its components as a share of GDP since 2007 Q2[a]

Sources: ONS and Bank calculations.

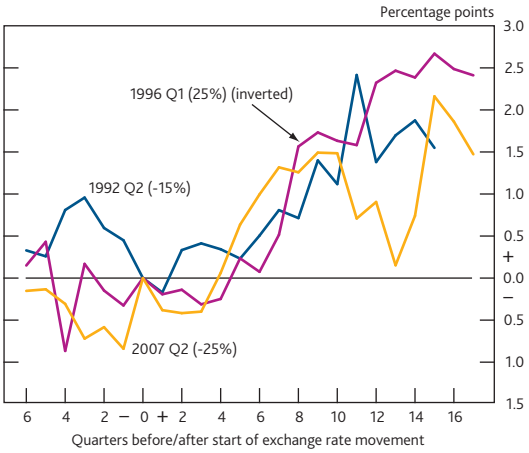
(a) Imports are inverted, since they detract from GDP.

Overall, goods net trade has increased substantially since 2007 Q2, relative to its previous trend (**Chart 19**). Services net trade, meanwhile, has continued to rise in line with its pre-depreciation trend. That reflects the large and broadly offsetting falls in financial services exports and travel services imports. Taking goods and services together, there has been a significant improvement in real net trade.

Comparison with previous exchange rate episodes

Another way of placing the change in net trade in context is by comparing it with previous episodes involving significant movements in sterling. These may indicate the scale of the increase in net trade that might be expected. The improvement of 1.5 percentage points in net trade is broadly consistent with the movements following the (smaller) 1992 depreciation and the (comparable) 1996 appreciation (**Chart 21**).

Chart 21 Cumulative changes in net trade as a share of GDP around previous large sterling moves[a]



Sources: ONS and Bank calculations.

(a) Labels indicate the quarter before the exchange rate movement began, with the peak-to-trough sterling exchange rate movement in parentheses.

Conclusions

The sterling effective exchange rate depreciated by around 25% between mid-2007 and early 2009. That has contributed to a significant improvement in the UK real trade balance, roughly in line with the movements following previous large movements in sterling. This article has considered developments in the disaggregated data in order to understand that change in net trade.

The share of UK goods exports in world demand has been broadly stable, a marked improvement on its previous trend. The services export market share fell, reflecting the large decrease in financial services exports associated with the financial crisis. And it is consistent with services exports being less sensitive to movements in the exchange rate. Together, these developments mean that the aggregate export share has risen slightly above its pre-depreciation trend.

Since the depreciation, the share of imports in final expenditure has fallen, relative to its previous upward trend. That movement is similar to its past relationship with relative import prices. Within imports, travel services have fallen markedly, while there appears to have been less of a boost so far from weaker sterling to other goods or services imports. That may reflect the fact that the United Kingdom has become more specialised in its production or that a large price-level difference still exists with other emerging economies.

Looking ahead, both the level of sterling and developments in the rest of the world are likely to be crucial to the United Kingdom's trade performance.

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The financial position of British households: evidence from the 2011 NMG Consulting survey

By Kishore Kamath and Kate Reinold of the Bank's Structural Economic Analysis Division, Mette Nielsen of the Bank's Risk Assessment Division and Amar Radia of the Bank's Monetary Assessment and Strategy Division.[1]

Over the past year the recovery in the UK economy appears to have slowed. That weakness in UK demand has been driven by falling consumption, reflecting the challenging environment facing households. This article examines the factors affecting households' budgets and spending decisions using the latest survey of households carried out for the Bank of England by NMG Consulting in September 2011. The survey suggests that most households had experienced an income squeeze, and credit conditions remained tight. Around half of households reported that they had been affected by, and had responded to, the fiscal consolidation. Reported levels of financial distress had remained elevated but had been contained by the low level of Bank Rate and some forbearance by lenders. Looking ahead, households were uncertain about future incomes and expected to continue to be influenced by the fiscal tightening. Households in aggregate, did not expect to change the amount they saved.

Introduction

The economic environment for households is challenging. Real incomes have fallen. The fiscal consolidation has begun and is planned to continue. Unemployment has remained higher than before the recession, and credit conditions are still tight. Partly in response to these circumstances, the Bank of England's Monetary Policy Committee (MPC) has maintained Bank Rate at 0.5% since March 2009. As a further stimulus, between March 2009 and January 2010 the Bank purchased £200 billion of assets financed by the issuance of central bank reserves, so-called quantitative easing (QE).[2] In October 2011, the MPC decided to purchase a further £75 billion of assets.[3]

The outlook for aggregate spending and the incidence of debt payment problems is likely to depend on whether these influences have affected most households to a similar extent or have been concentrated among certain groups. Disaggregated data can shed light on this and also provide information on whether households have already adjusted to the challenges they face or whether they have further adjustment to make in the future.

Between 23 and 29 September 2011, NMG Financial Services Consulting carried out a face-to-face survey of about 2,000 British households on behalf of the Bank.[4] This year, an online survey was carried out in parallel to the traditional face-to-face survey. The online survey was commissioned in order to gain a better understanding of differences between results using the two modes of survey, and with a view to potentially moving the entire survey online in the future. The design of, and a few results from, the online survey are described in the box on page 317. The rest of the article, however, reports the results from the face-to-face survey in order to ensure direct comparability with previous years' survey results.

Households were asked a range of questions about their finances. These included questions about their incomes, how much they owed, whether their borrowing was secured or unsecured and whether they had difficulty accessing credit. This year there were new questions on income uncertainty, loan forbearance, saving intentions and the impact of, and

(1) The authors would like to thank Michael McLeay and Nicola Worrow for their help in producing this article.
(2) For more information on the effectiveness of the Bank's programme of asset purchases, see Joyce, Tong and Woods (2011).
(3) The NMG survey was conducted in September, prior to this decision.
(4) The NMG Consulting survey is carefully designed and weighted to be representative of British households, in terms of the following characteristics: age, social grade, region, working status and housing tenure. But, as in any small sample of a population, care must be taken in interpreting small changes in results from year to year because they may not be a reliable guide to changes in the population.

reactions to, the fiscal consolidation. The survey is the ninth that the Bank has commissioned NMG Consulting to conduct on household finances.(1) Some results from this year's survey were presented in the November 2011 *Inflation Report* to assess developments in household saving, and in the December 2011 *Financial Stability Report* in the context of forbearance and household vulnerabilities. This article describes the detailed results from the survey in more detail.(2)

A number of results in the survey are split by the respondents' housing tenure: outright owners, mortgagors and renters. Previous survey results have shown that it is useful to distinguish between these types of households as they are likely to react differently to changes in economic circumstances. This may be because they have different exposure to interest rates or are at different stages in their life cycles.

The first section of the article discusses the impact on household balance sheets of incomes, the fiscal consolidation, credit conditions and the housing market. The second section describes households' ability to keep up with debt commitments and household bills and how those experiencing payment problems are resolving them. The third section considers how households have changed — and intend to change — their saving decisions and looks at the distributions of assets and liabilities across households. A box on page 313 discusses new questions included in the online survey designed to obtain estimates of marginal propensities to consume.

Influences on household finances

Weakness in incomes

Over the past year, relative to pre-recession levels, unemployment has remained elevated and nominal earnings growth — while recovering slightly — has been subdued. Both these factors are likely to have continued to push down on nominal incomes. The unemployment rate of respondents in this year's survey was about 7%, lower than the 8.3% recorded in the ONS Labour Force Survey in 2011 Q3.

An important underlying driver of households' finances over the past year is likely to have been the squeeze in real incomes arising from the increase in the rate of Value Added Tax (VAT) and the rises in energy prices and import prices. Those factors have contributed to unusually weak real income developments. The fiscal consolidation by the Government (of which the rise in VAT has been part) may also have reduced household incomes.

Table A reports the results of the income questions in the NMG survey according to the housing tenure of the respondent. The average pre-tax household income of respondents was just over £2,850 per month. The survey also asked respondents about the level of their 'available' income — disposable income left over after paying tax, national insurance, housing costs (rent, mortgage payments, council tax), loan payments and utility bills — and how it had changed over the past year.(3) The average level of available income was £720 per month. This was highest for high loan to value (LTV) mortgagors (at just under £1,050) and lowest for renters (at nearly £450).

Table A Changes in monthly available income by housing tenure(a)(b)

Household income by tenure	Outright owners	Low LTV mortgagors	High LTV mortgagors	Renters	Total
Percentages of households	**34**	**32**	**6**	**28**	**100**
Characteristics					
Mean monthly pre-tax income (£s)	2,481	4,193	4,117	1,624	2,856
Mean monthly available income (£s)	781	893	1,040	434	720
Distribution of changes in monthly available income (percentages of households)					
Down	**51**	**59**	**66**	**56**	**56**
of which, by more than £100	22	37	38	27	28
of which, by £51 to £100	17	18	23	19	18
of which, by £1 to £50	13	5	4	10	9
Not changed	**36**	**27**	**15**	**31**	**31**
Up	**13**	**14**	**20**	**13**	**13**
of which, by £1 to £50	4	3	3	4	4
of which, by £51 to £100	2	4	3	5	4
of which, by more than £100	6	8	13	3	6
Mean change in monthly available income (£s)	-36	-55	-53	-48	-46

Sources: NMG Consulting survey and Bank calculations.

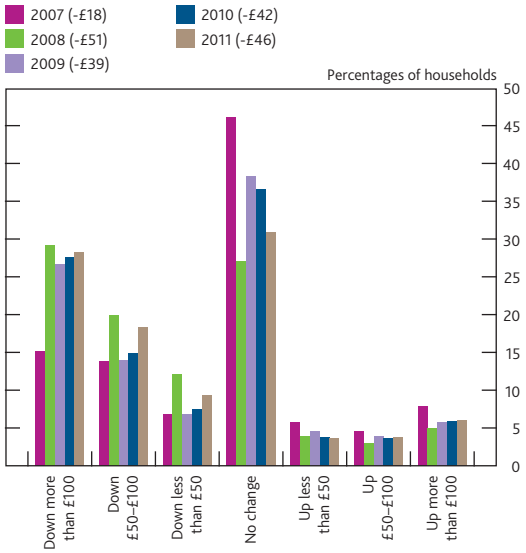
(a) Questions: 'How much of your monthly income would you say your household has left after paying tax, national insurance, housing costs (eg rent, mortgage repayments, council tax), loan repayments (eg personal loans, credit cards) and bills (eg electricity)?'. 'And how much would you say that your monthly left over income has changed over the past year?'.
(b) The distributions of changes might not sum to 100 because of rounding.

The average level of available income reported by respondents in this year's survey is higher than in 2010 when average available income was £655 per month. The difference is more likely to reflect a more affluent sample in 2011 than in 2010 rather than a similar increase in available income across the UK population as a whole. The weekly Capibus survey (run by Ipsos MORI), to which the NMG survey questions were added, shows that — compared to previous weeks — the share of high-income households was particularly high in the week in which the 2011 NMG survey was carried out. A higher average level of income in the 2011 sample would affect the comparison with 2010 for a number of variables in the survey. As with any results from a small-sample survey, care must be taken interpreting changes in results from year to year.

(1) The results of each year's survey have been reported in the *Quarterly Bulletin*. See Nielsen *et al* (2010) for details of the 2010 survey.
(2) The raw survey data are available at www.bankofengland.co.uk/publications/quarterlybulletin/nmgsurvey2011.xls.
(3) The available income question may capture some elements of the real income squeeze, for example, increases in energy prices have resulted in higher utility bills. But the pressure on real income from higher prices of other essential goods and services — due to higher VAT and import prices — will probably largely not be captured by the question.

On average, respondents reported that their own available income had fallen over the past year by £46 per month, continuing the trend reported in the past four annual surveys. More than a half of households in the NMG survey reported a fall in monthly available income, while income was unchanged for around a third. And the distribution has shifted to the left since the 2010 survey (**Chart 1**).[1]

Chart 1 Changes in monthly available income[a][b]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'How much would you say that your monthly left over income has changed over the past year?'.
(b) The numbers in parentheses after the years are the average (mean) change in monthly available income reported in that year's survey.

The falls in monthly available income appear to have been broadly based across different types of household by housing tenure, although outright owners fared better to some extent, and mortgagors slightly worse (**Table A**).

Fiscal consolidation

In 2010 the Government announced fiscal measures designed to reduce the size of the United Kingdom's budget deficit. Some of those measures were implemented over the past year, such as the increase in the rate of VAT, and others are expected over the coming years. In the survey, households were asked about how they had been affected by the measures over the past year, and how they expected to be affected in the future. Those households who reported that they had been affected or expected to be affected were also asked about any action they had taken in response to the measures, and likely action in the future.

There is evidence that the fiscal consolidation is expected to have more of an impact in the future than it has had over the past year. **Table B** shows that 48% of households felt they had been affected in some way by the fiscal measures over the past year, with higher taxes and lower income reported as the main ways in which they had been affected. Households who said they had been affected by the fiscal consolidation reported a larger fall in income (-£65) than those that reported that they had not been affected (-£24). Looking forward, 69% of households thought they would be affected by the fiscal measures in the future. A much larger share of households were concerned about losing their job in the future as a result of the fiscal measures (19%), than had reported that they had lost their job as a result of the fiscal measures over the past year (7%).

Table B Impact and expected impact of fiscal measures on households[a]

Percentages of households

	Impact over the past year	Expected impact in the future
Those affected	**48**	**69**
How affected:[b]		
Higher taxes	23	32
Lower income	19	24
Less spending on services used	13	20
Lower benefits	10	16
Loss of job	7	19
Not heavily affected	**34**	**15**
Hadn't thought about it	**18**	**16**

Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'In 2010, the government announced a set of measures in order to cut the country's budget deficit. Some of these measures have already come into effect. How have these measures affected your household over the past year?'. 'Some of the government's measures will come into effect over coming years. Which of the following are you most concerned about for the future?'.
(b) Impacts may not sum to totals since households could choose up to three effects.

Working households that gained more than half of their labour income from the public sector were slightly more likely to report that they had been affected by the fiscal measures (58% compared to 48% for the sample as a whole). Future job loss was a concern for around a third of working households that were reliant on the public sector for more than half of their income, a smaller share than the 50% that reported they were concerned about job loss in the 2010 survey. This could reflect that when public sector job losses were announced, all public sector employees were concerned about job loss, but as job cuts are made, remaining employees have greater certainty over their own job.

Around half of households reported that they had taken some action in response to the fiscal measures, and the same share expected to take action in the future (**Table C**). The main responses that households had taken were through the labour market, for example looking for a new job or working longer hours. And looking forward, saving more was the most prevalent likely response in the future.

Credit conditions

Since the escalation of the financial crisis in 2008, households' access to credit has tightened. From 2008 to 2010, each NMG

(1) The box on page 313 outlines new estimates from this year's survey of households' marginal propensities to consume out of the fraction of these changes in income that was estimated by households to be unexpected.

Table C Actions and likely actions taken in response to the fiscal measures[a][b]

Percentages of households

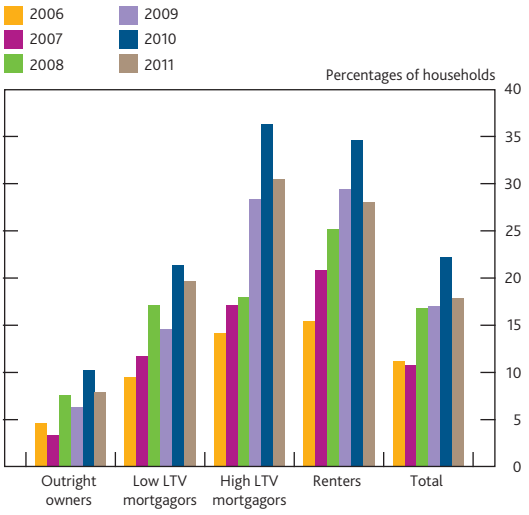
	Action taken over the past year	Likely action in the future
Responded/will respond	**54**	**55**
Type of response:[c]		
Look for new job	21	23
Work longer hours	20	22
Save more	15	24
Spend more	7	3
Not responded/won't respond	**46**	**45**

Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'Which, if any, of the following actions have you taken in response to these measures?'. 'Which, if any, of the following actions will you take in response to these measures?'.
(b) Actions questions were not asked to those households who reported that they 'hadn't thought about it' to the effects question reported in **Table B**.
(c) Types of response may not sum to totals since households could choose up to three types of response.

survey reported a higher proportion of households who were put off spending by concerns about credit availability than the previous year's survey. And that was particularly the case for high LTV ratio mortgagors and renters. By contrast, that proportion fell by 4 percentage points in the 2011 survey, reversing much of the increase reported in the 2010 survey (**Chart 2**). Nevertheless, the overall level of households reporting credit constraints remains elevated compared to the period before the onset of the financial crisis.

Chart 2 Proportion put off spending by concerns about credit availability[a]

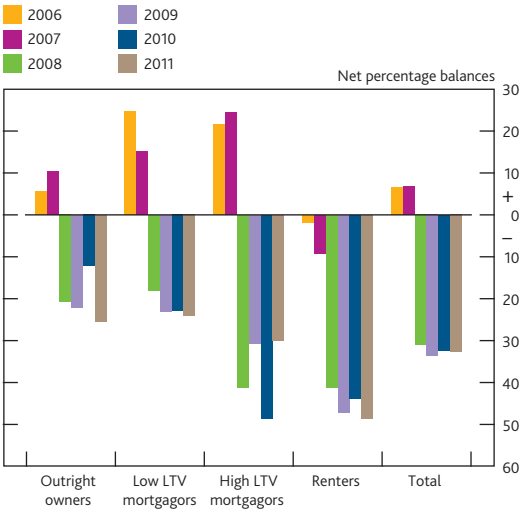


Sources: NMG Consulting survey and Bank calculations.

(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 would be turned down?'.

Further, a large net percentage of households reported that they found it harder to borrow than a year ago, a similar net percentage balance to that reported in the 2010 survey (**Chart 3**). The net percentage reporting that it had become more difficult to access credit was largest for renters, or,

Chart 3 Changes in credit conditions[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Have you found it easier or harder to borrow to finance spending than a year ago?'.

cutting the sample differently, for those with no debt or only unsecured debt.

These results seem to contrast with those from the Bank's *Credit Conditions Surveys* over most of the past year, in which lenders reported that the availability of credit to households had remained broadly unchanged (Bank of England (2011)). That may be because in the *Credit Conditions Survey* lenders are likely to report credit availability for a given level of credit risk. But if, for example, a household is perceived to be less creditworthy by lenders than they were a year ago, that household may report that they have found it more difficult to access credit. A further issue is that households tend to observe any changes in credit conditions only infrequently when they ask for credit or need to refinance it. As a result, some households may only now be noticing an earlier tightening in credit conditions or deterioration in their creditworthiness.

The housing market

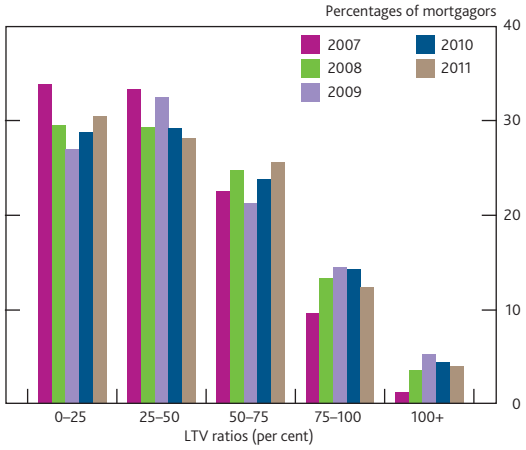
House prices have fallen modestly over the past year, following a large fall in 2007–08 and a smaller rise in 2009–10.[1]

The LTV distribution on mortgagors' outstanding secured debt reported in the NMG survey shifted towards slightly lower shares of debt (**Chart 4**). There was a modest fall — from 19% to 16% — in the share of mortgagors with high (above 75%) LTV ratios.

Housing transactions remain at very low levels relative to before the financial crisis.[2] And the number of first-time

(1) Calculated using an average of the Nationwide and Halifax seasonally adjusted quarterly indices.
(2) The weakness in transactions is likely to have meant less acquisition of debt by households and so is consistent with the leftward shift in the LTV distribution. See Reinold (2011).

Chart 4 Distribution of LTV ratios on mortgagors' outstanding secured debt[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Mortgage debt from the NMG survey captures only mortgage debt owed on households' primary residences.

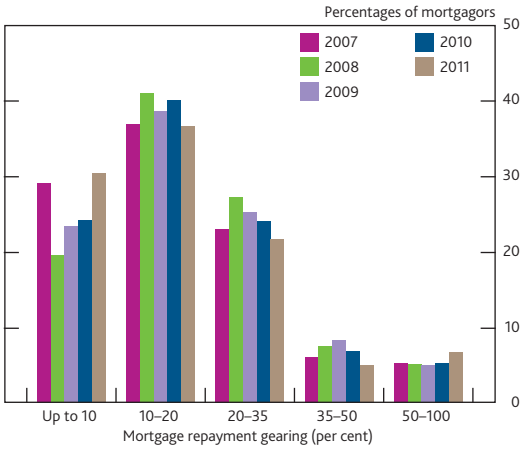
buyers in the housing market is still low. While house prices are 14% below their 2007 Q3 peak, and relatively low mortgage rates have made owning a property more affordable for first-time buyers, the median deposit required for a mortgage remains high relative to the pre-crisis period. For the second year in succession, around a quarter of renters in the NMG survey that reported that they were increasing saving were doing so to finance a deposit on a property. Tight credit conditions are likely to be continuing to make it difficult for first-time buyers to enter the housing market, which in turn is consistent with the low number of transactions relative to the pre-crisis period.

Interest rates and affordability

An important way in which monetary policy influences the economy is by affecting the interest rates faced by households. Between October 2008 and March 2009, the MPC cut Bank Rate from 5% to 0.5%. Following these cuts in Bank Rate, borrowers on standard variable rate or Bank Rate tracker mortgages experienced a fall in their monthly mortgage repayments (Nielsen *et al* (2010)). And over the twelve months prior to the latest survey, household effective mortgage rates (the average mortgage rate held by households with existing mortgages) had fallen by a further 0.2 percentage points.

Changes in interest rates faced by households influence the affordability of debt. One way to assess affordability is by looking at the share of pre-tax income devoted to servicing debt (repayment gearing). The proportion of mortgagors who reported that they had devoted less than 10% of their pre-tax income to mortgage repayments was higher than in the 2010 survey (**Chart 5**). This is likely to reflect, in part, the impact of lower effective mortgage rates. It may also be due to the effect of lower housing market turnover as there are relatively few new borrowers with high income gearing to offset the gradual improvement in the affordability of older mortgages as debts are paid down.

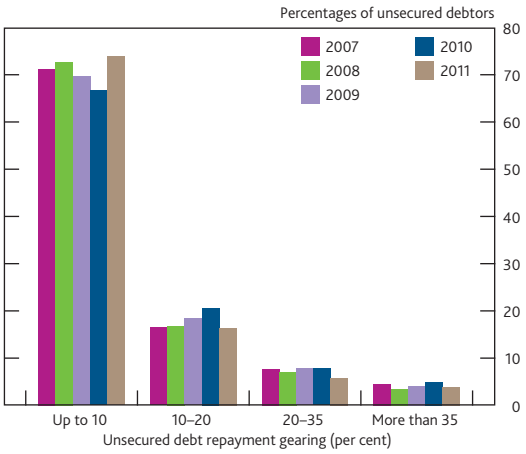
Chart 5 Mortgage repayment gearing[a](b)(c)



Sources: NMG Consulting survey and Bank calculations.

(a) Mortgage repayment gearing is calculated as total mortgage payments (including principal repayments)/gross income.
(b) Calculation excludes those whose gearing exceeds 100%.
(c) Reported repayments may not account for endowment mortgage premia.

Chart 6 Unsecured debt repayment gearing[a](b)



Sources: NMG Consulting survey and Bank calculations.

(a) Unsecured debt repayment gearing is calculated as total unsecured debt payments (including principal repayments)/gross income.
(b) Calculation excludes those whose gearing exceeds 100%.

There was also a rise in the proportion of households reporting that they devoted less than 10% of their pre-tax income to servicing unsecured debt (**Chart 6**).

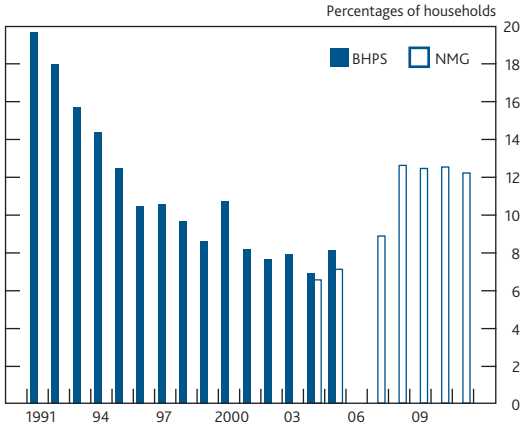
Repayment problems and household responses to them

Distress

Reported levels of distress remained elevated in the 2011 survey. As in the 2010 survey, 12% of households reported having experienced difficulty paying for their accommodation in the past twelve months (**Chart 7**). There was variation across tenure groups, however, with distress increasing for outright owners and renters, but falling for mortgagors.[1]

(1) Accommodation costs could for example be interpreted to include rent, mortgage payments, council tax, service charges and utility bills.

Chart 7 Difficulty paying for accommodation[a][b]



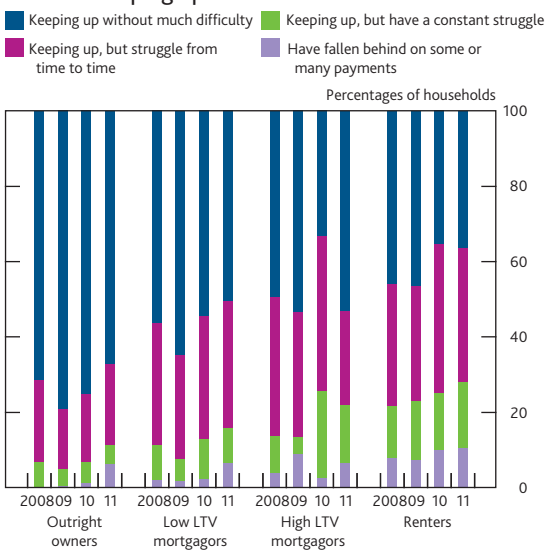
Sources: British Household Panel Survey (BHPS), NMG Consulting survey and Bank calculations.

(a) Question: 'Many people these days are finding it difficult to keep up with their housing payments. In the past twelve months would you say you have had any difficulties paying for your accommodation?'.
(b) In the 2006 NMG survey, renters and outright owners were not asked this question, so data for 2006 are not comparable and have been excluded from the chart.

Distress is likely to have been pushed up by increasing bills and rents but, for mortgagors, the effect of higher bills may have been more than outweighed by a fall in mortgage repayment gearing.

A larger share of respondents reported that they had fallen behind on some or many bills or credit commitments than in 2010: 7.5% had fallen behind in 2011 compared to 4.1% in 2010. This might in part be driven by recent increases in utility bills and the price of essentials, rather than problems with servicing debt. Consistent with this, distress appeared to have increased the most for outright owners and low LTV households (**Chart 8**). There was a rise in the fraction of high LTV mortgagors that reported keeping up with bills and credit commitments without much difficulty. This may in part be due to a fall in mortgage repayment gearing among high LTV households.

Chart 8 Keeping up with bills and credit commitments[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Which one of the following statements best describes how well your household is keeping up with your bills and/or credit commitments at the moment?'.

Respondents were also asked about the actions they were taking to resolve their difficulty in keeping up with bills and credit commitments. The most common actions were to cut back on spending, work longer hours or take on a second job, and to use cash from savings or other assets (**Table D**). About 10% of households received financial help from family or relatives. Compared to last year, fewer households reported that they were taking actions involving debt solutions or new debt. This drove a moderate increase in the fraction of respondents taking no action.

Table D Actions to resolve difficulties in keeping up with bills and credit commitments[a]

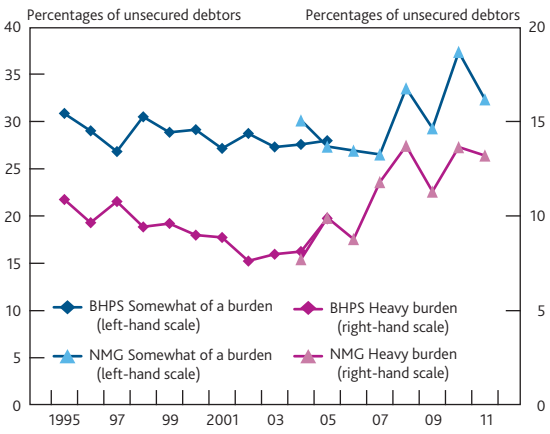
	2010	2011
Percentages that mentioned:		
Cut back on spending	50	49
Working longer hours/taking on a second or better-paid job	18	16
Use cash in savings/other assets	16	14
Getting financial help from family/relatives	11	11
Sell your house	4	3
Enter into another debt solution such as a debt management plan	6	3
Take out another loan	5	2
Take out another mortgage on your house	3	1
Declare yourself insolvent (ie bankruptcy or Individual Voluntary Arrangement)	1	1
Not taking any action	24	32
Other	2	1

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'What actions, if any, are you taking to resolve the difficulty you have in keeping up with bills and/or credit commitments? Please select no more than three of the following'.

The proportion of households who reported difficulty in dealing with unsecured debt was somewhat lower than in 2010 (**Chart 9**). The fraction of households finding unsecured debt somewhat of a burden or a heavy burden fell by 5 percentage points. The burden of unsecured debt is still high relative to pre-recession levels.

Chart 9 Burden of unsecured debt[a]



Sources: BHPS, NMG Consulting survey and Bank calculations.

(a) Question: 'To what extent is the repayment of these loans and the interest a financial burden on your household?'.

Factors limiting distress

Household financial distress could have been higher than suggested above in the absence of forbearance by lenders, where the terms of a loan are renegotiated or relaxed in response to an actual or prospective breach of the original terms of the loan. The 2011 NMG survey included new questions about the level of forbearance and how households would have fared in the absence of this help. The results suggest that 12% of mortgagors were benefiting from some kind of forbearance on their secured debt (**Table E**). The most common types of forbearance were a switch to an interest only (or part interest only) mortgage, a reduction in interest rate due to difficulties in making payments and a payment holiday. The numbers point to a slightly higher level of forbearance than the FSA forbearance review, which covered three quarters of UK mortgages and suggested that 5%–8% of mortgages were subject to forbearance (see December 2011 *Financial Stability Report*). The difference may in part be due to the relatively small sample size of the NMG survey and the possibility that some borrowers included general changes to their mortgage in answering the NMG survey, even if these were not in response to payment difficulties.

Table E Secured forbearance[a]

	Percentages of mortgagors
A (temporary or permanent) switch from a repayment mortgage to an interest only (or part repayment/part interest only) mortgage	3.6
A reduction in interest rate offered due to difficulties in making payments	2.2
Having a (part or full) mortgage payment holiday	2.1
Having lower monthly payments due to having extended the term of your mortgage in the past	1.8
Having had mortgage arrears added to your outstanding mortgage balance (capitalisation) in the past	1.8
Claiming Support for Mortgage Interest (SMI)	1.3
Another change to the terms of an existing mortgage to help ease the burden of payment	0.6
None of these ie did not need help to meet payments or did not request/was not granted any of the above	87.1
Received at least one type of forbearance (excluding SMI)	11.8

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Are you or your household currently benefiting from any of the options below to help ease the burden of your mortgage? Please include options that you are benefiting from that were permitted in the original terms of your mortgage as well as those that were not. Do not include any general benefit you may be getting from the current low interest rates. You can choose more than one answer'.

The NMG survey also suggests that 11% of unsecured debtors were receiving forbearance on their unsecured debt (**Table F**).[1] The most common types of forbearance were making token payments to creditors and having lower monthly payments due to having extended the term of a loan in the past. Nearly 3% of unsecured debtors reported lower payments because of a Debt Management Plan, Debt Relief Order, Bankruptcy Order, or Individual Voluntary Arrangement. There was some overlap between the households reporting that they received secured and unsecured forbearance: 25% of mortgagors who held unsecured debt and received forbearance on their mortgage also received forbearance on their unsecured debt.

Table F Unsecured forbearance[a]

	Percentages of unsecured debtors
Making token payments to creditors	4.8
Having lower monthly payments due to having extended the term of your loan in the past	3.2
A Debt Management Plan (DMP), Debt Relief Order (DRO), Bankruptcy Order or Individual Voluntary Arrangement	2.8
Another change to the terms of an existing unsecured loan to help ease the burden of payment	1.6
None of the above (did not need help to meet payments or did not request/was not granted any of the above)	88.7
Received at least one type of forbearance	11.3

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Are you or your household currently benefiting from any of the following actions/changes to your loan agreement to help ease the burden of your debt (other than mortgage debt)? You can choose more than one answer'.

When asked how they would have fared in the absence of forbearance, 29% of mortgagors and 47% of unsecured debtors receiving forbearance reported that they would have otherwise been in arrears on their mortgage or unsecured debt respectively (**Table G**). And a further 46% of mortgagors and 31% of unsecured debtors would have struggled to keep up in the absence of forbearance. The numbers are not directly comparable to the measures of distress discussed above but, among those that were benefiting from forbearance, only 11% of mortgagors and 18% of unsecured debtors were currently behind on *any* bills or credit commitments.

Table G Situation in the absence of forbearance[a][b]

	Percentages of debtors
Secured	
I would be up to date with my mortgage payments, without much struggle	25
I would be up to date with my mortgage payments, but it would be a struggle	46
I would be behind on my mortgage payments by less than 6 months of payments	24
I would be behind on my mortgage payments by 6 months or more of payments	5
Unsecured	
I would be up to date with my loan payments, without much struggle	22
I would be up to date with my loan payments, but it would be a struggle	31
I would be behind on my loan payments	47

Sources: NMG Consulting survey and Bank calculations.

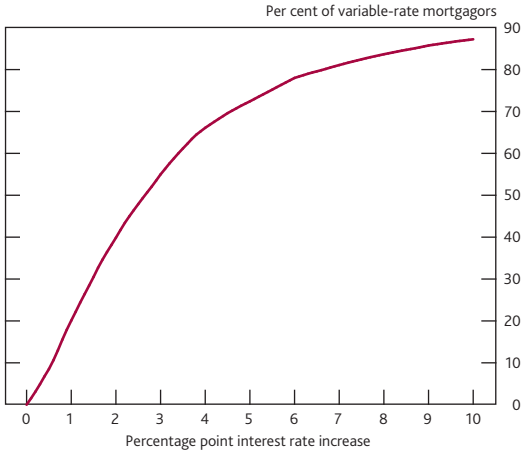
(a) Question: 'If you had not made this change, which of the following would describe your likely situation?'.
(b) The top (bottom) section lists the percentage of mortgagors (unsecured debtors) that received secured (unsecured) forbearance and that would have otherwise been in the given situation.

Distress is also likely to have been contained by low interest rates on secured debt. To gauge the extent to which households would be affected by higher debt payments, variable-rate mortgagors were asked how much more they would be able to pay on their mortgage every month without having to take some action to find the extra money. A fifth of these mortgagors reported that they would need to take some

(1) Forbearance appeared slightly higher (12%) among those with credit card debt, a personal loan and/or an overdraft.

action if rates were to increase by 1 percentage point immediately (**Chart 10**). It should be noted however, that overnight index swap rates indicate that financial market participants do not expect Bank Rate to be 1 percentage point higher than today until early 2016.

Chart 10 Mortgagors needing to take action if interest rates were to increase[a][b][c][d]



Sources: NMG Consulting survey and Bank calculations.

(a) Per cent of variable-rate mortgagors that would need to take some action if interest rates were to increase by the number of percentage points indicated on the x-axis.
(b) Question: '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?'.
(c) The answers were provided in sterling amounts and translated into interest rate increases using information on the mortgage outstanding.
(d) The question was asked only to mortgagors with discounted, base rate tracker or standard variable-rate mortgages.

Prospects for saving and the distribution of net assets across households

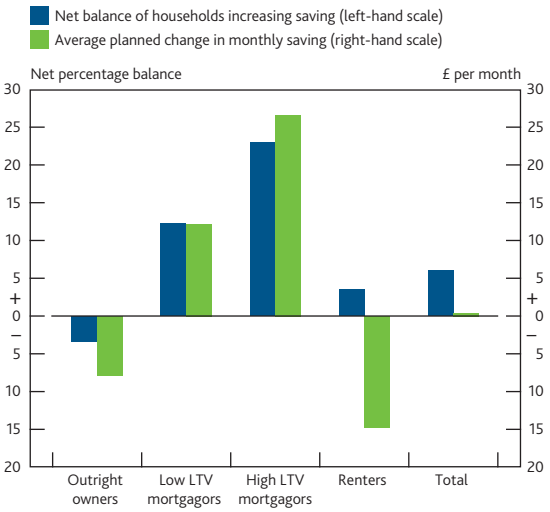
Saving decisions of households

The different influences on household balance sheets discussed in the first section all impact on households' saving and spending behaviour. Changes in income affect the amount of money that households have to divide between spending and saving or debt repayment. And changes in uncertainty, credit conditions, asset prices and debt levels affect the share of any changes in income that households choose to spend — that is their marginal propensity to consume (see the box on page 313).

Households were asked about the amount of money they saved each month. There had been a small increase in average reported monthly saving by households from £156 per month in 2010, to £176 a month in 2011. But while on average there was an increase in saving, there was considerable dispersion across the monthly saving of different households: around two fifths of households reported that they did not save anything on a monthly basis, a slight increase from 2010. But this was offset by higher saving by other households.

When asked about their saving intentions, 61% of households reported that they did not intend to change the amount saved each month. Of the others, a larger share of households were planning to increase saving (22%) than were planning to decrease saving (16%). That means that the net balance of all households planning to increase saving was positive (**Chart 11**). But the average decrease in monthly saving was larger than the average increase, so the average intended change in savings for all households was broadly zero. When split by tenure, mortgagors were most likely to be increasing saving and by the largest amount. For renters and outright owners, the average change in monthly saving was a decrease.

Chart 11 Planned change in monthly saving[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'Over the next year, are you planning to change the amount of money you save?'.

Table H shows the reasons given by those households that were planning to increase saving. The different saving decisions by households with different tenures are likely, in part, to reflect their different stages in the life cycle. For example, outright owners (who had an average age of 62) who planned to increase their saving were more likely to be saving for retirement, and saving for a deposit was important for those renters who were planning to save more (although on balance, as a group, they intended to save less), who tend to be younger. Despite the variation in some types of response, the main reported reasons for increasing monthly saving (personal commitments, retirement and reducing debts) were important for all tenure types and were similar to the drivers of saving in 2010.

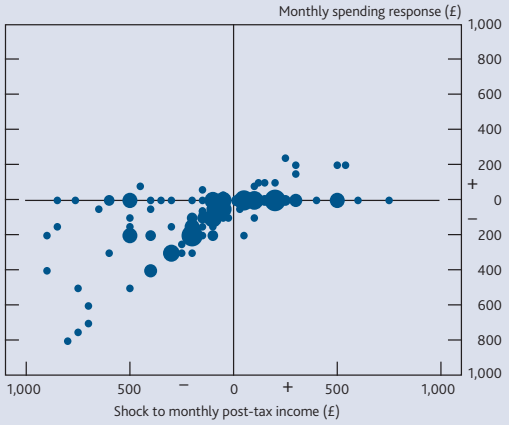
The most common reasons given by households intending to reduce saving were that households could not save as much each month, either because of the higher cost of essential items, or lower household income (**Table I**). Households who reported that they planned to save less because of lower incomes or the higher cost of essentials had indeed seen larger falls in their monthly available income (an average of £74 a month compared to £46 for the sample as a whole). Renters and outright owners were most likely to think that they had

Estimates of marginal propensities to consume

To quantify households' responses to shocks to their income, it is necessary to estimate their marginal propensity to consume (MPC). The MPC is the share of any unexpected rise in income which is spent, or the proportion by which spending is cut when income falls. There are few estimates for the United Kingdom and theory says that MPCs change over time, depending on factors such as credit conditions, and the level of interest rates. Questions were added to the 2011 online survey (see the box on page 317 for details of the online survey) which tried to elicit MPCs from households. Potentially these questions could be repeated to track MPCs over time.

First, households were asked whether their post-tax income was higher, lower or the same as they had expected a year ago and how they had adjusted their spending in response. **Chart A** shows the income shocks and spending responses that households reported. Around a third of households had experienced an income shock. Of those shocks, 70% were negative, and 30% were positive.

Chart A Income shocks and spending response(a)(b)(c)



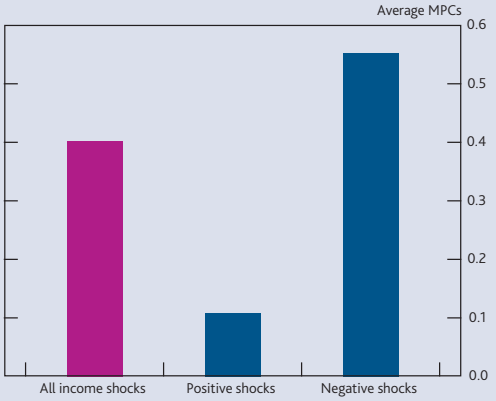
Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'Is your household's current monthly income more or less than what you expected it would be this time last year?'. 'How did you change your monthly spending in response to this unexpected change in household income?'.
(b) Axes are limited to positive and negative £1,000 to ease presentation, but larger shocks are included in calculations.
(c) Larger bubble indicates greater number of responses.

Comparing the size of the spending response to the size of the income shock gives an estimate of the MPC. For example, those households in **Chart A** who changed their monthly spending by the same amount as the unexpected change in their income would have an MPC of one. And those households that did not change their spending at all (and so lie on the horizontal zero line) would have an MPC of zero. **Chart B** shows that the average MPC was 0.4, but that the MPC out of positive shocks (0.11) was much smaller than from negative shocks (0.55).

Household characteristics affect the size of the MPC. **Chart C** shows that, as theory suggests, credit-constrained households

Chart B Average marginal propensities to consume by direction of shock(a)



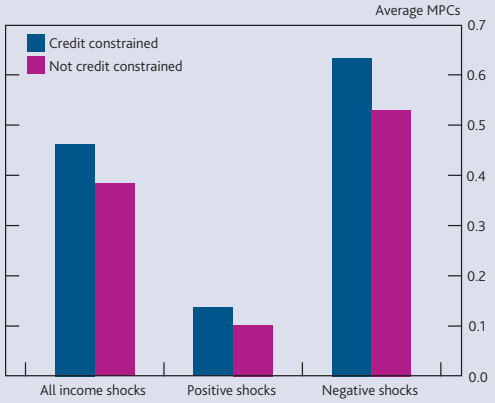
Sources: NMG Consulting survey and Bank calculations.

(a) MPCs greater than one and less than zero are excluded.

have a slightly higher average MPC. Credit-constrained households find it more difficult to access credit to smooth through any temporary shocks and so adjust spending by more. Another result shows that the average MPC is smaller when negative shocks are a larger share of available income. Households may be able to adjust fully to small shocks to income by reducing spending on discretionary items, but for large shocks, may not be able to cut spending on essentials.

An average MPC of 0.4 is at the upper end of what might be expected from a temporary shock.(1) This might reflect that some of the shocks were permanent and so households adjusted their spending by more. Households were asked the reason for their income shock, but these did not give a good indication of whether a shock was permanent or temporary. This could be improved were the questions to be repeated in the future. Or it might reflect that the sample of households responding was skewed towards those that had characteristics which might raise their MPC, such as being credit constrained.

Chart C Average marginal propensities to consume by credit constraints(a)



Sources: NMG Consulting survey and Bank calculations.

(a) MPCs greater than one and less than zero are excluded.

(1) For example Kreinin (1961), Landsberger (1966) and Johnson, Parker and Souleles (2004) find estimates of MPCs out of transitory shocks have been around 0.2 to 0.4.

Table H Reasons for planning to increase monthly saving, by housing tenure[a][b]

Percentages of households

	Outright owners	High LTV mortgagors	Low LTV mortgagors	Renters	Total (2011)	Total (2010)
Personal commitment	34	55	29	19	27	24
Retirement	32	22	26	20	24	25
Reduce debts	19	19	25	28	23	26
Saving for a big item	13	36	25	24	21	18
Increased income	15	7	15	14	14	9
Expected future tax increases	9	12	13	22	14	10
Expected future interest rate rises	5	18	24	12	13	12
Saving for a deposit	9	13	5	22	13	10
Fear of redundancy	9	7	14	14	12	17
Less guaranteed monthly income	8	14	3	14	10	7
Extra cash from lower mortgage repayments	7	4	3	3	3	8
Value of assets fallen	7	0	2	1	3	5
Don't know	2	0	1	3	3	5

Sources: NMG Consulting survey and Bank calculations.

(a) Question: 'What would you say are the main factors driving this increase?'.
(b) Responses may not sum to 100 because households could choose up to four reasons.

Table I Reasons for planning to decrease monthly saving, by housing tenure[a][b][c]

	Outright owners	Mortgagors	Renters	Total
Higher cost of essentials	42	38	34	38
Lower income	23	31	30	28
Have enough savings	16	7	19	14
Low level of interest rates	15	15	11	13
Bought the item was saving for	9	17	2	9
Other	1	2	2	2
Don't know	17	8	10	11

Sources: NMG Consulting survey and Bank calculations.

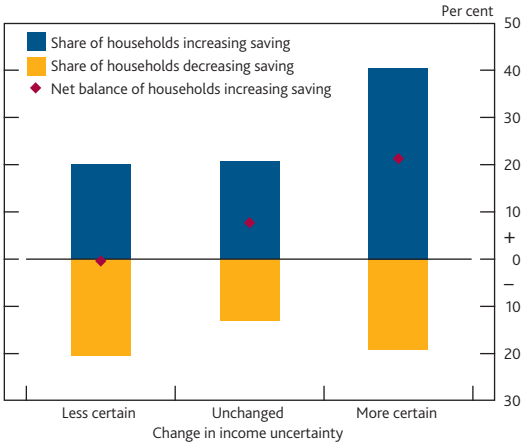
(a) Question: 'What would you say are the main factors driving this decrease?'.
(b) This question was not asked in 2010.
(c) Responses may not sum to 100 as households could choose up to four reasons.

enough savings, while owners outright and mortgagors were most likely to be put off by the low level of interest rates.

Some of the possible reasons for saving more given in **Table H** capture uncertainty about future available income — for example, fear of redundancy, less guaranteed monthly income and tax rises. That might reflect the desire of households to hold a buffer of saving which they can use if they suffer shocks to their income.

New questions in the 2011 survey asked households how certain they were that they knew what their household income would be in a year's time and how their uncertainty had changed over the past year. Around a quarter of households had 'no idea' what their income would be in a year. 31% of households reported that they were less certain than a year ago, while 9% were more certain than a year ago.[1] Given precautionary motives for saving, it is perhaps surprising that those households that were less certain about future income than a year ago were less likely to increase saving than those who were more certain (**Chart 12**). That may be because those households lacked the resources to increase saving.

Chart 12 Saving intentions by change in income uncertainty[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Questions: 'Over the next year, are you planning to change the amount of money you save?'. 'How, if at all, has your certainty about your future household income changed over the past year?'.

Distribution of assets and liabilities across households

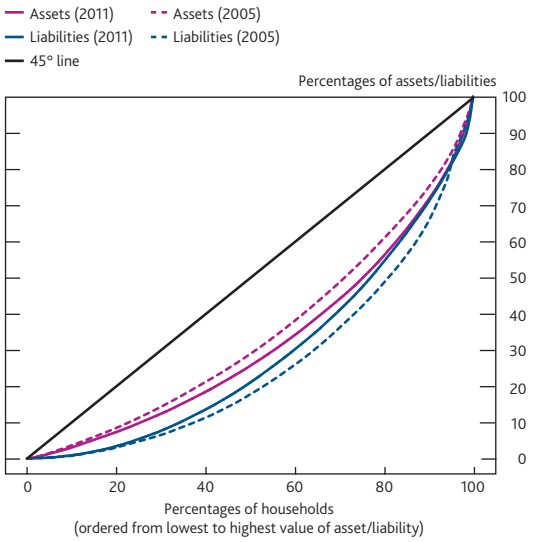
The monthly saving and borrowing decisions of households over time feed into the distribution of assets and liabilities across households. **Charts 13** and **14** show the distributions of assets (including financial assets and housing wealth) and liabilities (including mortgages and consumer credit) across mortgagors and renters respectively.[2] These are based on household reports of their holdings of assets and liabilities which, as discussed in the box on page 316, may be a sensitive issue for households and so the distributions can be treated as indicative only.

For each of the variables, households are ordered along the horizontal axis from those with the lowest reported amount of assets or liabilities at the left to those with the highest at the right. And reading across the vertical axis gives the share of the asset or liability attributable to that share of households. For example, the magenta line in **Chart 14** shows that the bottom 50% of mortgagors by share of assets held around 25% of assets, down from 29% in 2005.

Liabilities have become more evenly distributed since 2005 for both renters and mortgagors (the distributions are nearer the 45° line). Assets reported by households have become more unevenly distributed since 2005 for both mortgagors and renters. In particular the share of households holding relatively few assets has increased.

(1) It is difficult to know how significant these results are as this question has not been asked in previous surveys.
(2) Outright owners were not asked for the value of their house so corresponding charts cannot be drawn for that group of households.

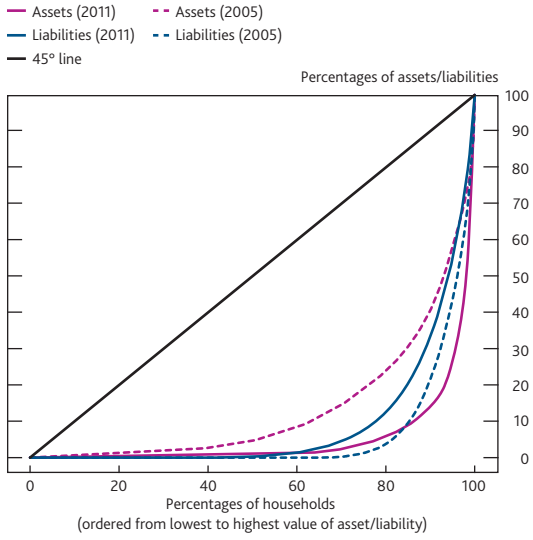
Chart 13 Distributions of assets and liabilities of mortgagors[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Assets include financial assets (including bank/building society saving accounts or bonds, stock and shares, ISAs, Child Trust Funds, NS&I account/bonds and premium bonds, but excluding pensions) and the value of the main family home (it does not account for second homes or property that is rented out). Liabilities include any mortgage and unsecured debt.

Chart 14 Distributions of assets and liabilities of renters[a]

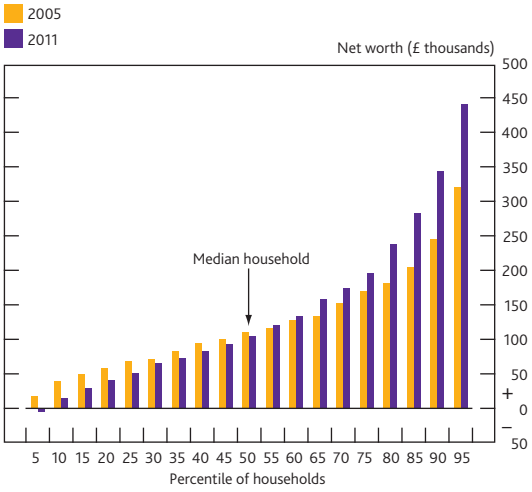


Sources: NMG Consulting survey and Bank calculations.

(a) Assets include financial assets (including bank/building society saving accounts or bonds, stock and shares, ISAs, Child Trust Funds, NS&I account/bonds and premium bonds, but excluding pensions) and the value of the main family home (it does not account for second homes or property that is rented out). Liabilities include any mortgage and unsecured debt.

But it is important to understand the joint distribution of assets and liabilities. The net position of a household — that is, a household's assets less their liabilities — gives an indication of the resources that a household has to smooth through any shocks to their household finances. **Chart 15** shows that, for mortgagors, while the position of the median household is little changed, the extremes of the distribution have changed by more. Results from the 2011 survey showed that the bottom half of mortgagors held fewer net assets than in 2005, while the top 50% held significantly more — especially towards the very top end of the distribution.

Chart 15 Distributions of net worth across mortgagors[a]

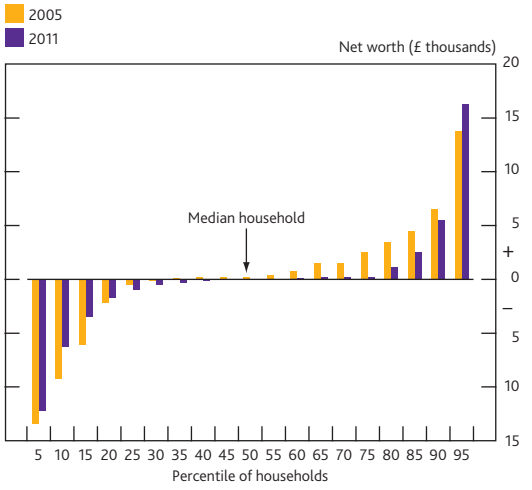


Sources: NMG Consulting survey and Bank calculations.

(a) Net worth equals household assets minus liabilities.

Despite the fairly large changes in the asset and liability distributions of renters shown in **Chart 14**, the net position of the median renter household is also unchanged (**Chart 16**). The top 20% of the distribution holds slightly fewer net assets than in 2005 (with the opposite true for the top 5% of the distribution). But the bottom 20% of the distribution looks in a better position, holding slightly less net debt.

Chart 16 Distributions of net worth across renters[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Net worth equals household assets minus liabilities.

Conclusion

The 2011 NMG Consulting survey suggests that the environment facing households remains challenging. Incomes were reported to have fallen and the outlook for them was relatively uncertain. Some households reported that the fiscal consolidation was affecting them, mainly through lower income and higher taxes, and that they were responding, particularly by trying to increase their labour supply through

Survey method

The survey was undertaken between 23 and 29 September 2011 by adding 34 questions related to household finances and housing wealth to a regular weekly survey, Capibus, carried out by Ipsos MORI. Interviews were conducted on 1,985 households in the respondents' homes using Computer Assisted Personal Interviewing (CAPI). The results were weighted to help correct for any bias in the sample using nationally defined profiles for age, social grade, region, working status and housing tenure.

A limitation of all surveys about sensitive issues such as household finances is that some people are reluctant to discuss them in face-to-face interviews. Those who face the most financial stress might be more likely than others to refuse to answer certain questions or to understate their difficulties. As in previous years, the survey was designed to reduce these possibilities. In order to encourage respondents to divulge sensitive information, they were told that the survey was being carried out on behalf of the Bank of England and would be useful in assessing how spending might be affected by its monetary policy decisions and in judging the risks to financial stability. They were assured that their replies would be treated in the strictest confidence. Also, to avoid embarrassment in revealing sensitive information to the interviewer, replies to questions were coded on show cards and recorded on a computer in such a way that the interviewer would not know the content of respondents' answers. Despite these attempts and the weighting of answers, the survey may not be representative for some questions. For example, collectively, survey respondents are known to systematically underrecord the value of their unsecured debt and overrecord the value of their housing assets (Redwood and Tudela (2004)). Since these biases do not tend to vary over time, changes in the distribution of balance sheets over time may be taken as representative of changes in the population as a whole.

Response rates for the 2009, 2010 and 2011 surveys have generally been higher than those in previous years. Only those respondents who were the chief income earner or main shopper were asked for their income. On a weighted basis, this meant that 9% of respondents were not asked about their income. A further 26% of households refused to provide (16%) or did not know (10%) their household income. And 14% of mortgagors refused to say or did not know how much secured debt they owed. A similar percentage of unsecured debtors did not provide information about the size of their unsecured debts, with 8% not knowing how much they owed and 2% refusing to say how much. There was quite a large overlap between those households who refused to provide information about their income and those that refused to provide information about their debts.

All calculations reported in this article have been carried out using all available responses in each individual survey question. As discussed in the 2009 article (Hellebrandt *et al* (2009)), this could in principle introduce a bias in the results if non-responses are not distributed uniformly across groups in the survey population, but in practice, the overall results are not very sensitive to the imputation method used.

Finally, as in 2008, 2009 and 2010 the ratios calculated in this article assume that each respondent's weight is uniformly distributed between the minimum and maximum value of the ratio consistent with the buckets selected. For more details of this method, as well as a discussion of its advantages and disadvantages compared to an alternative approach using mid-points, see Nielsen *et al* (2010). This approach was not used in computing monthly saving as a proportion of monthly income, where the size of the buckets of these two variables was similar enough to generate relatively few distortions.

finding a new job or working longer hours. A larger share of households were concerned about being affected by the fiscal consolidation going forward than had been affected over the past year. And credit conditions also remained tight.

Despite the considerable pressures on household balance sheets, reported levels of financial distress — while elevated relative to before the crisis — were little changed on the year. The low level of mortgage rates (and so income gearing) may have helped to contain distress. New evidence suggests that forbearance by lenders may also have been important. But, some variable-rate mortgagors reported that they would need to take action if there was an immediate 1 percentage point rise in interest rates. Financial market participants, however, do not expect Bank Rate to rise by 1 percentage point until 2016.

Households were, on the whole, not intending to change the amount that they save on a monthly basis. For those households that were saving more, personal commitments, retirement and reducing debt were important. But some households were finding that they could not save as much due to lower income or the higher cost of essentials. Over time, these saving decisions feed into the distribution of net worth. The median renter and mortgagor households had seen little change in their net worth compared to 2005, but there had been more change at the top and bottom of the distributions.

Online survey

Introduction and methodology

This box describes the online survey that was carried out in parallel to the traditional face-to-face survey this year. This survey followed a smaller online pilot survey carried out in 2010. The results in the main article draw only on the face-to-face survey results.

The 2011 online survey was carried out by NMG Consulting, with fieldwork running over the same period as for the main survey. The survey contained all of the questions asked in the face-to-face survey as well as additional questions intended to determine households' marginal propensities to consume as described in the box on page 313. Responses were weighted using the same variables as for the face-to-face survey to ensure a nationally representative sample; see the box on page 316 for details. A total of 1,004 responses were collected.

The 2010 online pilot survey was also carried out by NMG Consulting. Again, fieldwork ran over the same period as the main survey. Quotas were set to ensure a nationally representative sample, using the same definition as for the face-to-face survey. A total of 502 responses were collected. Only a subset of the face-to-face questions was asked online in 2010.

Survey comparison

In comparison to traditional face-to-face methods, self-administered online surveys present a number of potential advantages. First, online surveys are less resource-intensive, giving rise to the possibility of a larger sample size for the same cost. This can be especially important when looking at subsets of the sample. Second, a dedicated online survey creates the potential for a rotating panel design,(1) so that we would have consecutive observations on a subset of households rather than repeated cross-section observations. But most importantly, asking households questions in a less time-pressured situation without the presence of an interviewer might help overcome some of the issues with face-to-face surveys discussed in the box on page 316.

In particular, the literature suggests that online surveys can help increase disclosure in questions on sensitive topics and reduce social desirability bias. For example, Dayan, Paine Schofield and Johnson (2007) found that disclosure levels to sensitive questions were higher in online surveys than in the Capibus face-to-face survey. For the NMG survey, it was also found that the proportion of households responding 'don't know' or refusing to answer was in general lower in the online than face-to-face survey. It is also possible that households give more accurate responses to questions about their finances when they are not limited for time. This may be because they can think more carefully about the answer, or can consult other information such as a bank statement.

There are also potential drawbacks of self-administered online surveys. Online samples may be biased because of limited coverage of the internet and self-selection into the online panels that the sample is drawn from. The first issue is likely to diminish as an increasing fraction of the population obtains access to the internet.(2) Overall, the (unweighted) demographic profile of the households surveyed was similar in the online and face-to-face NMG surveys (**Table 1**). Altering the mode of a survey from face-to-face to online also results in a loss of direct comparability with previous surveys. But this can be partly overcome by parallel runs of online and face-to-face surveys to understand better any differences.

Table 1 Demographic profile of respondents(a)

	Face-to-face	Online
Average age	49	47
Proportion male/female	50%/50%	46%/54%
Proportion working	45%	55%
Proportion mortgagor/outright owner/ renter	30%/35%/35%	39%/35%/26%

Sources: NMG Consulting face-to-face and online surveys and Bank calculations.

(a) Summary statistics are calculated by giving equal weight to each survey response.

Comparing the results of the online and face-to-face surveys suggests that some of the biases suspected may be reduced in the online survey. For example, the proportion of households reporting that they hold unsecured debt is around 11 percentage points greater in the online survey than the face-to-face survey in 2011. And the average amount of unsecured debt is around £1,400 higher. These results suggest that the underrecording of unsecured debt in surveys might be at least somewhat mitigated through the use of online methods. Similarly, households generally reported greater levels of distress in the online survey. For example, the proportion of households finding unsecured debt somewhat of a burden or a heavy burden was 14 percentage points higher in the face-to-face survey than in the online survey in 2011.

(1) In a rotating panel design, households are re-contacted in successive years and asked to complete the survey again. As it is likely that a significant number of these households will not respond, new households make up the remainder of the sample.
(2) ONS data suggest that 77% of households in Great Britain had an internet connection in 2011, up from 61% in 2007.

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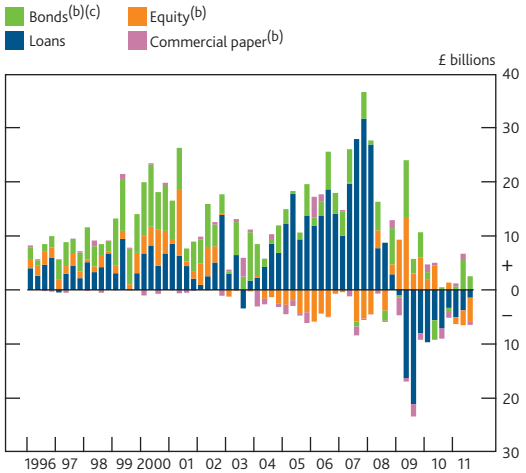
Going public: UK companies' use of capital markets

By Aashish Pattani and Giuseppe Vera of the Bank's Macro Financial Analysis Division and James Wackett of the Bank's Foreign Exchange Division.[1]

Public capital markets play an important role in financing the activities of non-financial companies in the United Kingdom, providing them with the main alternative to bank loans and private sources of finance. Although a small number of UK companies issue public bonds and equity, those that do account for a relatively large share of domestic investment and employment. Since the start of the financial crisis in 2007, bond and equity issuance has allowed some large companies to dampen the impact of the contraction in bank lending and the worsening economic outlook on investment and hiring. This suggests that there may be macroeconomic benefits to broadening access to public capital markets. The Bank has helped support primary corporate bond issuance at times of impaired secondary market functioning since 2009 through its Corporate Bond Secondary Market Scheme.

UK companies dramatically revised their spending and financing decisions during the financial crisis that started in 2007 and the ensuing recession. They reduced investment by over 20% between 2007 and 2009, and cut employment and research and development sharply. But companies also re-evaluated how much debt and equity to hold, and the composition of their external finance between bank and non-bank sources (**Chart 1**).

Chart 1 UK PNFC net external finance raised[a]



(a) Includes sterling and foreign currency issuance.
(b) Non seasonally adjusted.
(c) Includes stand alone and programme bonds.

This article focuses on the external financing decisions of UK private non-financial corporations (PNFCs) during this period. In particular, it investigates how large UK companies use public debt and equity, their main alternative to bank loans for funding long-term projects.[2] In doing so, it attempts to gauge how important public capital markets are to the UK economy, and to what extent they may have helped dampen the impact of the contraction in bank lending that accompanied the financial crisis.

The article has three sections. The first outlines the role of public external finance. The second looks at the importance of public capital markets for the UK economy, and highlights some common characteristics of UK companies that use public external finance. The third section focuses on public debt and equity issuance patterns between 2008 and 2011. And it explores whether public external finance helped UK companies maintain investment and hiring during the crisis.

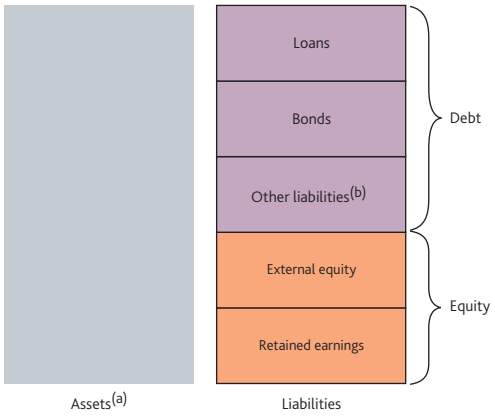
The article draws on three main sources: aggregate statistics on corporate liabilities; a company-level data set constructed at the Bank of England;[3] and information gathered from companies and capital market practitioners as part of the Bank's market intelligence activities.

(1) The authors would like to thank Jiaqian Chen, Michael Chin, Nikki Howes and Mika Inkinen for their help in producing this article.
(2) Unless otherwise specified, the word 'public' is used throughout the article to denote investors in general, rather than the public sector.
(3) The data set combines the Thomson Reuters Worldscope database with the Dealogic Debt Capital Markets and Loan Analytics databases, covering about 3,600 UK companies between 1989 and 2011. For each company this data set makes it possible to estimate the amount of loans, bond and equity issued each year, as well as observing its complete financial statement. Therefore, it allows analysis of companies' financing decisions in greater detail than financial statements alone.

Role of public external finance

UK companies seek to raise money from outside investors for two purposes. First, in order to expand their business — for example by acquiring new machinery, when they are unable or unwilling to use internal funds. Second, in order to change the structure of the liabilities they use to finance their assets (**Figure 1**) — for example by substituting debt for equity, or one form of debt or equity for another.

Figure 1 A stylised PNFC balance sheet



(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.

In exchange for external finance, companies offer investors claims on their resources such as debt contracts or equity shares. These claims allow investors to benefit from the cash flow generated by the company; and from a share of the company's assets in case of liquidation. Furthermore, they provide some degree of control over the company's management. For example, equity holders have voting rights, while debt holders may acquire the right to intervene in management if certain conditions are violated.

Companies can offer debt or equity privately to a single investor, or a small group of investors. In the United Kingdom, the most important example of such private external finance is bank lending, whereby banks provide finance to companies, typically in the form of loans. A smaller private placement market also exists, where companies sell debt or equity to small groups of buyers such as investment funds. In contrast, companies can also offer debt and equity claims to investors in general — including institutional investors (such as pension funds and insurance companies) and households — in public capital markets.(1)

This article focuses on companies' use of public external finance. In particular, it considers long-term external finance, and does not discuss short-term liabilities that companies use to finance working capital or manage liquidity, such as commercial paper. And it does not explicitly address companies' choice of leverage (the ratio of debt to equity on the balance sheet), which has been highlighted as a key influence on company performance since the seminal work by Modigliani and Miller (1958, 1963).(2)

The rest of this section describes the most common forms of public, long-term external finance used by UK PNFCs. And it outlines the key advantages and disadvantages of using public capital markets.

Types of public external finance

UK PNFCs sell both debt and equity claims to the public. **Table A** presents estimates of public debt and equity on their balance sheets in 2010. Public corporate bonds and equity each account for around 25% of total external finance.

Table A UK PNFC public debt and equity(a)(b)

	Amount outstanding (£ billions)
Memo: bank loans	**722**
Public corporate bonds	**338**
of which:	
Secured	*5*
Unsecured	*333*
and of which:	
Stand alone bonds	*316*
Programme bonds (medium-term notes)	*22*
Public equity	**346**
of which:	
Common equity	*345*
Preferred equity	*1*

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

(a) Total corporate bonds and bank loans are from the ONS *Financial Statistics* for 2010. The amount of secured bonds was estimated by scaling the total by the share of bonds of the same type reported by Dealogic for the period 1980–2011 — and similarly for unsecured, stand alone bonds and medium-term notes (see footnote (3) below). Total public equity is estimated as the total face value of common stock and preferred stock, including capital surplus, as reported by UK PNFCs covered by the Thomson Reuters Worldscope database in fiscal year 2010.
(b) Includes foreign currency issuance.

A public corporate bond is similar to a bank loan: the issuing company promises investors regular interest payments in addition to payment of the principal at maturity. But bonds typically have a longer maturity than bank loans. Corporate bonds might be secured on physical or financial assets, though only a small fraction of UK PNFCs' bonds are secured.(3)

Common public equity gives investors a residual claim to a company's assets in the case of liquidation. Due to this claim, shareholders are considered to be the owners of the company. Holding equity also grants investors voting rights, allowing them to participate in corporate governance decisions and to

(1) The banking system retains a key role in public capital markets. Investment banks typically support companies' public issues by underwriting them, advertising and distributing them to investors. And they are often the main market makers in the secondary market, where already issued public debt and equity are traded.
(2) See the surveys in Hart (2001) and Myers (2001), as well as Tirole (2005), Chapters 13–15.
(3) Medium-term notes are another type of public debt, less common in the United Kingdom. Unlike bonds, they are offered on a recurring basis by the company, often with a menu of maturities and rates from which investors can choose.

benefit from dividend payments.[1] As of 2010, UK PNFCs had an estimated £346 billion public equity outstanding.

UK companies issue public debt and equity in a range of currencies. While public equity issues are mostly denominated in sterling, the denomination of bonds is evenly spread between sterling, US dollar and euro — with very little issuance in other currencies. Foreign currency issuance allows companies to access a wider investor base, and enables those with international operations to better match the currency exposure of their liabilities with their revenues (see O'Connor, Wackett and Zammit (2011)).

Trade-off between public and private external finance

Public claims differ from their private counterparts in an important aspect: their ownership and the associated risks tend to be diffuse, because they are offered to investors in general, and are easily transferable among them. This wide investor base might include agents who, compared with private claim owners, have less incentive to monitor the issuing company, or may be less expert in doing so.[2]

Diffuse and less-informed public investors might therefore monitor a company's state and future opportunities less intensively, and exert less influence over management's actions, than private investors.[3] Monitoring is sometimes delegated to credit rating agencies or research firms, which provide periodic assessments of companies' creditworthiness.

The process of issuing public bonds and equity tends to be costly. Given the diffuse nature of public investors, and regulatory requirements, a company bears a higher cost to disclose information in public issues than in private deals. And it must pay fees to investment banks for their support in the issuance process. Disclosure and placement costs can be substantial: total fees for the UK PNFC bond issues recorded by Dealogic on average exceed £3 million, or 1% of the amount issued.

A company's choice between private and public external finance is driven by the price that different investors offer to buy the company's claims, but also by non-price considerations. Using public capital markets presents various benefits to a company:

- **Availability of funds**. Public debt or equity issues provide access to a wide pool of investors, allowing the company to finance projects that might be too big for any single investor. For example, the median bond issue in the data set is almost twice as large as the median long-term bank loan.

- **Market-based valuation**. Already issued public claims are often actively traded between investors. A company's equity or bond price in the secondary market can be a timely measure of how investors assess the company's prospects. Such measures can be used to decide when to raise new external finance, or to link managers' compensation to an objective benchmark.

- **Management discretion**. Typically, public financing contracts constrain management less than private ones. For example, public equity claims only grant investors general voting rights, while private equity deals often include provisions to withdraw financing and demote managers if stringent conditions are not met.

On the other hand, reliance on public external finance carries costs and can expose a company to risks:

- **Cost of financial distress**. If a company is experiencing financial distress, numerous and dispersed public stakeholders might struggle to co-ordinate on a restructuring plan, and potentially lead the company to bankruptcy,[4] while it might be easier to renegotiate financing bilaterally.

- **Contagion in funding markets**. Less-informed public investors might value equity and bonds based on indirect information, such as wider market conditions, more than private investors. Therefore in periods of market stress a company might be denied financing, irrespective of its actual investment opportunities.

- **Looser management discipline**. If public investors exercise less control over a company's projects, the management might reduce effort and extract private benefits.

The ability to access both public and private external finance provides an important source of flexibility. It ensures that a company can tailor financing to its projects, for example by using flexible bank credit lines to finance working capital and trade; and longer-maturity public bonds for capital expenditures, and research and development. Furthermore, a company can respond to negative supply shocks in one financing market by switching to another. In the data set constructed at the Bank (see footnote (3) on page 319), more than 75% of companies continue to borrow from banks after their first public debt or equity issue.

(1) Companies can also issue preferred equity shares, which might guarantee the investor a fixed periodic payment, but usually carry no voting rights.
(2) For example, unlike banks, institutional investors might not have staff who regularly monitor companies' performance. Consistent with this, they typically acquire relatively small debt or equity stakes in the companies, implying that the costs associated with intensive monitoring are not justifiable.
(3) See Emerick and White (1992). Diamond (1991), Holmstrom and Tirole (1997) and Bolton and Freixas (2000) explore the effect of asymmetric information between investors on companies' financing patterns within theoretical settings.
(4) International empirical evidence in Hoshi, Kashyap and Sharfstein (1990) and Asquith, Gertner and Sharfstein (1994) suggests that distressed public debt is more likely to lead to bankruptcy than distressed on private debt.

Issuers of public external finance in the United Kingdom

Importance of public external finance for the UK economy

Only a relatively small number of UK companies use public capital markets. Fewer than 1,300 of the almost 1.2 million UK private sector enterprises are financed by public equity or bonds, with fewer companies issuing corporate bonds than issuing public equity (**Table B**).(1)

Table B Number of UK PNFCs issuing public external finance and their employment

	Number	UK employment (millions)(a)
Total UK PNFCs(b)(c)	**1.2 million**	**22.5**
Public external finance issuers	**1,257 (0.1%)**	**3.7 (16%)**
of which:		
Issuing equity and bonds	*141*	*2.2*
Issuing only equity	*1,000*	*1.0*
Issuing only bonds	*116*	*0.5*

Sources: Company accounts data, Dealogic, Department for Business, Innovation and Skills *Business Population Estimates 2010*, London Stock Exchange, Plus Markets, Thomson Reuters Datastream and Bank calculations.

(a) Private sector employment data estimated on a best-efforts basis, using 2010 annual report data where available. Where UK employment data was not directly available, it is estimated by scaling total employment by the share of companies' UK assets relative to total assets.
(b) Total number of UK enterprises in the private sector employing at least one member of staff, excluding financial and insurance companies.
(c) Total employment of UK enterprises in the private sector, excluding financial and insurance companies.

Despite their small number, companies that raise public external finance account for a large share of economic activity in the United Kingdom. Information from companies' annual reports suggests that they employ approximately 3.7 million people in the United Kingdom — around one sixth of total private sector employment. Total employment by corporate bond issuers is much larger than equity-only issuers, reflecting the larger average size of bond issuers.

The proportion of total investment accounted for by these companies is likely to be even higher, because large companies tend to be more capital-intensive than small ones. A crude estimate suggests that public equity issuers alone invested almost £30 billion in 2007, accounting for around 47% of total UK domestic investment.(2)

The importance of public external finance for the UK economy may be understated by focusing on domestic bond and equity issuers. First, many foreign-owned companies that use public external finance have a material economic presence in the United Kingdom. Second, small UK companies that transact with larger UK public bond and equity issuers may benefit from the extension of supply-chain finance from these large trading partners.

Companies in different countries rely on public external finance to different degrees. UK companies as a whole are less reliant on public bond and equity — and more on bank lending — than the US corporate sector. For example, bank loans account for more than 65% of UK corporate debt (**Table A**), compared to less than 25% in the United States. By contrast, public external finance plays a smaller role in the euro area, where bank loans account for around 75% of corporate debt.

Characteristics of public debt and equity issuers

The fact that only a small number of UK PNFCs raise funds from public capital markets suggests that the disadvantages outweigh the benefits for many. Understanding the factors affecting companies' ability and willingness to use public equity and debt is not straightforward, however. Non-public companies have less stringent reporting requirements, so that comparable data before and after a company issues public debt or equity cannot in general be observed. Although all companies in the data set constructed by the Bank have issued public equity, those that do and do not issue bonds can be compared in order to highlight their different characteristics.

The size of a company appears to be a key factor associated with use of public bonds. 90% of bond issues recorded in our database are larger than £60 million, and 90% of issuers employ more than 2,500 staff. The importance of size may suggest that the large fixed costs associated with issuing public bonds make it infeasible for companies with small borrowing requirements. Or that investors prefer large issue sizes, as these are more likely to be traded in a liquid secondary market. The Bank's market intelligence suggests that bond issues smaller than £250 million are rarely traded in the secondary market.

Furthermore, companies that issue public bonds tend to be older than companies that do not, perhaps because less-expert public investors are reassured by a longer track record (**Chart 2**). They tend to have a higher proportion of tangible assets that creditors can easily realise in case of bankruptcy. And, although they are typically as profitable as non-issuers, their return on assets is less volatile, making them easier to monitor. Companies such as energy and communications providers, with a large proportion of fixed assets (such as network infrastructure) and predictable revenues, represent a large share of the UK corporate bond market — accounting for a quarter of all corporate bond issues since 1995.

In addition to size and the other characteristics above, a company's reputation is important in facilitating access to the public bond market. As the econometric analysis in the box on page 323 shows, having a credit rating — an external assessment of the creditworthiness of the borrower —

(1) Which employ at least one member of staff.
(2) Estimated as the total capital expenditure of companies with public equity listed in the United Kingdom, scaled by the average share of domestic sales (as reported in their financial statements).

Graduating to the public bond market(1)

The UK public corporate bond market is predominantly used by very large companies. On the other hand, 5% of first-time bond issuers in the data set constructed at the Bank (see footnote (3) on page 319) were medium-sized companies with fewer than 500 employees, suggesting that, to some extent, company size is not a rigid barrier to entry into the bond market.

This box explores how various characteristics of a UK company affect its probability of becoming a public bond issuer. Some characteristics might accelerate the run-up to its first bond issue, while others might slow it. In addition to size, this experiment focuses on various characteristics. First, whether the company borrowed via a syndicated loan prior to the first bond issue (as in the US study by Hale and Santos (2008)). Second, on whether the company obtained a credit rating prior to its first issue. Syndicated loans and credit ratings could reduce the information costs borne by less-informed public investors. Proxies for the company's profitability and riskiness (return on assets, Tobin's Q and leverage), and for the ease of monitoring (the proportion of tangible and liquid assets on the balance sheet) are included as control variables.

To test how each characteristic affects the timing of a company's first bond issue, a variant of the Cox survival model is used:

$$p(t) = p(0)\exp\{X_{it}\beta\}$$

where the dependent variable $p(t)$ is the probability of a first bond issue in year t.(2) And the explanatory variables in X_{it} are the characteristics described above. $p(0)$ represents a baseline probability estimated non-parametrically from the data.

The estimated model suggests that, as expected, size is important: as a company grows by US$10 billion, the probability of a first bond issue will roughly double (**Table 1**). But bank relationships and credit ratings appear to be even more important. A syndicated loan increases the probability of a first-time bond issue by more than 20 times, and a credit rating increases it by 9 times.

To compare the relative importance of size and reputation (as represented by syndicated loans and credit ratings) curves indicating companies' estimated probability of issuing the first bond at each point in time can be plotted. For example, **Chart A** compares these curves for the average company in the sample and one ten times as large (total assets of around US$500 million and US$5 billion, respectively). **Chart B** compares curves for the average company and one of equal size, but with a credit rating. The gap between the two curves is higher in **Chart B**, indicating that a rating boosts the probability of a company issuing bonds more than an increase in size of that order.

Table 1 Probability of issuing the first corporate bond(a)

Dependent variable: probability of issuing the first bond in year *t*		
Size (total assets)	1.05 ***	1.05 ***
Tangible assets	6.3 ***	4.7 ***
Liquid assets	0.1	0.1 *
Leverage	14.4 ***	17.7 ***
Return on assets	7.1 ***	7.4 ***
Tobin's Q	1.2 **	1.2 **
Company used a syndicated loan	26.7 ***	–
Company has a credit rating	–	9.4 ***
Observations	**21,545**	**21,545**
Chi-squared	**124.03**	**89.55**

(a) The table displays the proportional change in the dependent variable following a one-unit increase in the explanatory variables. For example, if size increases by one unit, the probability of issuing the first bond increases from *P*% to (1.05 x *P*)%. *, **, *** indicate that the effect is statistically significant at the 10%, 5%, and 1% level, respectively.

Chart A Probability of issuing the first bond: effect of company size

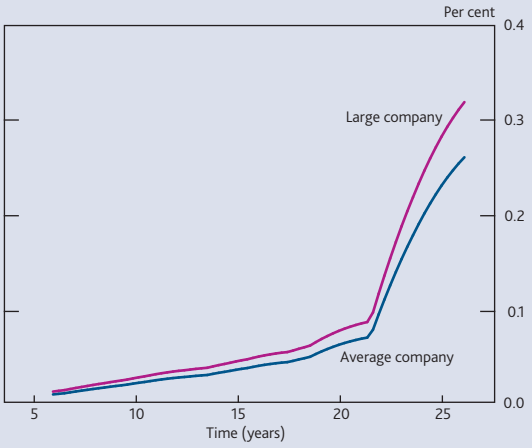
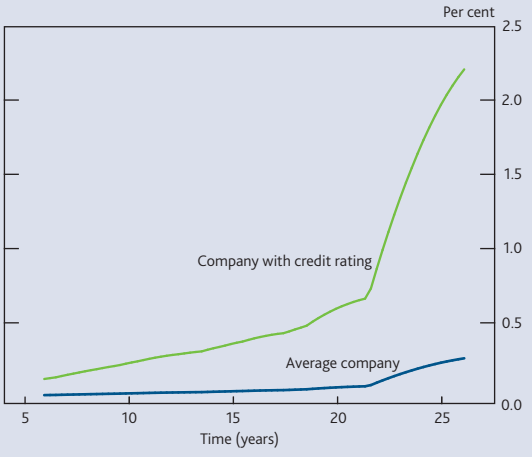
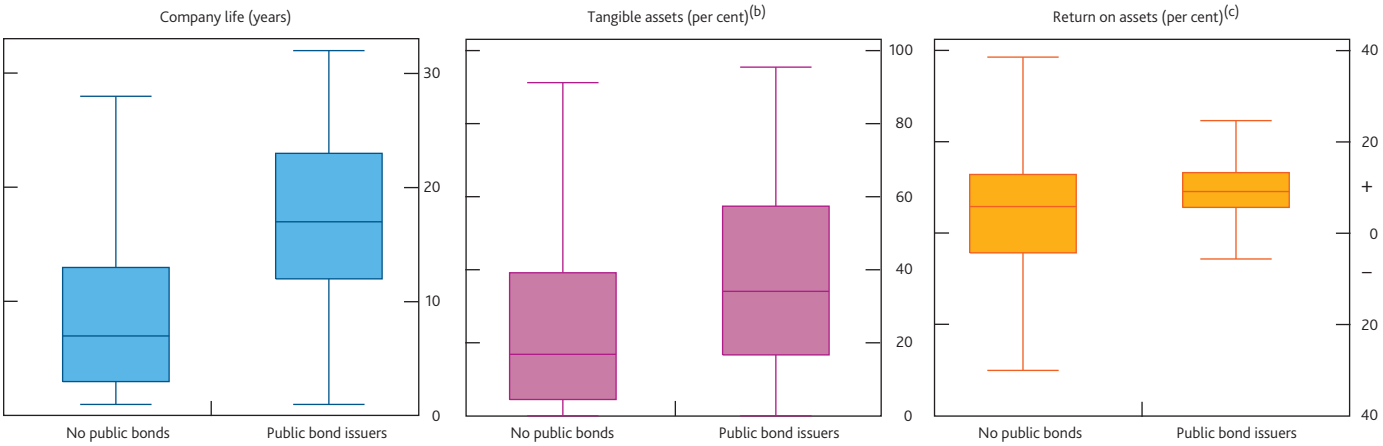


Chart B Probability of issuing the first bond: effect of credit rating



(1) This box is based on work carried out by Jiaqian Chen.
(2) In this test, time is measured as the number of years for which a company has reported financial statements included in the Thomson Reuters Worldscope database.

Chart 2 Characteristics of UK companies that do and do not issue public corporate bonds[a]



Sources: Dealogic, Thomson Reuters Datastream and Bank calculations.

(a) For each variable and each grouping, the box contains the interquartile range of the variable distribution; the horizontal line in the box denotes the median; and the vertical stalks extend between the minimum and the maximum of the same distribution.
(b) Ratio between the book value of tangible assets and total assets as reported in companies' financial statements.
(c) Ratio between operating income and previous fiscal year total assets as reported in companies' financial statements.

dramatically increases companies' likelihood of issuing their first bond. Existing banking relationships also appear to matter. UK companies that have previously issued syndicated loans appear, other things equal, more likely to issue bonds.(1) Prior relationships with investment banks may make it easier for companies to arrange a bond issue, or increase investor awareness about the company.

The results suggest that, by actively seeking to issue a syndicated loan, or to obtain a credit rating, some companies could reduce the cost of issuing public bonds. Since syndicated loans and credit ratings are accessible by companies smaller than the typical UK bond issuer (for example, the average syndicated loan issuer in the database has around one third of the assets of the average bond issuer), increased use of both could raise the number of companies able to issue bonds. Indeed, in the United States, where PNFCs appear to use syndicated loans more than in the United Kingdom,(2) use of public bonds is also more widespread, including among smaller companies.

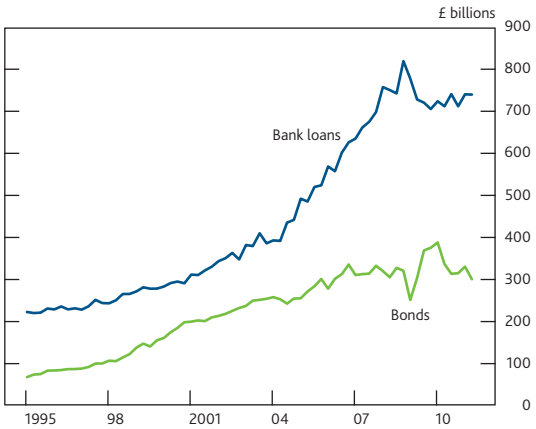
While such reputational factors might offer a 'fast track' to public capital markets for already large companies, they are unlikely to be a shortcut to public markets for most UK small and medium enterprises.

Use of public external finance between 2008 and 2011

This section focuses on how UK companies used public capital markets between 2008 and 2011, highlighting a number of conjunctural and structural factors affecting their financing decisions. The use of corporate bond and equity markets are investigated in turn, before assessing the implications of these issuance patterns for companies' spending decisions.

The financial crisis that started in 2007 was accompanied by a contraction in bank lending to UK non-financial companies. This ended a decade of rapid growth in the provision of bank credit relative to non-bank credit (**Chart 3**). The banking sector became significantly less able to extend new credit to UK companies. And, as the economic outlook deteriorated, companies reduced their demand for credit while scaling back operations and investment plans.(3)

Chart 3 UK PNFC stock of bank loans and corporate bonds



Source: Thomson Reuters Datastream.

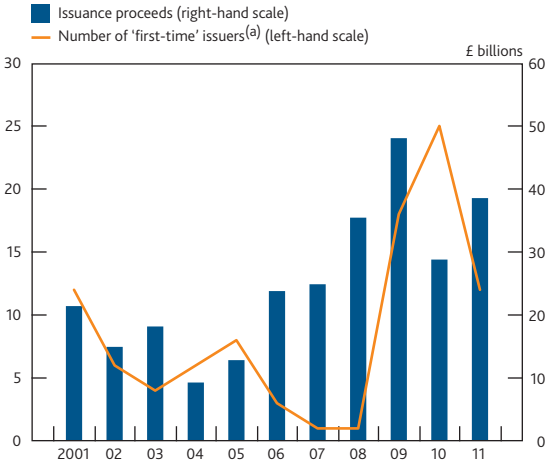
(1) In a syndicated loan, a company borrows from a group of banks, which often includes investment banks. Hale and Santos (2008) document a similar effect for companies in the United States.
(2) According to a crude estimate based on Bloomberg data and national statistics, syndicated loans account for 55% of total PNFC credit in the United States, compared with 20% in the United Kingdom.
(3) See Bell and Young (2010) for a more detailed discussion of the contraction in bank lending in the United Kingdom, and the relative importance of supply and demand factors. Ivashina and Sharfstein (2010) argue that the fall in new bank lending to US companies in 2008 was primarily a consequence of the liquidity crisis hitting the banking sector.

By contrast, corporate bond and equity issuance increased sharply, despite volatile conditions in secondary markets. The impact of secondary market conditions on primary issuance — discussed in the box on page 326 — prompted the Bank to intervene in the sterling corporate bond secondary market.

Use of corporate bonds

There was a large increase in corporate bond issuance by UK companies in 2008 and 2009. UK PNFCs issued on average £42 billion of bonds per annum in 2008 and 2009, compared with £17 billion per annum between 2002 and 2007 (**Chart 4**).

Chart 4 UK PNFC corporate bond issuance[a]



Sources: Dealogic and Bank calculations.

(a) Issuance of a bond by a unique UK PNFC parent company for the first time.

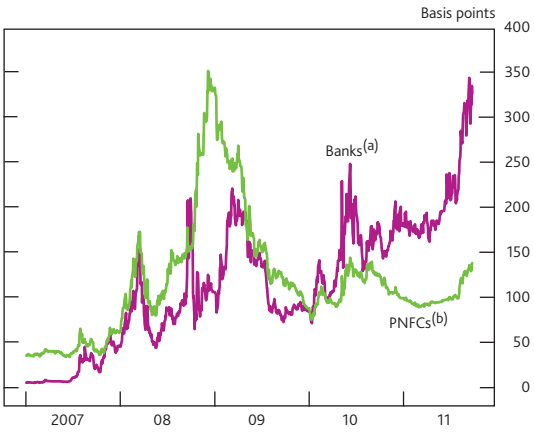
Much of this new issuance came from companies that had previously issued bonds, and was used to replace bank loans. The reduced availability of bank lending, and its increasing cost relative to reference rates such as three-month Libor, particularly for loans at longer maturities, encouraged companies to raise funds from the corporate bond market as a substitute for loans. Substitution between loans and bonds is not unique to the recent UK experience. Econometric evidence suggests that similar trends were also observed in both the United States and the United Kingdom during previous episodes of banking sector stress.(1)

While issuance in 2008 was almost entirely accounted for by companies that had previously accessed the bond market, the number of first-time bond issuers rose sharply in 2009 (**Chart 4**). These new issuers tended to be smaller and lower rated than existing bond issuers. A major use of bond finance by these new issuers was to raise funds to repay maturing bank loans. The Bank's market intelligence contacts reported that, in some cases, a bank helped arrange corporate bond issues which companies used to repay outstanding loans at the same bank.

UK PNFC bond issuance subsequently declined in 2010 as a result of three factors. First, the need to replace maturing bank debt had dissipated following UK companies' actions during 2009. Moreover, as suggested by the Bank's *Credit Conditions Survey* and the *Deloitte CFO Survey*,(2) the availability of bank loans improved for some larger companies, albeit only modestly. Finally, demand for new external finance may have remained muted for some large companies because their stock of internal funds — in the form of cash and other short-term assets — had risen over this period. The number of companies accessing bond markets for the first time remained high in 2010, however. Contacts said this reflected, at least in part, the protracted lags in the process of first-time issuance.

Bond issuance since 2010 may also have been supported by investors' perceptions that UK PNFCs had become less risky relative to UK banks. Indeed, credit default swap (CDS) premia — which indicate the cost of insuring against credit events such as default, and serve as signal of the marginal cost of funding — have been lower for a number of UK PNFCs than for major UK banks since 2010 (**Chart 5**).(3) This suggests that it may have become cheaper for some large companies to raise public external finance rather than borrow from banks.

Chart 5 Five-year CDS premia for UK banks and non-financial companies



Sources: Markit Group Limited, Thomson Reuters Datastream and Bank calculations.

(a) Median value of Barclays, HSBC, Lloyds Banking Group, Royal Bank of Scotland and Santander UK CDS premia.
(b) Sample median of 56 UK PNFCs for whom daily CDS data are available for the entire sample period.

Use of public equity

There was also a sustained increase in public equity issued by UK companies in 2008 and 2009 (**Chart 6**). This was almost entirely driven by companies that had previously raised equity, rather than first-time equity issuers.

UK PNFCs primarily issued equity in order to reduce leverage rather than finance new projects. This is consistent with chief

(1) See Becker and Ivashina (2011) and Bell and Young (2010), page 318.
(2) CFO views as reported in the *Deloitte CFO Survey*, available at www.deloitte.com/view/en_GB/uk/research-and-intelligence/deloitte-research-uk/the-deloitte-cfo-survey/index.htm.
(3) See the box entitled 'The marginal funding cost: transfer pricing' on pages 174–75 in Button, Pezzini and Rossiter (2010).

Secondary market conditions and primary issuance in 2008 and 2009

This box focuses on the impact of secondary market conditions on public bond and equity issuance by UK PNFCs in 2008 and 2009.

Corporate bond markets

At the height of the crisis in late 2008, the issuance of bonds by UK companies was hindered by the impaired functioning of the secondary market. Many banks were less willing to act as secondary market makers due to the heightened costs of funding their inventories of corporate bonds. As investors demanded additional compensation for the illiquidity of corporate bonds, the costs of issuing new debt for companies rose.

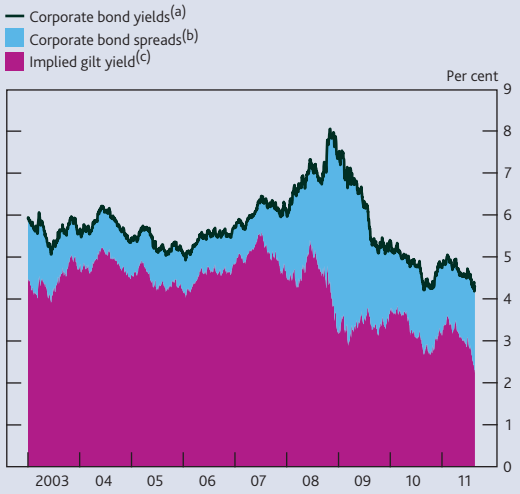
The Bank's Corporate Bond Secondary Market Scheme — part of the Asset Purchase Facility — sought to mitigate this problem. By offering to make regular small purchases — and subsequently sales — of a wide range of high-quality sterling-denominated corporate bonds, the Scheme aimed to facilitate secondary market activity. In doing so, it helped remove one of the obstacles that limited companies' access to capital markets.(1)

The sharp falls in corporate bond yields during 2009 provided an additional incentive for companies to issue bonds. The decline was driven by both a decline in the spread between corporate bond yields and gilts, which had previously risen sharply at the peak of the financial crisis, and a fall in gilt yields (**Chart A**). The decline in gilt yields reflected the fall in both the actual and expected future level of Bank Rate, as well as reductions in risk premia. In March 2009, the Monetary Policy Committee initiated its programme of asset purchases (so-called 'quantitative easing'), which is estimated to have been a significant factor in lowering gilt yields, and may in turn have increased corporate bond issuance.(2)

Equity markets

Elevated price volatility in the secondary equity market increased the cost of issuing new equity for UK companies in early 2009. One measure of the cost of new equity capital, which would not be reflected in the existing price of a company's share price, is the discount companies concede on new shares in order to ensure successful issuance. These discounts rose sharply during 2009 (**Chart B**) for two reasons. First, elevated expected equity price volatility meant that larger discounts were required to insure against falls in a company's share price that could jeopardise its capital issuance. And second, banks were less willing to underwrite equity issuance, and so required companies to significantly discount their issuance to ensure they were successful.

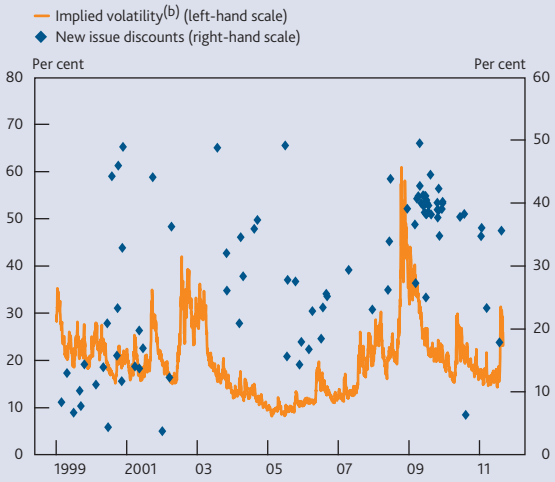
Chart A A decomposition of sterling corporate bond yields



Sources: Bank of America/Merrill Lynch and Bank calculations.

(a) Sterling corporate investment-grade industrials yield to maturity.
(b) Sterling corporate industrial option-adjusted spread over equivalent-maturity government bonds.
(c) Gilt yield calculated as the difference between corporate bond yields and spreads.

Chart B New issue discounts on UK PNFC follow-on equity issues by UK PNFCs(a)

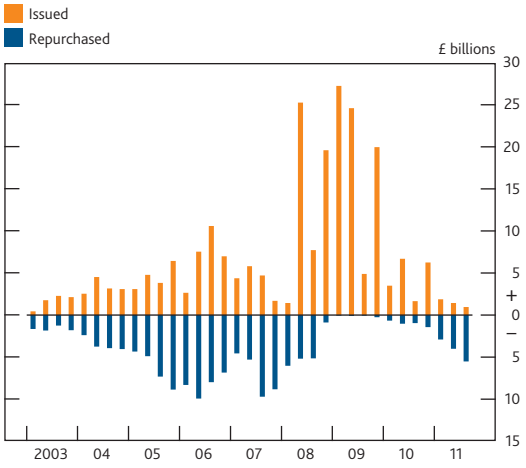


Sources: Dealogic and Bank calculations.

(a) Rights issues smaller than £50 million are excluded for clarity.
(b) Implied volatility is the three-month at-the-money implied volatility for the FTSE 100.

(1) More details about the Bank's Asset Purchase Facility can be found at www.bankofengland.co.uk/markets/apf/index.htm.
(2) A more-detailed discussion of the impact of quantitative easing can be found in Joyce, Tong and Woods (2011).

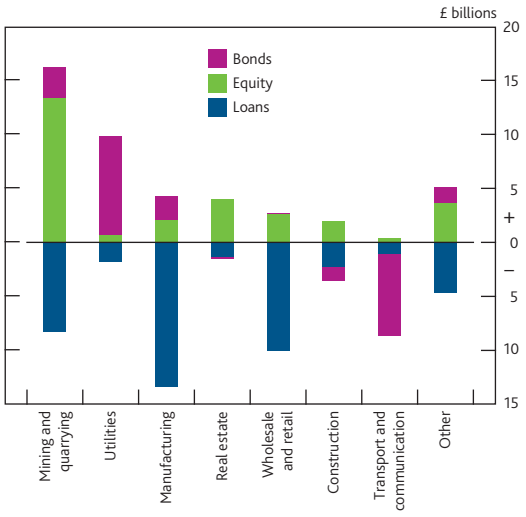
Chart 6 Equity issuance and repurchases by UK private non-financial companies(a)



(a) Quarterly gross repayments and issues of all currency shares in sterling, non seasonally adjusted.

financial officers' (CFOs') perceptions that pre-crisis leverage levels in their companies were too high, and that the economic environment had deteriorated.(1) Market intelligence and sectoral data suggest that proceeds from equity issuance were used to pay down outstanding bank loans. And many UK companies operating in the real estate sector raised further equity in the face of unprecedented sharp falls in commercial and residential real estate values to ease pressure on their balance sheets (**Chart 7**).(2)

Chart 7 Analysis of net funds raised by UK businesses in 2009 by industrial sector(a)



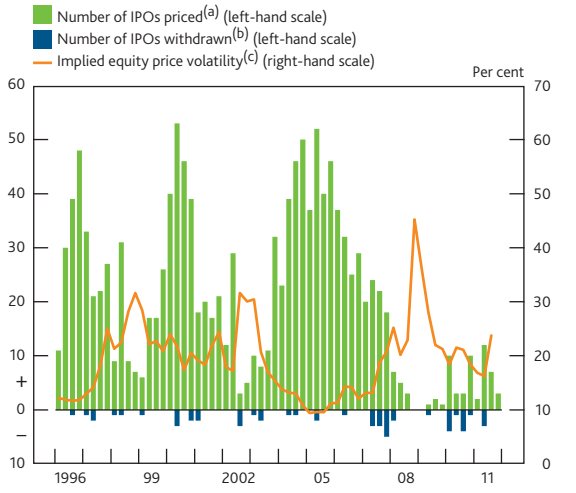
(a) Funds raised by PNFCs from UK monetary financial institutions and capital markets. Data cover lending in both sterling and foreign currency, expressed in sterling terms. Loans are seasonally adjusted. Bond and equity issuance are non seasonally adjusted. Commercial paper is included within bonds.

In addition to issuing new equity, some large UK PNFCs temporarily suspended their share repurchase programmes — a way of returning cash to shareholders by buying back outstanding equity — during 2008 and 2009 (**Chart 6**). Contacts suggested that they often did so in order to retain cash at a time when availability of external finance had become more uncertain.

Equity issuance declined in 2010 and 2011, and a greater proportion of proceeds were used to finance new projects, as the desire for companies to deleverage waned. Indeed, UK CFOs viewed balance sheets as appropriately leveraged by the third quarter of 2010, having been overleveraged during 2009. And company announcements and market intelligence suggest that a larger share of proceeds was used for investment and expansion purposes, particularly in the utilities and mining sector.

In stark contrast with the corporate bond market, first-time equity issuance by UK companies — or initial public offerings (IPOs) — all but disappeared during 2008 and 2009. There were no IPOs conducted by UK PNFCs between October 2008 and June 2009, similar to previous episodes of high equity market volatility (**Chart 8**). According to the Bank's market contacts, the reduction in IPOs reflected a fall in both demand for and supply of equity. Fewer companies were looking to float their shares on the stock market. And investors were reportedly less willing to invest in shares of smaller, newer companies relative to larger, more-established companies.

Chart 8 Quarterly initial public offerings by UK PNFCs



Sources: Dealogic and Bank calculations.

(a) IPOs which were announced and subsequently priced.
(b) IPOs which were announced and subsequently withdrawn from the market.
(c) Quarterly average of three-month at-the-money option implied volatility for the FTSE 100.

First-time equity issuance remained low in 2010 and 2011. This can, in part, be explained by a persistent lack of demand for external equity finance from companies, as the global economic outlook remained highly uncertain. But market contacts suggest that supply-side factors also mattered. A

(1) CFO views as reported in the *Deloitte CFO Survey*, available at www.deloitte.com/view/en_GB/uk/research-and-intelligence/deloitte-research-uk/the-deloitte-cfo-survey/index.htm.
(2) See the box entitled 'Capital market issuance and bank lending' on pages 6–7 of the December 2009 *Trends in Lending*, available at www.bankofengland.co.uk/publications/other/monetary/TrendsDecember09.pdf.

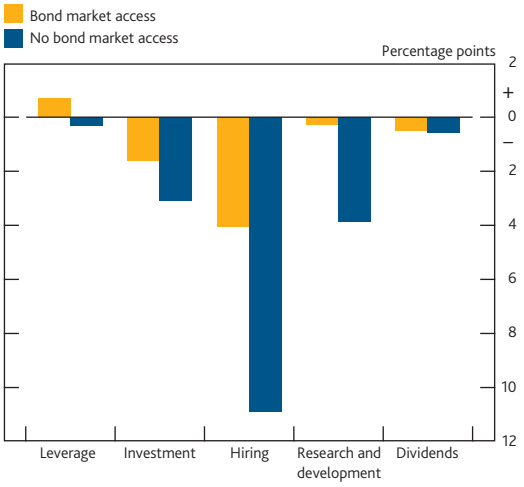
relatively high proportion of companies that did attempt to raise equity via IPOs failed to do so, and had to withdraw from the issuance process (**Chart 8**), perhaps dissuading other companies from attempting to raise finance via the equity market. These failed IPOs were, in part, a result of structural features in the primary issuance process that reduced the likelihood of an IPO being successful during periods of heightened market volatility.(1)

Implications for PNFC spending decisions

Public debt and equity issuance patterns are informative of the financial constraints faced by UK companies during the financial crisis. These patterns suggest, in particular, that some companies with investment opportunities might have been constrained by the contraction in bank lending; and that leverage became more costly compared to the run-up to the crisis. But understanding how access to public external finance affected UK companies' spending decisions, such as investment and hiring, is difficult because there is less information available about private firms to compare against.

Comparing the behaviour of UK companies with and without access to the public bond market, however, suggests that the ability to access non-bank finance may have had a positive impact on spending decisions between 2008 and 2011. On average, leverage increased for companies with bond market access, while it fell for companies without. This suggests that some of the deleveraging by bank-reliant companies was driven by the contraction in bank lending. Furthermore, companies with bond market access reduced their investment, hiring rates, and research and development spending by less than companies without access to bond markets (**Chart 9**), compared to pre-crisis levels. These findings are robust to considering pre-crisis differences in the variability of investment, hiring, and research and development spending between the two groups.

Chart 9 Financing and spending of UK PNFCs, difference between post and pre-crisis averages(a)



Sources: Dealogic, Thomson Reuters and Bank calculations.

(a) The sample includes 104 companies with bond market access and 1,616 without. All variables are measured at book value. Leverage is the ratio of total debt to total assets; investment and research and development spending and dividends are divided by total assets; hiring is the annual percentage change in employees. For each variable, the bar shows the difference between the 2000–07 and the 2008–10 averages across groups.

UK companies' ability to access public equity markets might also have positively affected their spending decisions during the crisis. Companies who were able to de-lever by issuing new equity might have paid more dividends to shareholders, or might have had to sell fewer assets, than companies unable to do so. Although all companies in the data set have access to public equity, those that issued new equity during the crisis cut leverage more drastically than companies that did not, compared with pre-crisis levels.

This evidence suggests that UK companies that were able to access alternative sources of external finance to bank lending adjusted both financing and spending behaviour less sharply during the crisis.(2)

Conclusions

Public capital markets play an important role in the UK economy. Even though only a small fraction of UK companies issue public debt or equity as a form of external finance, those that do account for a relatively large share of economic activity, including domestic employment and investment.

Furthermore, evidence suggests that access to public capital markets allowed some companies to dampen the impact of the recent financial crisis, particularly the sharp reduction in the supply of bank credit. Corporate bond issuance enabled companies to switch away from bank loans. And equity issuance also allowed companies to reduce their leverage. In the absence of external sources of non-bank finance, the evidence suggests that the spending decisions of companies might have been more dramatically affected, with potentially sharper cuts in employment and investment.

Access to public capital markets is no panacea, however. Public external finance cannot substitute many of the relationship aspects of lending via bank loans, and may be unsuitable for some companies — particularly small or high-risk companies who have a high likelihood of needing to re-negotiate with their lenders. Companies that are overly reliant on public external finance could also be vulnerable to volatility in secondary markets, which may restrict capital market access irrespective of their investment opportunities.

(1) A number of these features — such as large IPO syndicates, the time lag between publicising and completing an IPO, and the process of frequently updating investors during the pricing process — are discussed in the 2011 Q1 *Quarterly Bulletin*, pages 15–16, available at www.bankofengland.co.uk/publications/quarterlybulletin/qb1101.pdf, and a recent London Stock Exchange report 'Leadership in a changing global economy: the future of London's IPO market', available at www.londonstockexchange.com/about-the-exchange/media-relations/reports/ipo-report2011.pdf.

(2) The evidence on UK PNFCs in the data set is consistent with results in Campello, Graham and Harvey (2010), which explores international survey evidence on financial constraints and corporate spending during the crisis.

Broadening access to public capital markets may reduce the impact of tight bank credit supply on real activity in the United Kingdom. Although a number of UK companies have issued bonds for the first time since 2009, many smaller companies may have been unable to use alternative sources of finance from outside the banking system. In part recognising this, the Government has established an industry working group to explore how to develop access to non-bank lending channels further, including forms of bond issuance, for SMEs and mid-sized businesses.(1)

Central banks can also play a role in maintaining orderly financial markets to support issuance of public debt or equity. For example, the Bank of England has intervened in the sterling corporate bond market since 2009 as part of its Asset Purchase Facility operations.

(1) See page 41 of HM Treasury's 2011 Autumn Statement, available at http://cdn.hm-treasury.gov.uk/autumn_statement.pdf.

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Trading models and liquidity provision in OTC derivatives markets

By Nick Smyth of the Bank's Foreign Exchange Division and Anne Wetherilt of the Bank's Payments and Infrastructure Division.[1]

As part of a G20 commitment to improve transparency and mitigate systemic risk in derivatives markets, many OTC derivatives will be required to be traded on exchanges or electronic platforms by the end of 2012. It is important that liquidity on the new trading platforms is resilient, both during normal and stressed market conditions. This article discusses how liquidity is provided in different trading models and how liquidity resilience can be achieved. The article shows that liquidity provision depends on many factors, including the willingness of dealers to provide continuous prices, their ability to manage the inventory risk arising from their role as market makers, and the ability of customers to execute large or sensitive trades with minimum price impact. The article also suggests that conceptually, liquidity resilience can be achieved in a variety of trading models.

Introduction

Derivative instruments, such as interest rate swaps and credit default swaps, are mainly traded in over-the-counter (OTC) markets, meaning dealers and clients trade bilaterally. As part of a G20 commitment to improve transparency and mitigate systemic risk in these markets, many OTC derivatives will be required to be traded on exchanges or electronic platforms by the end of 2012. It is important that liquidity on the new trading platforms is resilient, both during normal and stressed market conditions. This article explains how liquidity is provided in different trading models and how resilient liquidity provision is likely to be in stressed market conditions.

Derivatives play a key role in the financial system as hedging instruments, allowing businesses and financial institutions to reduce their risk exposures. Trading of derivatives creates a network of counterparty credit risk exposures between market participants. These interconnections also create fragilities in the system (Tucker (2011)).

Trading in OTC derivatives markets is facilitated by dealers at global banks who act as market makers and provide liquidity to end-users. In stressed market conditions, market participants may be inclined to scale back their trading, resulting in reduced liquidity, and consequently greater cost to end-users seeking to hedge risks.

Liquidity will be more resilient in a market where participants have confidence in their ability to manage counterparty exposures. And, if the network of exposures is well understood, both the risks to individual participants and the risk of system-wide contagion can be mitigated more effectively. The Bank's new Financial Policy Committee (FPC) is charged with identifying, monitoring and taking action to remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system.[2] Hence, the FPC has an interest in promoting the robustness of systemically important markets. Trading models are an important component of the infrastructure supporting those markets.

In January 2009, the G20 asked for substantial reforms to OTC derivatives markets in order to 'improve transparency, mitigate systemic risk, and protect against market abuse'. The G20 reform agenda requires standardised OTC derivatives to be cleared through central counterparties (CCPs) so they can benefit from consistent and transparent risk management. It calls for the establishment of trade repositories that will collect detailed transaction data, thus providing valuable information about both individual and aggregate exposures.

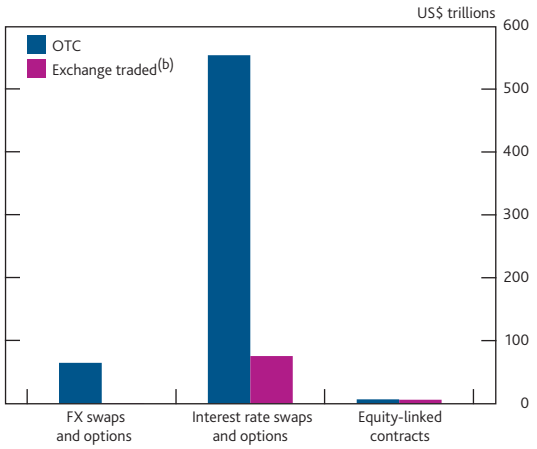
The G20 reform agenda also mandates that OTC derivatives be traded on exchanges or electronic trading platforms. In the United States, the trading requirement is being implemented as part of the Dodd-Frank Act, with the Commodity Futures

(1) The authors would like to thank Evangelos Benos and David Norcross for their help in producing this article.
(2) Record of the interim Financial Policy Committee meeting held on 20 September 2011, published 3 October 2011.

Trading Commission and the Securities and Exchange Commission in charge of rule making; in Europe it is part of the Markets in Financial Instruments Directive (MiFID) review led by the European Commission. The requirements will apply to the most actively traded instruments. Less actively traded derivatives may continue to be traded bilaterally.

Trading of OTC derivatives instruments currently relies on bilateral relationships between a relatively small group of dealers who act as liquidity providers for their customers. Transactions are often bespoke and may be of a very large size. Dealers may need time to offset the customer trades they take on.(1) Exchange-based trading of derivatives remains relatively low (**Chart 1**) and is limited to highly standardised futures and options contracts. Most OTC derivatives transactions are executed using so-called voice-based methods, either via the telephone or internet messaging. Electronic trading of OTC derivatives remains limited in its uptake, although it is growing rapidly.

Chart 1 Gross notional amount outstanding of OTC and exchange-traded derivatives by asset class(a)



Source: BIS.

(a) As at June 2011.
(b) Exchange-traded derivatives includes futures and options.

The remainder of this article is organised as follows. The second and third sections describe trading arrangements in OTC derivatives markets. The fourth section discusses how various trading models differ in terms of transparency, access, and ability to customise client trades. Drawing on the academic literature, it analyses whether these differences matter for liquidity and liquidity resilience, highlights where there are trade-offs, and describes the specific role of dealers. The final section concludes.

OTC derivatives markets: general features

Dealers and their clients

Traditionally, most derivatives have been traded over the counter, meaning that dealers and clients trade bilaterally. The OTC derivatives markets have evolved in this way because clients have historically wanted to trade bespoke products, that is derivatives that are tailored to the specific requirements of the client. For instance, a firm wanting to hedge the interest rate risk on a two-year loan that it is due to take out in six months' time, may want to use an interest rate swap specifically customised to these dates. Standardised products, such as interest rate futures, may not perfectly match the client's requirements, exposing them to residual interest rate risk that they are unprepared to take on. Similarly, an asset manager may want to hedge the interest rate risk associated with a specific bond they own, and may want to use an interest rate swap with the same maturity date and fixed-coupon rate.

As each client has their own unique hedging requirements, it is highly unlikely that two clients will want to trade the exact same derivatives contract with each other at the same time. So these dealers act as intermediaries, allowing clients with diverse requirements to trade in a timely fashion. Clients often have long-standing relationships with several dealers.

When trading with a client, the dealer takes on the other side of the client trade. The dealer may hold this position in his inventory until he finds a broadly offsetting trade with another client or with another dealer(s) in the interbank market, also referred to as the inter-dealer market. Here dealers trade with one another only.

Dealers often hedge their market risk on bespoke client trades with more liquid market-standard contracts. In the example above, the dealer might hedge the two-year interest rate swap starting in six months' time with a 'vanilla' two-year or three-year interest rate swap in the interbank market. This leaves the dealer with residual interest rate risk, which they are better placed to monitor and manage than their clients. In Europe, dealers also use Euribor futures contracts and German bund futures contracts to hedge client positions. These futures markets are highly liquid and allow dealers to hedge their interest rate risk quickly and at low cost. They are usually closely correlated with interest rate swaps. Because dealers have confidence they can hedge their interest rate risk in these futures markets, they are more willing to provide liquidity to clients in the swaps market.

Other factors affect the intermediation services that dealers provide to their clients, besides their ability to hedge in related markets. One factor is the competition for client business (see also the section on dealer competition). Dealers with a greater market share tend to earn more from trading, gain more information on trading flows (including from those clients who are perceived to have greater ability to forecast price movements), and have a greater ability to cross-sell or

(1) See for example Chen *et al* (2011).

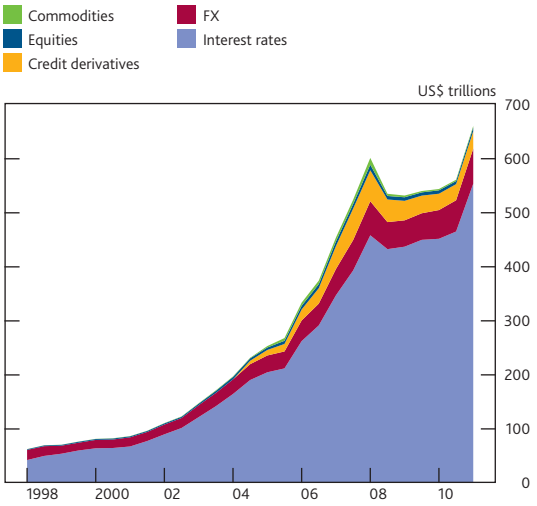
cross-subsidise different investment bank business (such as syndicated primary debt issuance).

Dealers' willingness to act as intermediaries also depends on the volatility of market prices and dealers' own risk appetite. Dealers accumulate positions by virtue of their trading with clients, and these positions fluctuate in value. In volatile markets, dealers tend to quote wider bid-ask spreads to protect themselves against the possibility that prices may move sharply after they trade with a client (but before they have had the chance to hedge).(1)

Size of the market

According to the Bank for International Settlements (BIS), the total notional amounts outstanding of OTC derivatives as of June 2011 was just over US$700 trillion, with interest rate swaps accounting for US$554 trillion, followed by FX swaps (US$65 trillion), credit default swaps (US$32 trillion), and equity and commodity derivatives (US$6.8 trillion and US$2.7 trillion, respectively) (**Chart 2**).(2) Average daily turnover in OTC interest rate derivatives was US$2.1 trillion in April 2010, with interest rate swaps accounting for US$1.3 trillion.(3)

Chart 2 Gross notional amounts outstanding of OTC derivatives(a)



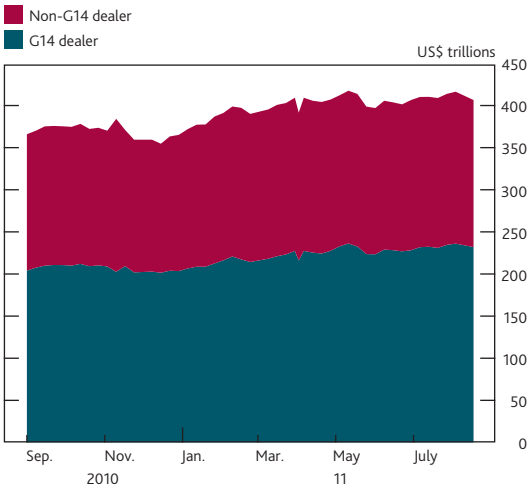
Source: BIS.

(a) As at June 2011.

Trading in OTC derivatives tends to be dominated by the large global dealers. As an example, **Chart 3** shows that interest rate swap transactions between the major OTC derivatives dealers (commonly referred to as the G14 dealers) make up around 57% of all outstanding contracts.

Competition among dealers is typically higher for the more liquid products; for less liquid, less actively traded contracts, dealer concentration tends to be higher and competition lower. This is illustrated in **Chart 4** which shows that as the number of credit default swap trades per day declines, the number of participating dealers also falls.

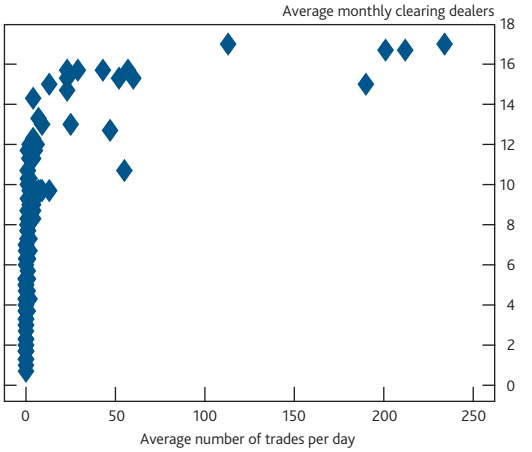
Chart 3 Gross notional amount outstanding by counterparty type(a)(b)



Source: TriOptima.

(a) G14 dealers are the group of fourteen international banks that have signed up to meet the Federal Reserve Bank of New York's regulatory commitments.
(b) CCP-cleared trades counted as G14 dealer trades.

Chart 4 Trading frequency of CDS index entities against average number of dealers(a)(b)



Source: DTCC Trade Information Warehouse.

(a) Each marker represents a single reference entity of index credit default swaps (CDS) plotted against the average number of dealers clearing the entity per month (y-axis) and the average number of trades per day (x-axis).
(b) From 20 December 2010 to 19 March 2011.

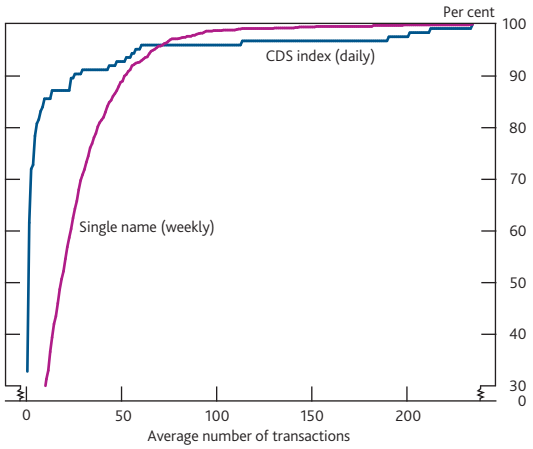
Finally, trading volumes in OTC derivatives are skewed, with only a few contracts attracting high trading volumes. As an illustration, **Chart 5** shows that just over 90% of all credit default index transactions trade fewer than 50 times a day, and just below 90% of all single-name credit default swaps trade less than 50 times a week.

How OTC derivatives are traded

Currently, OTC derivatives are mainly traded in so-called *quote-driven markets*. In these markets, dealers quote prices at

(1) The bid-ask spread, also referred to as the bid-offer spread, is defined as the difference between the prices at which the dealer is willing to buy and sell.
(2) The total amount outstanding of OTC derivatives also includes other unallocated contracts with a notional value of US$46 trillion as at June 2011.
(3) Numbers for daily turnover differ from the printed version of the *Bulletin*, which reported the incorrect numbers.

Chart 5 Cumulative distribution of average number of trades for CDS index[a] and single name[b][c]



Source: DTCC Trade Information Warehouse.

(a) Average daily transactions for 125 CDS index contracts.
(b) Average weekly transactions for 1,000 single-name CDS contracts.
(c) From 20 December 2010 to 19 March 2011.

which they would be willing to trade with their counterparts. A trade takes place when a counterparty (a customer or another dealer) contacts the quoting dealer and they both agree to the deal — often the quoted price is merely indicative and may be improved upon through bilateral negotiation. OTC derivatives share this market structure with foreign exchange, government and corporate bond, and structured product markets.

In contrast to OTC derivatives, most stocks and futures are traded in so-called *order-driven markets*. In these markets, orders are submitted to a central limit order book which lists all outstanding buy and sell orders. A trade is executed if it can be matched against an existing order in the book; if not, the order will join the list and wait for a new offsetting trade to arrive.[1] The two market structures overlap, however, with some government bonds trading in an order-driven environment, and many stock exchanges offering quote-driven segments, for example for less liquid, smaller-capitalisation stocks.

Historically, most trading of OTC derivatives has taken place via voice execution, which refers to both telephone and internet-based messaging. With the increase in electronic trading of other products (notably foreign exchange, equities and highly liquid government bonds), some OTC derivatives trading has started to gravitate towards electronic trading venues, some relying on quote-driven models, others on order-driven models. IOSCO (2011) estimates that in June 2010 around 12% of interest rate swaps and just below 17% of all credit default swaps were traded electronically.

The transformation mandated by the G20 has two dimensions — a technology dimension and a market structure dimension. The former involves automating aspects of the trading process. The latter involves changes in the trading model: whether to replace bilateral trading with multilateral trading and whether to choose a quote-driven or an order-driven model. These choices are facilitated by technology and are evident in the variety of trading models that are being developed.

The remainder of this section describes a variety of electronic trading models for OTC derivatives. Some are currently in use, others are still being developed. The discussion starts with a model that mimics many of the features of bilateral voice trading — the single-dealer platform — and ends with inter-dealer platforms that are very close to the central limit order book operated on exchanges.

What are the main trading models?

Single-dealer platforms (SDPs): These are proprietary electronic trading systems offered by individual dealers for trading with their clients. Dealers display firm buy and sell prices for various standard swap maturities which are tradable up to a certain trading volume. The client can trade by selecting the desired maturity shown on screen, whether they want to buy or sell, and the size of the trade. This is the 'click to trade' method of execution.

Clients may also use SDPs to trade bespoke interest rate swaps, ie those instruments that are not market standard and therefore not shown on screen. To do so, the client must key in the desired maturity dates, along with other customisable fields, and their intention to buy or sell. The client's enquiry is sent to the dealer who provides a price in response. This is the 'request for quote' (RFQ) method of execution: clients ask the dealer for a quote and can then choose whether or not to trade.

Operators of SDPs grant access to clients on request (and by the same token, can restrict access to select clients). As the name suggests, clients only see a single dealer's prices. Trading a swap via an SDP is similar in many ways to trading by voice, in that it represents a bilateral trade agreement between two participants that is not observed by the rest of the market. Hence, the SDP is an example of a quote-driven model. Dealers are also able to tailor the pricing they show to different customers.

A client with access to more than one SDP will need to contact each platform individually to find a suitable quote. Electronic solutions are being developed to reduce the resulting search costs. So-called aggregation tools allow clients to view the prices of all the dealers whose individual platforms they are allowed to access in an easy to use format.

Under proposed US and European regulations, SDPs in their current form may no longer be eligible to trade standardised

(1) There is a parallel with auction theory with the quote-driven model corresponding to a uniform-price auction, and the order-driven one to a discriminatory-price auction.

OTC derivatives. Instead, market participants may need to trade eligible instruments on multi-dealer trading platforms described next.

Multi-dealer request for quote (RFQ) model: These are systems that provide buy and sell prices to clients for various standard swap maturities. The user's screen looks similar to the single-dealer's screen, except that the prices are based on submissions from a number of contributor dealers. Trade volumes are also not shown and prices are not attributable to a certain dealer. Clients may send requests to several dealers for firm quotes and then select the most favourable price.

Like the single-dealer platform, the multi-dealer RFQ is an example of a quote-driven model. Existing multi-dealer RFQ systems allow customers to request a quote from only one dealer, if they do not wish to reveal their trading intentions too widely. This allows the customer to transact in a similar way to how they would on a single-dealer platform, although the customer retains the ability to trade with more than one dealer if they wish to.

Multi-dealer limit order book model: These systems allow dealers to post firm buy and sell limit orders at various standard swap maturities. Customers can trade if they find a suitable limit order in the book, but cannot enter limit orders themselves. The full depth of the book is visible, so customers can view all the limit orders at a point in time, not just the best bid and offer. Customers need permission from the respective dealers to access the platform. This model is still being developed for trading OTC derivatives. It is an example of an order-driven model, but as will be explained below, differs from the central limit order book model operated on exchanges.

Inter-dealer limit order book model: In the interbank market, a limit order book model, operated by interbank brokers, has emerged. Dealers provide continuous prices in the form of limit orders for standard swap maturities, and these form the basis of a centralised order book. Access to the electronic trading platform is limited to dealers only, so clients can neither post, nor trade on outstanding limit orders. As in the multi-dealer limit order book model described above, the full depth of the limit order book is visible, so dealers can view all outstanding limit orders. After trades are executed, the traded price is shown to all participants but not the volume traded. And unlike the multi-dealer limit order book model outlined above, orders displayed are anonymous. Another difference with the multi-dealer limit order book model is that the users of the system — exclusively dealers in this case — can both post limit orders to the limit order book and trade on existing orders.

At present, this inter-dealer limit order book complements voice trade execution offered by the interbank brokers, effectively creating a hybrid model. Dealers can submit their orders to the limit order book, trade via voice, or do both. Market participants note that smaller and more standardised inter-dealer trades are increasingly executed on limit order books, whereas larger or more bespoke trades continue to be done via voice. Indeed, a distinguishing feature of the inter-dealer market is the flexibility to trade large sizes bilaterally, away from the screens. These trades are known as 'block trades'. Regulators are currently debating where the block-trade threshold should be set for OTC derivatives.

Central limit order book: Finally, on futures exchanges, so-called central limit order books provide full and open access to all interested trading parties. Trading is anonymous, with the order book showing firm prices and trade sizes to all participants. Dealers are no longer the sole liquidity providers — both dealers and their clients can submit limit orders and thus add liquidity to the market. There is no price discrimination and no opportunity to customise trades. But as in other exchange-type environments, liquidity depends on the timely arrival of orders from market participants. Hence, this model critically relies on the existence of a deep pool of buyers and sellers — conditions likely to be the case in only the most liquid contracts (IOSCO (2011)). And in stressed market conditions, liquidity may be less resilient as trading interest may be thinner. For this reason, some futures exchanges rely on designated participants to provide continuous quotes and/or liquidity.

To summarise, the OTC derivatives market is characterised by a variety of trading models. These include quote-driven models (single-dealer platforms and multi-dealer request for quote models) and order-driven models (the inter-dealer limit order book), alongside voice-based trading. The multi-dealer limit order book model is under development as banks prepare for the implementation of the G20 commitments.

Table A provides a brief summary of the trading models discussed in this section.

Trading models and liquidity

This section discusses how the various models differ in terms of pre and post-trade transparency, access, and ability to customise client trades. It further assesses whether these differences matter for liquidity and liquidity resilience. In doing so, the section draws on the academic literature on dealer markets.

Pre-trade transparency

Pre-trade transparency refers to the information available to market participants prior to executing a trade, including price quotes and trade sizes. Pre-trade transparency differs across trading models. It is highest in the central limit order book, followed by inter-dealer and multi-dealer limit order books

Table A Summary of trading models

Single-dealer models	
Click-to-trade model:	an electronic platform which allows clients to execute trades against firm prices posted by a single dealer.
Request for quote model:	an electronic platform which allows clients to request firm quotes from a single dealer for a specific transaction.
Multi-dealer models	
Limit order model:	an electronic platform which lists buy and sell orders in a limit order book — only dealers are allowed to enter limit orders; participating clients may trade against posted orders.
Request for quote model:	an electronic platform which allows clients to request firm quotes from multiple dealers simultaneously.
Inter-dealer limit order book model	
	a limit order book model, operated by interbank brokers; no client access.
Central limit order book model	
	a limit order book model which provides full and open access to all interested trading parties.
Hybrid model	
	a trading model which combines electronic platform trading with bilateral voice-based trading.

which display tradable prices and sizes from a number of market participants simultaneously. It is a little lower on multi-dealer RFQ models, where participants need to contact several dealers in order to compare price quotes. And it is lowest on single-dealer platforms and in bilateral trading since market participants only see the prices or quotes of one dealer at a time, although earlier-mentioned search tools help participants bring together information from different sources.

Hence, the G20 mandated move from bilateral voice-based trading to electronic platform trading is likely to entail an increase in pre-trade transparency. While this reduces search costs and in turn the cost of trading, it may also have implications for liquidity provision. Here the academic literature usefully highlights the various incentive effects at play.(1)

First, the literature makes a distinction between informed and uninformed traders (see the box on page 337). Uninformed traders tend to benefit from seeing prices and trade sizes, as it reduces their adverse selection risk — namely the risk of losing money in a trade with a better informed counterparty. Hence, everything else equal, uninformed traders will prefer to trade in the more transparent setting, in turn contributing to liquidity.

Greater pre-trade transparency can, however, affect the incentives of informed traders who often act as liquidity providers. Market structure theory shows that greater pre-trade transparency can deter these traders from providing liquidity, for example if it reduces the returns they earn on their research. Yet, the theory also shows that greater pre-trade transparency reduces strategic behaviour among informed dealers, encouraging them instead to compete more and improve upon each others' quotes, thus reducing transaction costs and improving liquidity.

In sum, the impact of increased pre-trade transparency remains ambiguous, with some empirical studies showing a reduction in liquidity, and others the opposite.(2) While increased use of electronic trading platforms is likely to entail an increase in pre-trade transparency, it is difficult to predict its precise impact on liquidity provision.

Post-trade transparency

Post-trade transparency refers to the information about executed trades made available to market participants other than the two parties involved in the trade, or a narrow set of dealers. This typically includes prices and volumes, and may involve a reporting delay. In quote-driven markets, post-trade transparency has traditionally been low, although there are notable exceptions, such as US corporate bond markets. In contrast to pre-trade transparency which is an intrinsic characteristic of the trading model (see the section on pre-trade transparency above), post-trade transparency can be achieved in the form of reporting requirements, independent of trading venue.

Greater post-trade transparency is generally considered to reduce information asymmetries, thus contributing to improved price discovery and liquidity. At the same time, greater disclosure of trade information may discourage informed traders from trading, which could reduce liquidity. In common with pre-trade transparency, greater post-trade transparency may also reduce incentives for informed market participants to gather information (eg by conducting research) and bring their trades to the market, thus weakening price discovery.

An additional consideration in dealer markets is that post-trade transparency may reveal information about dealers' inventory positions. This in turn makes it more difficult for dealers to unwind their positions.(3) Hence, the concern that greater transparency may lead to an increase in inventory risk and in turn to a deterioration in liquidity provision in the customer-to-dealer market (Gravelle (2002)).

Inventory risk is a particular concern in less-actively traded contracts, as it may take the dealer longer to unwind his inventory. It is also more pronounced for large trade sizes. Recognising these issues, many reporting regimes allow for the delayed reporting of large, so-called block trades.

(1) See Biais *et al* (2006) for a useful overview of transparency studies considered in this section.
(2) See for example Gravelle (2002).
(3) See for example Chen *et al* (2011).

Market microstructure theory(1)

Market microstructure theory aims to understand the process of price formation by modelling the trading process, ie the precise mechanism by which buyers and sellers meet and agree on a price. In doing so, market microstructure theory recognises that prices may not just reflect fundamentals, but also the characteristics of buyers and sellers (their risk preferences and individual knowledge), the characteristics of the trading rules (ie how buy and sell orders are matched), and the characteristics of trading venues (ie where buyers and sellers meet).

In a liquid market, buyers and sellers can trade with minimal delay. Both large and small orders can be accommodated and without causing large price swings. A market has resilient liquidity if these properties are maintained, even when prices become more volatile and/or investors more risk-averse.

Market makers contribute to market liquidity by their willingness to buy and sell, building up and running down an inventory of positions. In return, they expect to earn the bid-ask spread. But markets are not always liquid, and some are more liquid than others. The market microstructure literature attributes these differences to information asymmetries on the one hand, and execution uncertainty on the other.

Information asymmetries

These can give rise to adverse selection risk: when trading with better informed counterparts, uninformed participants are at risk of making the wrong trading decision. An uninformed market maker faces this risk too, but can protect himself by widening his bid-ask spread.

Informed traders may reveal some of their private information through their trading actions. It follows that uninformed traders can learn valuable information simply by observing the order flow (defined as the sum of all trades during a given time interval).

The order flow is a noisy indicator though, so uninformed traders are unlikely to discover the precise trading intentions of their informed counterparties. Moreover, if informed traders can keep some of their informational advantage, they will have incentives to acquire such information in the first place (eg through research) and be more willing to contribute to liquidity.

Market microstructure theory shows that increasing disclosure in the form of greater pre-trade or post-trade transparency may have ambiguous effects on liquidity (see the sections on pre and post-trade transparency).

Execution costs and uncertainty

This may result from the fact that buy and sell orders are often not perfectly synchronised. Market makers can reduce the costs to market participants arising from execution uncertainty by allowing market participants to trade immediately rather than having to wait for a counterparty. But in doing so they will incur inventory risk (or market risk). Bid-ask spreads provide a compensation for this risk.

During periods of increased price volatility, market makers may widen their bid-ask spreads or even refrain from providing sufficient liquidity. In turn, market participants may decide to stay away, as execution risk is higher. In other words, liquidity is less resilient in markets that see sharp falls in participation during volatile market conditions.

(1) See for example O'Hara (1995) and Madhavan (2000) for a survey.

Platform access, price discrimination and customisation

Electronic platforms also differ in terms of access, with many platforms limiting access to selected market participants. Access to a SDP is often part of the trade execution services offered to clients (alongside pre-trade research and post-trade processing). Likewise, multi-dealer platforms can set access restrictions. Moreover, both models allow dealers to use their discretion and offer different prices to different customers. They can also customise trades, giving clients flexibility (eg in terms of contract size, maturity or other trade characteristics). In sum, access criteria, price discrimination and customisation options feature in both single and multi-dealer models, and it is not clear *ex ante* how much the two models differ in this respect.

In the inter-dealer market, current electronic models restrict access to dealers only. But a distinct feature of the inter-dealer limit order book model discussed in the third section is that trading is anonymous, so there is no price discrimination. As mentioned earlier, current inter-dealer limit order books list the more standardised swap contracts only. Trading of bespoke contracts continues to be done almost exclusively via voice execution.

Finally, central limit order book models, as used on futures exchanges, offer unlimited access, limited customisation and no price discrimination.

On the one hand, broad access has so-called liquidity-pooling benefits, bringing together a larger number of actual (or potential) buyers and sellers. On the other hand, broad access

rules are less effective in a model that relies on dealers' willingness to commit their own capital. Regulators also allow platform operators to use access rules as a risk management tool, for example to ensure that participants meet the credit standards of the platform operator, provided the rules are objective and transparent (IOSCO (2011)). They further specify conditions under which platform operators can set discretionary execution rules that allow price discrimination.

Dealer competition

In principle, increased use of multi-dealer platforms will make it easier for clients to compare multiple price sources. This in turn could lead to greater competition between dealers, which in turn might affect liquidity provision. Again, academic work provides useful insights on the factors at work.

Early theoretical papers assumed dealers were competing for client orders.(1) In these, typically quite stylised, models, liquidity improves (in the form of narrower bid-ask spreads) as the number of market makers increases. Prices reveal available information more readily and adverse selection risk is reduced.

Later theoretical models show that dealers may quote wider bid-ask spreads (see for example Viswanathan and Wang (2002)), or reduce the amount of liquidity they supply to the market (Biais, Martimort and Rochet (2000)), when competition is reduced. These models suggest that competitive behaviour is restored as the number of dealers increases, with volumes increasing and bid-ask spreads narrowing. Empirical research supports these findings, although some papers find the effect to be small, suggesting that it is relatively difficult for new dealers to capture market share from the incumbents.(2)

But matters become more complicated when introducing more institutional detail. Theoretical work shows that quote-driven models (such as the RFQ model) and order-driven models (such as the inter-dealer limit order book) have very different properties in terms of liquidity, thus providing theoretical support for a trading environment that offers choice to market participants.

Viswanathan and Wang (2002) show that in a market with many dealers, small orders fetch better prices in the order-driven market, whereas large orders do better in the quote-driven market. Their insights are illustrated in **Figure 1**, which depicts the demand schedules of dealers in a quote-driven market (the green line) and in an order-driven market (the red line). For every quantity of the asset that a customer wants to sell, these lines give the price at which the dealer is willing to buy the offered quantity. For a small order, the customer will get a higher price when selling in the order-driven market (the red line lies above the green one), for a large order, he will prefer the quote-driven market.

Figure 1 Stylised demand schedules in order-driven and quote-driven markets

Sources: Bank of England and Viswanathan and Wang (2002).

The intuition is that an order in the quote-driven setting is typically executed at a single price (which only reflects the size of the trade in question), whereas in the limit order book, a customer order will travel down (or up if buying) the limit order book, starting from the highest posted bid (or lowest posted ask) and picking up successively worse prices to complete the order.

Viswanathan and Wang (2002) also show that when the number of dealers is small — eg when a stock is less actively traded — dealers (quoting a single price) will no longer provide competitive quotes. But for the limit order book to be a viable alternative, it needs to be supported by a sufficient number of liquidity providers. In other words, a limit order book can only support a market with few dealers if total trading activity is sufficiently high.

The authors conclude that their results provide justification for a hybrid model, which offers customers a choice between quote-driven and order-driven trade execution.

Although stylised, the model illustrates that it is difficult to predict how a move from bilateral voice trading to electronic trading, or from single-dealer to multi-dealer trading, will affect the liquidity-competition relationship. The precise effect may depend on the number of dealers, on the trading model and on trade sizes. These factors are relevant in derivatives markets where average trade sizes can be large, and where the number of dealers varies with trading interest (**Chart 5**).

(1) These early models assume Bertrand-type competition, with free entry and exit and dealers earning zero profits.
(2) See Biais, Glosten and Spatt (2005) for a survey. It should be noted, however, that many of the empirical studies are carried out in the context of quote-driven equity markets (such as NASDAQ or the London Stock Exchange prior to 1997).

Inter-dealer trading

A recent study of credit default swaps (Chen *et al* (2011)) finds that dealers often need several days to hedge their large customer trades. Thus dealers in this market are subject to significant market risk. As explained in the third section, the inter-dealer segment of OTC derivatives markets provides dealers with an opportunity to rebalance their positions after trading with their customers. In doing so, dealers can reduce their own market risk, and will be more inclined to provide liquidity to their customers.

Viswanathan and Wang (2004) model the interaction between the customer and dealer segments of the market as a two-stage game, showing that inter-dealer trading can improve liquidity. In the first stage, dealers compete with one another for customer business, and one dealer 'takes it all'. In the second stage of their model, when trading in the inter-dealer market, the winning dealer attempts to maximise revenue. Being a monopolist (or having market power in general) she achieves that by restricting quantities. The authors show that this in turn encourages all dealers to behave competitively in the first round, resulting in better prices for customers.

Viswanathan and Wang (2004) also find the inter-dealer limit order book model to be robust in a market with high information asymmetries. Having obtained an order from an informed customer, a dealer using the order book can submit a series of small orders and trade at multiple prices, as explained earlier, starting from the best outstanding quotes. In contrast, a quote-driven market exacerbates adverse selection because it restricts dealers to trading the entire order at a single price. When worried about adverse selection risk, counterparties may be unwilling to take the other side of the trade. Hence the authors find liquidity resilience to be higher in an inter-dealer market which relies on a limit order book.

Electronic platform trading and liquidity resilience: key challenges and concluding remarks

As market participants prepare for the G20 mandated transition from bilateral voice-based trading to electronic platform trading, the nature of liquidity provision is likely to change. Given the systemic role of OTC derivatives, it is important that liquidity on the trading platforms supporting trading in this market is resilient, both during normal and stressed market conditions.

Moving trading from the bilateral environment to an exchange or electronic trading platform represents a significant change. It may include changes in transparency, in the relationship of dealers with their customers, and in the liquidity available, particularly during periods of market stress.

This article has described a variety of models for OTC derivatives trading. Some already exist and their volumes are increasing, others are still being developed. The article has shown that liquidity provision depends on many factors, including the willingness of dealers to provide continuous liquidity, their ability to manage the inventory risk arising from their role as market maker and the ability of customers to execute large or sensitive trades with minimum price impact.

Drawing on the academic literature, this article has shown that trade-offs may arise between increasing transparency and/or widening access on the one hand, and maintaining liquidity on the other hand. It has also shown that inter-dealer trading supports liquidity provision to end-users. And it has illustrated how the relative benefits of quote-driven and order-driven models may depend on several factors, including trade frequency and dealer concentration.

Liquidity resilience, or the ability of a market to attract buyers and sellers at all times, requires a model where the main liquidity providers are willing to quote continuous prices, even during periods of market stress. For a platform to be liquidity resilient, it needs liquidity providers who are confident that they can manage their inventories without incurring undue execution delays or adverse selection risk, compared to bilateral trading, even as prices become more volatile. Conceptually, such resilience can be achieved in different trading models. Academic studies show that liquidity provision is more robust when market participants have a choice between trading models. In other words, liquidity resilience is greater when liquidity providers have a choice on how to trade. This includes the ability for dealers to manage their inventory risk via inter-dealer trading.

Anecdotal evidence from market participants indicates that liquidity resilience can be maintained on electronic trading platforms during periods of market stress, even though bid-ask spreads may widen. But market participants also underline the need for flexibility, including the ability to trade via voice execution methods or in a dealers-only environment.(1)

As regulators and market participants are preparing for the implementation of the G20 objectives, it is important that the trade-offs inherent in the different trading models are recognised.

(1) IOSCO (2011) reaches a similar conclusion.

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Systemic capital requirements

Summary of Working Paper no. 436 Lewis Webber and Matthew Willison

Banking regulation has historically focused on making a detailed assessment of risk at the level of individual banks' balance sheets. But it is possible that, in an interconnected system, banks that appear sufficiently healthy when viewed individually may collectively present a material threat to the solvency of the system as a whole. First, there may be similarities between banks' asset exposures that generate a tendency for banks' solvency positions to deteriorate and improve together. This can leave the system vulnerable to common shocks to the macroeconomy or to capital markets. Second, losses at an individual bank that are sufficient to cause it to default may trigger contagious failures of other banks in the system if they have extended it loans. Such contagious failures could trigger further rounds of contagious defaults in the banking system. System-wide losses could then far exceed the size of the initial shock.

Vulnerabilities of the system as a whole that cannot be identified by focusing narrowly on the health of individual banks suggest that a change in the way that risks to the banking system are assessed and prudential requirements for banks are calibrated could be beneficial. For example, capital requirements for banks could be set with the goal of achieving a level of systemic credit risk that a policymaker is willing to tolerate. This paper describes a system-wide risk management approach to deriving capital requirements for banks that reflect the impact their failure would have on the wider banking system and the likelihood of contagious losses occurring. These are referred to in this paper as 'systemic capital requirements'.

At the centre of the approach is the policymaker's optimisation problem. The policymaker is assumed to be interested in ensuring that the probability of banking system insolvency over a given time horizon is less than a chosen target level. This reflects the policymaker's systemic risk tolerance. The target could, of course, be achieved in all states of the world by setting very high systemic capital requirements. But the policymaker may also want to limit the potential inefficiency costs associated with regulatory capital requirements. If equity capital is more expensive than debt because of market frictions, higher capital requirements could, for example, increase the cost of bank lending to non-bank borrowers. The possible trade-off between financial stability and financial efficiency motivates a constrained optimisation problem, where a policymaker seeks to identify systemic capital requirements for individual banks that minimise the total level of capital in the banking system, subject to meeting their chosen systemic risk target. In other words, a policymaker sets banks' capital requirements to maximise efficiency subject to achieving a preferred level of stability. The solution of the constrained optimisation problem is a unique level of capital in the banking system and its distribution across banks.

Nested inside the policymaker's constrained optimisation problem is a simple structural model of a banking system in which shocks to banks' non-bank assets can cause insolvency. The underlying model further allows such shocks that originate outside the banking system to be transmitted and amplified through a network of interbank loans, so that credit losses spill over onto other banks when one or more banks become insolvent. The model captures two important drivers of systemic risk: (i) correlations between banks' assets (as a result of common exposures to non-banks), which may lead to multiple banks becoming insolvent simultaneously; and (ii) the potential for contagious bank defaults to occur because of losses on interbank lending.

The model is calibrated to resemble the major UK banks. It is used to illustrate how assessing risks only at the level of individual banks' balance sheets can lead a policymaker to underestimate the level of systemic risk in the banking system as a whole. The probability of very large losses crystallising in the banking system is greater when the potential for interbank contagion is taken into account, particularly when a number of banks have their balance sheet simultaneously weakened by losses on loans to non-banks.

The modelling choices in this paper reflect a trade-off between realism (complexity) and pragmatism (simplicity) in the description of credit risks facing an interconnected banking system. The paper uses a simplified description of the evolution of banks' balance sheets so that computational effort can be focused on solving the constrained optimisation problem faced by the systemic policymaker, taking into account the interlinkages between banks. As such, the primary focus of the paper is to obtain general insights into the properties of risk-based systemic capital requirements, rather than to calibrate precise nominal amounts that may be required to achieve particular risk targets in practice.

Systemic capital requirements for individual banks, determined as the solution to the policymaker's optimisation problem, depend on the structure of banks' balance sheets (including their obligations to other banks) and the extent to which banks' asset values tend to move together. Generally, banks' systemic capital requirements are found to be increasing in: balance sheet size relative to other banks in the system; interconnectedness; and, materially, contagious bankruptcy costs.

The paper illustrates, however, that risk-based systemic capital requirements would decrease during economic upswings and increase during downswings in tandem with measures of bank credit risk that are based on contemporaneous financial market prices, other things being equal. This procyclicality can be smoothed, to some extent, by using through-the-cycle measures of the riskiness of banks' assets. Nevertheless, the effect of such smoothing on the distribution of system credit losses is modest relative to the effect of cyclical changes to the composition of banks' balance sheets (leverage), suggesting a role for explicitly countercyclical capital requirements.

Estimating the impact of the volatility of shocks: a structural VAR approach

Summary of Working Paper no. 437 Haroon Mumtaz

A large body of empirical work has focused on estimating the impact of structural shocks on the economy. A large proportion of these studies employ vector autoregressions (VARs) — a system of equations where each variable depends on the lags of all variables included in the model. However, in their current form VAR models cannot directly incorporate the possible role played by the change in the volatility of the structural shocks as this is assumed not to have a direct affect on the variables included in the model. As shown in recent theoretical work, however, changes in shock volatility and uncertainty can have a direct impact on the macroeconomy. For example an increase in uncertainty may cause firms to pause hiring and investment decisions thus affecting real activity.

This paper proposed an extended VAR model which incorporates two additional features. First it allows the volatility of structural shocks to be time-varying. Second it allows for a direct impact of this time-varying volatility on the level of the variables included in the model. The paper describes an econometric method to estimate this extended VAR model.

We use the proposed model to estimate the possible impact of changes in the volatility of monetary policy shocks on the US economy. The monetary policy shock is identified from the data using two methods: (1) by assuming that these shocks have no impact on output growth and inflation for one quarter due to policy lags; and (2) by assuming that when these shocks lead to an increase in the federal funds rate this results in a contemporaneous reduction in output and inflation. In both cases, we estimate that the volatility of the monetary policy shock was high during the mid-1970s, the early 1980s and during the recent recession.

In order to gauge the impact of the volatility of the monetary policy shock, the model is simulated under the scenario where this volatility is assumed to double and no other shocks hit the economy. Under these assumptions, this change in volatility is estimated to reduce US GDP growth by 0.2% and inflation by 0.3%. However, once the importance of this volatility shock is considered relative to other shocks hitting the economy, its contribution is found to be small. This suggests that, in relative terms, changes in the volatility of monetary policy shocks are not economically significant.

How do individual UK consumer prices behave?

Summary of Working Paper no. 438 Philip Bunn and Colin Ellis

It is important for monetary policy makers concerned with meeting an inflation target to consider how prices behave. Nominal rigidities imply that prices cannot freely adjust, and the degree of nominal rigidity in the economy will influence the short-term impact of monetary policy on real activity and hence the response of inflation. This paper uses a database of over 11 million price quotes to investigate how individual consumer prices behaved in the United Kingdom between 1996 and 2006. These are the microdata that underpin the monthly consumer prices index produced by the Office for National Statistics. This work enables us to establish the facts about how frequently consumer prices change and how much they change by when they do change, and it should help us to improve our understanding of the nature of the nominal rigidities that exist in the economy. The results also help to establish which theories of pricing behaviour most closely represent the way in which prices are set in the real world, or at least in the UK economy.

This paper is the first to examine how UK consumer prices behave using the individual price quotes underlying the published aggregate inflation measure that is targeted by the Bank of England. This paper complements similar work on producer prices, which examines how prices behave further up the supply chain, and a recent survey of how firms set prices that was carried out by the Bank.

We find that 19% of consumer prices change each month on average, although this falls to 15% if sales are excluded. There is little evidence to support the presence of downward nominal rigidities in product markets, since 40% of all consumer price changes are decreases. UK consumer prices appear to be slightly more flexible than in the euro area, but they are less flexible than in the United States.

Consumer goods prices change more frequently than those of services, as on average 24% of goods prices change each month, compared with only 9% of services prices. At the component level, the prices of energy goods change the most frequently. The main service sector components all display a similar degree of price stickiness.

The share of prices changing each month varies across different years of our sample. There is some correlation between the share of prices increasing and the aggregate consumer price inflation rate. There are also some seasonal effects: prices are most likely to change in January and April and least likely to change in November and December. For consumer goods prices, the probability of a price change is highest in the month immediately following the previous change. As more time passes since the last price change, the probability of a price changing in any given month declines. For services, prices are most likely to change a year after the previous change, suggestive of annual price reviews. The probability of services prices changing in other months is broadly constant.

The distribution of the size of price changes is wide, although a significant number of changes are relatively small and close to zero. Around 60% of all price changes are between -10% and 10%, and the modal price change is an increase between 1% and 2%. The distribution of the size of consumer price changes narrows a little if sale prices are excluded. There are more small increases in prices and fewer price cuts for services than there are for goods, but there are considerable differences in the shape of the distributions of price changes at the component level. Prices that change more frequently tend to do so by less. This relationship appears to be particularly strong for services prices, but it also hold for goods prices as well once the effects of sales are taken out.

Our results on the behaviour of UK consumer goods prices are similar to those from previous work on UK producer prices (which covers only goods and not services). This suggests that there are few pricing frictions between the production and retail sectors in the United Kingdom.

Our findings from the microdata are not consistent with any one theory of price-setting. The marked heterogeneity that we observe in the behaviour of prices in different parts of the economy suggests that different theoretical models may better explain how prices are determined in different sectors. This would argue against the use of 'representative agent' models. The challenge is to develop a new theory of price-setting that better fits the stylised facts observed in these micro-studies while also fitting the properties of the aggregate macrodata.

An efficient minimum distance estimator for DSGE models

Summary of Working Paper no. 439 Konstantinos Theodoridis

Economic models are useful to economists and policymakers only if they are able to reproduce important features of the observed data. This property depends crucially on the values attached to model's parameters, and one way to decide about them is through the 'estimation' of the model. In essence, estimation is a mathematical procedure where the chosen parameter values minimise an objective function. A well-known example is 'least squares', minimising the squared distance between the actual data and the predicted values, which penalises large mistakes. Unfortunately, the estimation of modern macroeconomic models that rely heavily on microeconomic theory to explain the behaviour of economic agents and therefore the evolution of the economy over time while subject to random (stochastic) shocks (known as dynamic stochastic general equilibrium (DSGE) models) poses serious difficulties. This is due to the fact that theory imposes on the data a large number of very severe restrictions, which are not always supported by the latter.

Despite this, DSGE models are very useful. They are an abstraction of the economy that allows economists and policymakers to think clearly about economic relationships and actual developments, combining theory and data in a coherent way, and thus offering real insights. The way to make this work is to keep the model simple, meaning that a large number of strong restrictions need to be imposed on the data. This trade-off between the usefulness of the model and its ability to replicate elements of the true world is what makes the estimation of microeconomic theory founded models a challenging task.

The objective function used for the estimation of the model can be based on all available data information (full information) or on a few selected features of it (limited information). Full information sounds ideal, but in practice it makes large demands on the model. In the second case, the estimated parameters are chosen to minimise some measure of the distance between key characteristics of the data produced by the model and those observed in the data. One important feature that reveals the dynamic properties of the model is the 'impulse response function'. This shows the effect over time on a variable — say, inflation — after a shock hits the economy. (Indeed, many economists choose the parameters of their models judgementally in order to match the cyclical patterns of the data as they are summarised by the impulse response function — a process not of estimation but 'calibration'.) An advantage is that the targets that the estimated model aims to 'hit' are observed, meaning that failures to match these statistics of interest can be used to infer what parts of the theory are still missing from the model and derive useful economic conclusions. This is not true for full-information techniques where the estimated parameter vector minimises the distance between the model and the true data-generation process, which is unknown and highly abstract.

At the heart of the problem is that we cannot hope to explain everything in economics. A particular DSGE model is usually developed to explain only certain economic phenomena. Limited information estimation techniques let the model reproduce these facts as closely as possible. This increases the usefulness of the model since the user can immediately assesses how well the model serves its purposes of creation and, consequently, to decide whether it can be used to draw meaningful economic conclusions.

This study introduces an impulse response matching estimator that encompasses all the existing ones. It relies on the maximum information set (it mimics full-information estimators under some conditions), while existing methods utilise only a small part of the available set of instruments. The statistical theory (assuming we have a very large sample) developed here covers all the existing impulse response matching estimators and thus closes an important gap in the literature. The (more realistic) small-sample behaviour is investigated through a simulation exercise, where the proposed estimator is compared to other (modern and less modern) estimators for theory-driven models.

The measure that results from the estimation of the model can be used to assess whether a model's dynamic properties (as they are summarised by the impulse response functions) are statistically different from those observed in the real world, meaning that it can serve as a device to rank candidate economic theories that aim to explain the same features of the data. The work in this paper uses a widely used macroeconomic model to assess the usefulness of the method. The results are very promising. Now that the proof of concept has been established, the next step will be to apply the method to real, rather than simulated, data.

Time-varying volatility, precautionary saving and monetary policy

Summary of Working Paper no. 440 Michael Hatcher

In order to design effective monetary policy, central banks require an understanding of the mechanism by which economic shocks are transmitted to key macro variables like inflation, consumption and output. Economists therefore conduct policy analyses using models in which key economic relationships are spelt out but are subject to 'stochastic shocks' that represent unpredictable external events that influence the economy. A key task for monetary policy is to understand the transmission mechanism of such shocks, thereby enabling effective policy responses to be formulated.

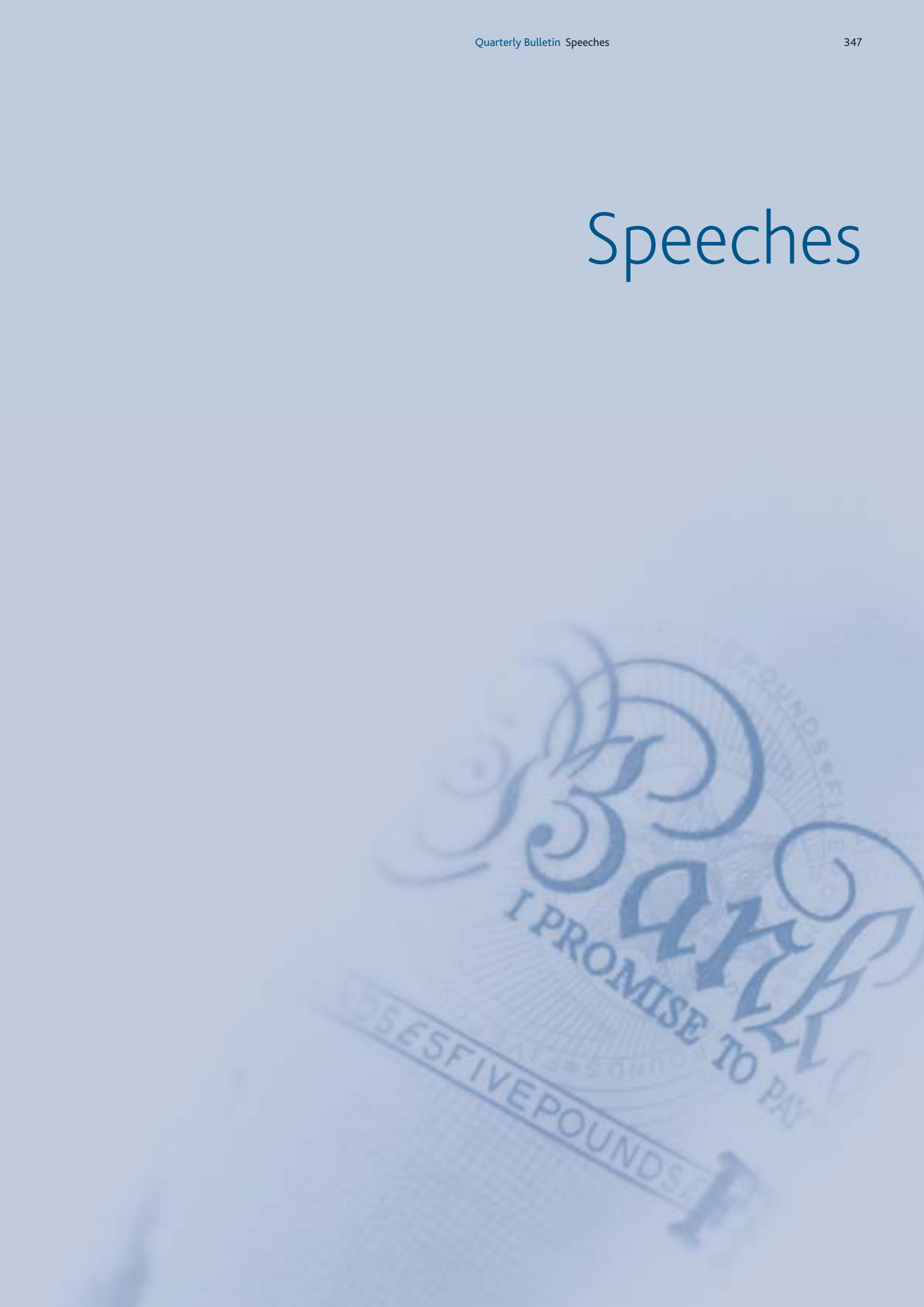
Perhaps oddly, most policy analyses are carried out in a way that sidesteps the impact of uncertainty on households. Such models can match many features in the data and have a number of advantages. Notably, they can be represented in the form of a linear system of equations, making numerical simulations of medium and large-scale models feasible. However, an important drawback is that they cannot properly capture swings in uncertainty (fluctuations in the volatilities of economic disturbances), to understand the impact of such swings on the economy, or to evaluate potential policy responses. Yet, as exemplified by the recent financial crisis, changing uncertainty can be an important driver of economic behaviour. By ignoring such effects, these models provide policymakers with an incomplete picture and may lead to biased policy recommendations. Previous research at the Bank of England and elsewhere has examined the impact of uncertainty. But beyond that, there is an issue of whether changing levels of volatility also affect behaviour materially. This paper builds on that work and investigates the issue in more detail, focusing on a single aspect of household behaviour that is influenced by changes in uncertainty — precautionary saving.

Precautionary saving is additional saving driven by the possibility that if households are unlucky, consumption will fall to a low level, at which point an extra pound of spending is highly valued. This introduces a powerful non-linearity into economic models which has to be addressed explicitly. Furthermore, it has direct relevance for monetary policy, because an increase implies a reduction in current consumption, the main component of aggregate demand and an important factor influencing the extent of inflationary pressure in the economy. Thus we look at the monetary policy implications of ignoring precautionary savings effects arising from variations in the volatilities of demand and supply disturbances hitting the economy — an investigation which, by definition, cannot be conducted within a constant volatility framework.

In order to capture these effects in the model solution, the model is solved numerically using a higher-order approximation method. Given that the mechanism is driven by uncertainty, crucial to financial markets, consumer preferences are specified in a way that has been shown to provide a better 'match' to asset pricing data. Specifically, it is assumed that utility follows an 'external habits' specification, such that consumers value the difference between consumption and a slow-moving reference value. This specification of preferences introduces cyclical variation in risk appetite and raises household aversion to risk, two effects that appear to be important features of financial markets. Given that the model itself is stylised, the quantitative results reported are intended to illustrate rather than estimate the monetary policy implications of volatility fluctuations.

A key finding is that volatility fluctuations can have a small but relevant impact on precautionary saving behaviour, and therefore upon the appropriate conduct of monetary policy. The main contribution of the paper is to clarify the mechanism by which volatility fluctuations are transmitted through the precautionary savings channel and to illustrate — both analytically and quantitatively — the implications for monetary policy. If volatility fluctuations are not taken into account by policy, interest rates will be set incorrectly. As a result, a central bank that follows an interest rate rule that ignores volatility fluctuations will increase inflation and output instability, albeit to a small degree. Moreover, sensitivity analysis shows that the extent of 'policy bias' falls as the importance of habits in preferences is decreased. Consequently, models which are not calibrated to match higher-order risk effects may understate the importance of volatility fluctuations for the economy.

Speeches



Bank of England speeches

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

Monetary policy in a weak economy

Martin Weale, Monetary Policy Committee member, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech535.pdf

In a speech delivered at the National Institute of Economic and Social Research, Dr Martin Weale reviewed the United Kingdom's unusually slow recovery from recession. He noted that there were two striking features: first, productivity had recovered, but not regained its previous path; second, household consumption had been weak, particularly when compared to disposable income. Dr Weale considered the connections between these and concluded that worsened productivity performance was probably one factor contributing to the weakness of consumption. On top of this, it was possible that pre-crisis consumption in the United Kingdom was simply too high.

Dr Weale argued that while the economy needed to rebalance away from consumption, renewed asset purchases supported consumption and these were required to prevent inflation falling below target in the medium term. Dr Weale concluded by noting that monetary policy was only one part of overall economic policy and could not, on its own, set the economy on a sound and sustainable growth path.

Promoting a prudent and stable financial system

Andrew Bailey, Executive Director, Prudential Regulation Authority — Deputy CEO designate, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech534.pdf

In this speech, Andrew Bailey discussed the pressures facing the banking sector and retail banking more specifically. Andrew spoke about how, earlier in the year, the authorities have worked with the banks to build their liquidity buffers and reduce their balance sheets in order to provide more protection against future stresses.

Andrew noted the deterioration in funding market conditions since the summer. He discussed how UK banks were not singled out, primarily because they do not have large direct exposures to vulnerable eurozone economies. Andrew added that it was important that banks plan for any disorderly consequences of the euro-area crisis.

Andrew spoke about the strains on retail banking from the sustained low interest rate environment and the impact this was having on the ability for banks to lend. Additionally, he discussed how the pricing of retail banking was becoming more opaque, and charges are levied inconsistently across products, with the consequence that some appeared free.

Lessons in lobbying

Robert Jenkins, Financial Policy Committee member, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech533.pdf

In this short speech, Robert Jenkins outlined the short-sightedness of the banking industry's lobbying efforts. He described the evolution of the recent approaches used by banking sector lobbyists from denying the need for reform, through advocating the need for reforms to be at a global level in the hope that they would be set to the lowest common denominator, to blaming the Basel rules for forcing banks to reduce their real-economy lending. The latest lobbying effort is intellectually dishonest because it is the market that is currently driving banks to improve their health and banks can do so without harming the real economy, for example by cutting bonuses and intra-financial risk-taking, and raising equity. Banks risk making the case for more regulation. Robert concluded by calling on bank leaders to lobby less and lead more.

A few remarks on current monetary policy in a rebalancing economy

Paul Tucker, Deputy Governor, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech532.pdf

In this speech, Paul Tucker discussed current monetary policy in light of the need for the UK economy to rebalance. Tight credit conditions were probably impeding reallocation of capital across the economy; it was also making labour market conditions harder to interpret. It was possible that firms benefiting from increased exporting opportunities had been hiring, while some firms in shrinking sectors had so far maintained headcount. He concluded that the ferocity of the shocks that had hit the economy, and the pervasive uncertainty that persisted about global economic and financial conditions, were circumstances where taking longer than usual to re-achieve the MPC's 2% target were warranted, provided that the Committee's credibility was underpinned. The credibility of monetary policy was an absolute precondition for

maintaining support to demand. Over the next few quarters it would become clearer whether the Committee's big judgement call on inflation — that it will fall rapidly from its current elevated level — will prove correct.

Mortgages, housing and monetary policy — what lies ahead?

David Miles, Monetary Policy Committee member, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech531.pdf

In a speech delivered to the Northern Housing Consortium, David Miles — external member of the Monetary Policy Committee — discussed how the financial crisis had transformed the UK housing and mortgage markets. First-time buyers now needed to postpone their purchases in order to save for a larger deposit and in the future may increasingly look at alternative schemes for financing house purchases with more outside equity that could bridge some of the gap between mortgage loans and deposits and also bring risk-sharing benefits. He predicted that this need for equity would lower the rate of owner-occupation. In the short term this created transitional problems — particularly for house builders — and recent Government policies had been designed to counter them. But in the longer term a lower rate of owner-occupation, and a bigger rental sector, did not need to be a negative outcome — it could help to offset tax distortions that work against renting and stabilise the housing and mortgage markets, and ultimately the wider economy. Monetary policy might need to be recalibrated but would not be less effective.

The economic outlook

Charles Bean, Deputy Governor, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech529.pdf

In a speech to the Council of Mortgage Lenders, Deputy Governor Charlie Bean explained the MPC's decision to restart its quantitative easing (QE) programme. He noted the contribution of heightened financial market tensions and the impact of squeezed real household incomes to a global slowing in growth. This had increased the chance that inflation would undershoot the 2% target in the medium term which had led the MPC to restart asset purchases. Charlie Bean saw no reason to believe that the impact of asset purchases had changed since the earlier phase of QE. He also considered the case for alternative stimulus in the form of vouchers, concluding that temporary increases in disposable income were likely to be largely saved. In conclusion he recorded the period of transition in the housing market and the potential support to consumption and mortgage demand of a moderation in the squeeze on household incomes.

Remarks by Robert Jenkins

Robert Jenkins, Financial Policy Committee member, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech528.pdf

In this short speech, Robert Jenkins noted that the primacy given by banks to return on equity (RoE) as a measure of profitability is wrong-headed. It does not adjust for the risks taken by banks to achieve RoE targets. And it incentivises banks to try to minimise the equity they hold and to lobby hard against reforms aimed at increasing minimum capital requirements. Robert outlined how successful investors are not interested in RoE *per se*, they are interested in high risk-adjusted returns. As such, if banks take on higher risks, including by leveraging up, to earn a higher RoE, investors should adjust for this risk. Such an adjustment would increase the cost of capital for riskier banks. Robert concluded his speech by stating that RoE targets had to go and called on the investment community to explain this to banks and sell-side analysts.

The capital conundrum

Robert Jenkins, Financial Policy Committee member, November 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech527.pdf

In this speech, Robert Jenkins discussed the confusion surrounding the cost of bank capital generally and the importance of equity specifically. Bankers have sought short-term high returns on equity (RoE). Aggressive RoE targets have not produced shareholder value but have produced systemic instability. The flaw resides in the fact that risk-taking firms were guided by a non risk-adjusted target. Robert called on the investment community to explain to banks that investors do not seek high RoE-producing enterprises. They seek high relative risk-adjusted returns. Banks with less equity are clearly more dangerous than those with more equity in the balance sheet mix. Investors will judge them accordingly. A bank with more equity and less leverage will enjoy a lower cost of capital, less volatile returns, a higher earnings multiple and quite possibly better shareholder value. Robert concluded that instead of fighting a higher equity requirement, bankers should welcome it.

Balancing security and aesthetics: the evolution of modern banknote design

Chris Salmon, Executive Director for Banking Services and Chief Cashier, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech526.pdf

In a speech addressing the British Numismatic Society on 25 October, Chris Salmon set out the evolution of the Bank's current approach to secure banknote design and its value in ensuring public confidence in our issuance. Chris also unveiled a new security feature of the forthcoming £50F, launched on 2 November, and highlighted the progress to date in increasing the quality of £5 notes in circulation.

Chris additionally explained the need for continued vigilance on the Bank's part with regard to emerging technologies which could be used by counterfeiters, and set out how the Bank's education programme and collaboration with the police further support the Bank's public confidence objective.

The speech also drew together a summary of the Bank's issuance history, with particular regard to the Bank's changing views as to how the banknote aesthetics influence their security. He paid tribute to Harry Eccleston OBE, lead designer of the 'D' series of notes first issued between 1970 and 1981, who sadly passed away in April last year.

Control rights (and wrongs)

Andrew Haldane, Executive Director for Financial Stability, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech525.pdf

Delivering the Wincott Annual Memorial Lecture, Andrew Haldane set out four structural factors which have led banks to take on too much risk. First, the introduction of limited liability 100 years ago meant that equity holders benefited from increases in firm value while losses were capped at zero. So if banks sought to maximise shareholder value, they would take on bigger and riskier bets. Second, biases in the tax system favoured debt over equity such that equity had, until the eve of the crisis, become a vanishingly small fraction of banks' balance sheets. Third, the notion of 'too big to fail' meant that debt holders did not have the incentives to restrain banks from risky activities because they were unlikely to face losses. Fourth, inappropriate performance targets such as return on equity meant that investors had incentives to increase their short-term equity-based return.

For each of these factors, Andrew Haldane set out possible solutions to better align bank risk-taking incentives with the public good. To reduce banks' appetite to take on too much risk and reduce the probability of public sector support, banks should hold higher equity and other loss-absorbing instruments such as convertible capital. To ensure that equity holders do not take risky decisions at the expense of other liability holders, the ownership and control of banks could be widened. And to avoid banks focusing their performance on a narrow set of the balance sheet (equity), banks could target the return on assets rather than the return on equity. All of these actions would seek to address the imbalance that has built up over 100 years between risk and return in the financial system.

Central counterparties: the agenda

Paul Tucker, Deputy Governor, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech524.pdf

In this speech, Paul Tucker discussed several issues essential to underpinning the safety and soundness of central counterparties (CCPs). First, with exchanges being combined with clearing into vertically integrated groups, he said CCP risk managers should have clear and independent reporting lines to group boards. Second, a balance would need to be struck between effective risk management and broadening access to global CCPs. Third, he called for the development of effective resolution regimes for CCPs (and other financial market infrastructure), in order to preserve a CCP's essential services and minimise disruption and value destruction. Clearing members should probably bear the brunt of 'recapitalising' CCPs. Finally, he said minimum initial margin requirements should apply across markets, and beyond over-the-counter contracts. European legislation should make explicit provision for minimum margin requirements to be altered by the authorities in light of changes in the risk environment.

Speech by the Governor, Mervyn King

Sir Mervyn King, Governor, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech523.pdf

The Governor began by noting that the UK economy had enjoyed the benefits of globalisation. Now it was seeing some of the costs, as they played out in a global financial crisis.

The underlying problem, which was one of solvency not liquidity, had not gone away. And this was reflected in the continuing imbalance between those economies running large current account surpluses and those running large current account deficits. One way or another, domestic spending had to be raised in the surplus countries and lowered in the deficit countries, relative to trend.

In the past, market-determined exchange rates had played an important role in rebalancing world demand and trade. It was crucial to the health of the world economy that a way was found of allowing competitiveness to adjust so that trade imbalances, and hence the present scale of indebtedness, could be reduced.

From the perspective of the United Kingdom, to enable rebalancing the objective was to steer the economy slowly back to a position of more normal interest rates and lower budget deficits. With a lower level of sterling and a credible plan to reduce the fiscal deficit over the medium term that was on track. But the marked slowing of the world economy, especially in the euro area, would be a threat to that strategy.

The Governor noted that, at 5.2%, inflation was uncomfortably high in the most recent data. It was the weaker outlook for inflation, rather than its current high rate, that explained the MPC's decision to resume asset purchases at its October meeting. The Governor explained the mechanism by which asset purchases were likely to work. This should benefit all companies and households. But it could not solve the underlying problem of indebtedness. Easy monetary policy, by bringing forward spending from the future to the present, meant that the ultimate adjustment of borrowing and spending would need to be even greater.

The Governor concluded that the fundamentals of the UK economy were strong. But without a rebalancing of spending in the world economy, a struggle between debtor and creditor countries would continue to inflict economic pain on everyone. It was important to use the gravity of the global crisis to provoke a bold response. Policymakers from all nations had acted together in 2009; they could do so again.

Why prudential regulation matters

Andrew Bailey, Executive Director, Prudential Regulation Authority — Deputy CEO designate, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech522.pdf

In this speech at the APCIMS conference, Andrew Bailey considered the challenges faced in the reform of financial supervision. Andrew spoke about the importance of Parliament clearly rooting the objectives of supervision in public policy. He compared the current position to monetary policy where the Bank has a clear public policy responsibility.

Andrew discussed the clear objective for the Prudential Regulation Authority; to pursue safety and soundness of firms in order to achieve the stability of the financial system, and noted that this does not mean a 'no-failure' regime.

Andrew also spoke about the role of judgement by supervisors, and forward-looking supervision. He noted the increase in European rule-making, and how this can make it more difficult to implement judgement-based supervision without a clear objective in public policy.

Andrew reiterated the need for supervisors to raise the key issues with regulated firms. He said it was important that firms had well-functioning risk and audit functions that are active and able to strongly advise senior management when there are issues with the firms' control framework.

Monetary policy and financial dislocation

David Miles, Monetary Policy Committee member, October 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech521.pdf

In a speech to the Royal Economic Society, Professor David Miles discussed the mechanisms through which asset purchases affect the wider economy and how powerful they might be in the current situation. The economic outlook had worsened since August, prompting the Monetary Policy Committee to increase the size of the Bank of England's asset purchase programme. Asset purchases were expected to stimulate domestic demand via several channels.
Professor Miles focused on two: first, investors who sold gilts to the Bank would invest in riskier assets of similar duration, making it easier for firms to raise funds directly in financial markets. Second, asset purchases increase deposits at banks. When bank lending is constrained by the amount of funds that banks can raise, a larger deposit base might support bank lending and consumption and investment by bank-dependent borrowers. By stimulating demand, asset purchases could help close the gap between demand and supply and prevent inflation further ahead from falling below target.
Professor Miles argued that purchases now might be as effective as in 2009/10.

Rebalancing and the real exchange rate

Ben Broadbent, Monetary Policy Committee member, September 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech520.pdf

Ben Broadbent's speech examined the cause and consequences of sterling's depreciation in 2007–08. First, he argued that it was not caused by monetary policy; rather it was a result of the need to rebalance UK supply away from non-traded goods and services, and towards the production of tradables, to meet a new pattern of demand — in particular, lower government consumption. Second, he argued that the process of rebalancing — and the size of the exchange rate depreciation

necessary to induce it — depends on how easy it is to reallocate productive resources between sectors of the economy; something hampered by the state of the banking sector. Third, he argued that rigidly sticking to the inflation target through this period would have involved significant economic costs, costs that the MPC's remit explicitly tells it to avoid. He concluded by drawing some longer-term lessons; the inflation-targeting regime remains credible, but there are limits to what monetary policy can hope to achieve.

Productivity and monetary policy

Spencer Dale, Executive Director and Chief Economist, September 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech519.pdf

In a speech to the South Tyneside Manufacturing Forum, Spencer Dale discussed productivity in the United Kingdom: a crucial factor in determining the balance of supply and demand in the economy and therefore inflation. He observed that the level of productivity was no higher than at the start of the financial crisis, three years previously. Productivity was therefore 9% lower than had it continued growing at its average rate from before the crisis, which was both a puzzle and a concern.

Spencer Dale offered three possible explanations for this shortfall in productivity. First, measured productivity may understate the supply capacity of the economy if data were mismeasured or if firms had 'hoarded' labour during the recession. But firms had been reporting little spare capacity and had increased employment strongly over the past year, suggesting they had little spare capacity. Second, looking at productivity data by sector suggests that it was probably unrealistic to have expected that productivity would have continued to grow at the same average pace as it had done prior to the financial crisis. The third possibility is that underlying productivity growth has been weakened by the impact of the financial crisis. Spencer placed greater weight on the third of these explanations, although all three were likely to have contributed to weak productivity growth.

Macroprudential policy: addressing the things we don't know

Alastair Clark, Financial Policy Committee member, and Sir Andrew Large, former Deputy Governor of the Bank of England, September 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech518.pdf

In this paper, Alastair Clark and Andrew Large discussed how macroprudential policy — targeted at system-wide conjunctural and resilience risks — could be used to fill the gap between monetary policy and microprudential regulation. A statutory framework is favoured to ensure clarity and accountability of decision-making, while retaining sufficient flexibility to respond to evolving risks and policy developments — including the potential to transfer leadership from central banks to finance ministries upon crystallisation of systemic risks. An integrated approach is proposed to consider interlinkages with other policy areas, both in terms of overlapping toolkits and spillover effects that may demand judgements about competing priorities. A number of potential tools and data sources are discussed, subject to an overarching need for intelligent use of both quantitative and qualitative analysis to inform decisions. This may also require the determination of a systemic risk appetite against which the costs and benefits of policy options may be considered. While differences in fiscal and legal frameworks currently restrict international convergence to areas of standard-setting, the increasing degree of global interconnectedness may necessitate greater international co-ordination of macroprudential policy.

How to do more

Adam Posen, Monetary Policy Committee member, September 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech517.pdf

In this speech, Dr Posen called for further monetary policy stimulus in the United Kingdom and abroad. Policy defeatism was unjustified because monetary ease would encourage restructuring and still be effective. Poor credit availability and heightened risk aversion beset all G7 economies, and monetary policy could reduce those problems. He also called for greater co-operation between the Bank of England and the British Government to encourage investment in small and medium-sized enterprises (SMEs), given the United Kingdom's structural deficiencies in domestic finance. Dr Posen advocated a two-part policy: first, additional traditional quantitative easing, with the purchase of £50 billion to £100 billion of government gilts over the next three months; second, the creation by the Government of a lending bank and a securitiser of loans to improve the provision of credit to SMEs. Working with the Government, the Bank would provide liquidity and discounting of high-quality securitised loans for these new entities.

Enhancing financial stability: the role of transparency

Donald Kohn, Financial Policy Committee member, September 2011.

www.bankofengland.co.uk/publications/speeches/2011/speech516.pdf

In this speech, Don argued that transparency could help to ensure financial stability. Don suggested that a lack of

transparency contributed to a mispricing of risk in the run-up to the previous crisis, and exacerbated the downturn, as contagion fed on uncertainty about the financial health of counterparties.

By way of improvements, detailed quarterly reporting of financial statements, including averages and intraday metrics, may help ensure that the condition of financial institutions is fairly represented in a timely manner. And provision of full information about the structure of individual instruments may reduce opaqueness and increase market confidence.

Increasing transparency is not without cost, however. Collecting information is costly; excessive requirements may unnecessarily distract management; and increased transparency may threaten legitimate competitive advantages.

The effectiveness of the FPC in preserving financial stability would also be dependent upon a high level of transparency about its concerns, recommendations and deliberations. This will be aided by the clear reflection of debates and recommendations in FPC meeting Records.

Appendices

Contents of recent Quarterly Bulletins

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

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

Articles and speeches

Speeches are indicated by (S)

2009 Q1
- Price-setting behaviour in the United Kingdom: a microdata approach
- Deflation

2009 Q2
- Quantitative easing
- Public attitudes to inflation and monetary policy
- The economics and estimation of negative equity
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2008

2009 Q3
- Global imbalances and the financial crisis
- Household saving
- Interpreting recent movements in sterling
- What can be said about the rise and fall in oil prices?
- Bank of England *Systemic Risk Survey*
- Monetary Policy Roundtable

2009 Q4
- The financial position of British households: evidence from the 2009 NMG survey
- Accounting for the stability of the UK terms of trade
- Recent developments in pay settlements

2010 Q1
- Interpreting equity price movements since the start of the financial crisis
- The Bank's balance sheet during the crisis
- Changes in output, employment and wages during recessions in the United Kingdom
- Monetary Policy Roundtable

2010 Q2
- Collateral risk management at the Bank of England
- The impact of the financial crisis on supply
- Public attitudes to inflation and monetary policy
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2009

2010 Q3
- Understanding the price of new lending to households
- Interpreting the world trade collapse
- What can we learn from surveys of business expectations?
- Residential property auction prices
- Chief Economists' Workshop: state-of-the-art modelling for central banks
- Monetary Policy Roundtable

2010 Q4
- The history of the *Quarterly Bulletin*
- Index of articles 1960–2010
- The UK recession in context — what do three centuries of data tell us?
- The Bank's money market framework
- Managing the circulation of banknotes
- Understanding the weakness of bank lending
- Evolution of the UK banking system
- The financial position of British households: evidence from the 2010 NMG Consulting survey
- The foreign exchange and over-the-counter interest rate derivatives markets in the United Kingdom
- Global finance after the crisis

2011 Q1
- Understanding the recent weakness in broad money growth
- Understanding labour force participation in the United Kingdom
- Global imbalances: the perspective of the Bank of England
- China's changing growth pattern
- Monetary Policy Roundtable

2011 Q2
- Assessing the risk to inflation from inflation expectations
- International evidence on inflation expectations during Sustained Off-Target Inflation episodes
- Public attitudes to monetary policy and satisfaction with the Bank
- The use of foreign exchange markets by non-banks
- Housing equity withdrawal since the financial crisis
- Using internet search data as economic indicators
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2010

2011 Q3
- The United Kingdom's quantitative easing policy: design, operation and impact
- Bank resolution and safeguarding the creditors left behind
- Developments in the global securities lending market
- Measuring financial sector output and its contribution to UK GDP
- The Money Market Liaison Group Sterling Money Market Survey
- Monetary Policy Roundtable

2011 Q4
- Understanding recent developments in UK external trade
- The financial position of British households: evidence from the 2011 NMG Consulting survey
- Going public: UK companies' use of capital markets
- Trading models and liquidity provision in OTC derivatives markets

Bank of England publications

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

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

Working papers

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

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

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

No. 425 International transmission of shocks: a time-varying factor-augmented VAR approach to the open economy (May 2011)
Philip Liu, Haroon Mumtaz and Angeliki Theophilopoulou

No. 426 Labour supply as a buffer: evidence from UK households (May 2011)
Andrew Benito and Jumana Saleheen

No. 427 System-wide liquidity risk in the United Kingdom's large-value payment system: an empirical analysis (May 2011)
Marcelo Perlin and Jochen Schanz

No. 428 Intraday two-part tariff in payment systems (May 2011)
Tomohiro Ota

No. 429 Domestic financial regulation and external borrowing (May 2011)
Sergi Lanau

No. 432 An estimated DSGE model of energy, costs and inflation in the United Kingdom (July 2011)
Stephen Millard

No. 433 The impact of permanent energy price shocks on the UK economy (July 2011)
Richard Harrison, Ryland Thomas and Iain de Weymarn

No. 434 Evolving UK and US macroeconomic dynamics through the lens of a model of deterministic structural change (July 2011)
George Kapetanios and Tony Yates

No. 435 Preferred-habitat investors and the US term structure of real rates (July 2011)
Iryna Kaminska, Dimitri Vayanos and Gabriele Zinna

No. 436 Systemic capital requirements (October 2011)
Lewis Webber and Matthew Willison

No. 437 Estimating the impact of the volatility of shocks: a structural VAR approach (October 2011)
Haroon Mumtaz

No. 438 How do individual UK consumer prices behave? (October 2011)
Philip Bunn and Colin Ellis

No. 439 An efficient minimum distance estimator for DSGE models (October 2011)
Konstantinos Theodoridis

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

External MPC Unit discussion papers

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

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

The following papers have been published recently:

No. 33 Banking crises and recessions: what can leading indicators tell us? (September 2011)
Matthew Corder and Martin Weale

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

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/bankstats/current/index.htm.

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

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

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

Financial Stability Report

The *Financial Stability Report* is published twice a year under the guidance of the interim Financial Policy Committee (FPC). It covers the Committee's assessment of the outlook for the stability and resilience of the financial sector at the time of preparation of the *Report*, and the policy actions it advises to reduce and mitigate risks to stability. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policymakers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available at a charge, from Publications Group, Bank of England, Threadneedle Street, London, EC2R 8AH and on the Bank's website at:

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

Payment Systems Oversight Report

The *Payment Systems Oversight Report* provides an account of how the Bank is discharging its responsibility for oversight of UK payment systems. Published annually, the *Oversight Report* sets out the Bank's assessment of key systems against the benchmark standards for payment system risk management provided by the internationally adopted Core Principles for Systemically Important Payment Systems, as well as current issues and priorities in reducing systemic risk in payment systems. Copies are available on the Bank's website at:

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

Handbooks in central banking

The series of *Handbooks in central banking* provide concise, balanced and accessible overviews of key central banking topics. The *Handbooks* have been developed from study materials, research and training carried out by the Bank's Centre for Central Banking Studies (CCBS). The *Handbooks* are therefore targeted primarily at central bankers, but are likely to be of interest to all those interested in the various technical and analytical aspects of central banking. The *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/ccbs/handbooks/index.htm.

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

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

www.bankofengland.co.uk/markets/money/publications/redbookdec11.pdf.

The Bank of England Quarterly Model

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

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

Cost-benefit analysis of monetary and financial statistics

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

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

Credit Conditions Survey

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

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

Trends in Lending

This 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/other/monetary/trendsinlending.htm.

Quarterly Bulletin

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

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

Inflation Report

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

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

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

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

Publication dates

Copies of the *Quarterly Bulletin, Inflation Report* and *Financial Stability Report* can be bought separately, or as combined packages for a discounted rate. Current prices are shown overleaf. Publication dates for 2012 are as follows:

Quarterly Bulletin

Q1	March
Q2	June
Q3	September
Q4	December

Inflation Report

February	15 February
May	16 May
August	8 August
November	14 November

Financial Stability Report

June
December

Quarterly Bulletin, Inflation Report and Financial Stability Report subscription details

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

Destination	2012					
	QB, IR and *FSR* package	*QB* and *IR* package	*IR* and *FSR* package	*QB* only	*IR* only	*FSR* only
United Kingdom						
First class/collection[1]	£31.50	£27.00	£13.50	£21.00	£10.50	£5.25
Students/schools (concessionary rate UK only)	*£10.50*	*£9.00*	*£4.50*	*£7.00*	*£3.50*	*£1.75*
Academics (concessionary rate UK only)	*£21.00*	*£18.00*	*£9.00*	*£14.00*	*£7.00*	*£3.50*
Rest of Europe						
Letter service	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50
Outside Europe						
Surface mail	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50
Air mail	£50.00	£43.00	£21.50	£34.00	£17.00	£8.50

(1) Subscribers who wish to collect their copy (copies) of the *Bulletin, Inflation Report* and/or *Financial Stability Report* may make arrangements to do so by writing to the address given below. Copies will be available to personal callers at the Bank from 10.30 am on the day of issue and from 8.30 am on the following day.

Readers who wish to become **regular subscribers**, or who wish to purchase single copies, should send to the Bank, at the address given below, the appropriate remittance, payable to the Bank of England, together with full address details, including the name or position of recipients in companies or institutions. If you wish to pay by **Visa, MasterCard, Maestro** or **Delta**, please telephone +44 (0)20 7601 4030. Existing subscribers will be invited to renew their subscriptions automatically. Copies can also be obtained over the counter at the Bank's front entrance.

The **concessionary** rates for the *Quarterly Bulletin*, *Inflation Report* and *Financial Stability Report* are noted above in *italics*. Academics at UK institutions of further and higher education are entitled to a concessionary rate. They should apply on their institution's notepaper, giving details of their current post. **Students and secondary schools** in the United Kingdom are also entitled to a concessionary rate. Requests for concessionary copies should be accompanied by an explanatory letter; students should provide details of their course and the institution at which they are studying.

These publications are available from Publications Group, Bank of England, Threadneedle Street, London, EC2R 8AH; telephone +44 (0)20 7601 4030; fax +44 (0)20 7601 3298; email mapublications@bankofengland.co.uk or fsr_enquiries@bankofengland.co.uk.

General enquiries about the Bank of England should be made to +44 (0)20 7601 4878.
The Bank of England's website is at www.bankofengland.co.uk.

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