

# 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.<sup>(1)</sup> The article also summarises market intelligence on selected topical issues relating to market functioning.

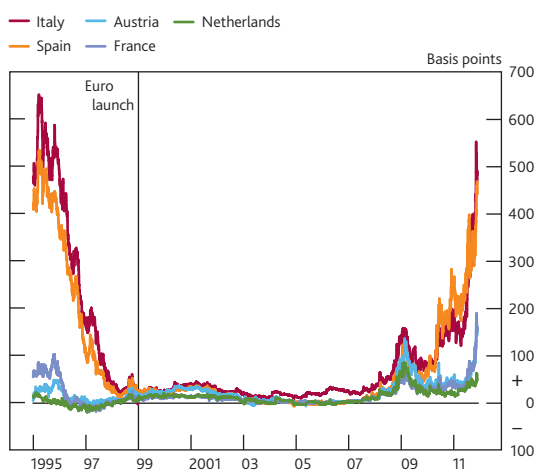
## Sterling financial markets

### 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<sup>(a)</sup>



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.<sup>(2)</sup> 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.

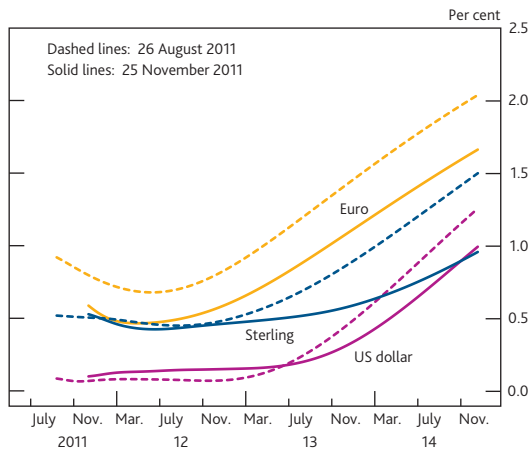
A Reuters poll of economists released after the end of the review period showed that all respondents expected further asset purchases, with a median expectation of £75 billion. Respondents expected an extension to the programme to be announced in 2012 Q1. The same poll indicated that expectations of 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](http://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<sup>(a)</sup>

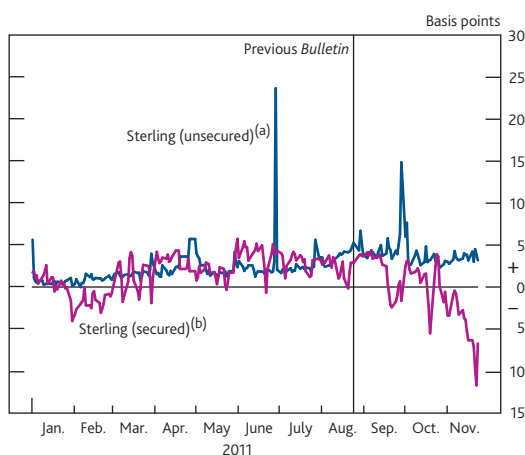


Sources: Bloomberg and Bank calculations.

(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<sup>(1)</sup>

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.<sup>(2)</sup> 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.<sup>(3)</sup>

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.<sup>(4)</sup>

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).<sup>(5)</sup>

### Gilt lending facility<sup>(6)</sup>

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 <sup>(a)</sup>	Commercial paper	Secured commercial paper	Gilts	Corporate bond		Total <sup>(b)</sup>
				Purchases	Sales	
25 August 2011 <sup>(c)(d)</sup>	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 <sup>(d)(e)</sup>	–	20	–		195	215
Total financed by central bank reserves <sup>(d)(e)</sup>	–	–	233,973		667	234,640
Total asset purchases <sup>(d)(e)</sup>	–	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.

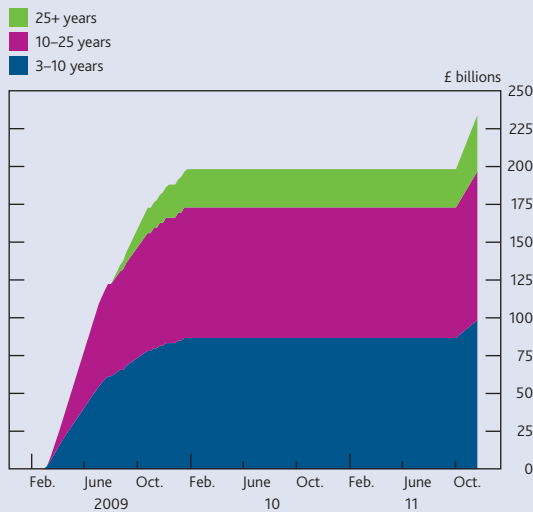
(b) Weekly values may not sum to totals due to rounding.

(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<sup>(a)</sup> by residual maturity<sup>(b)</sup>



(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.

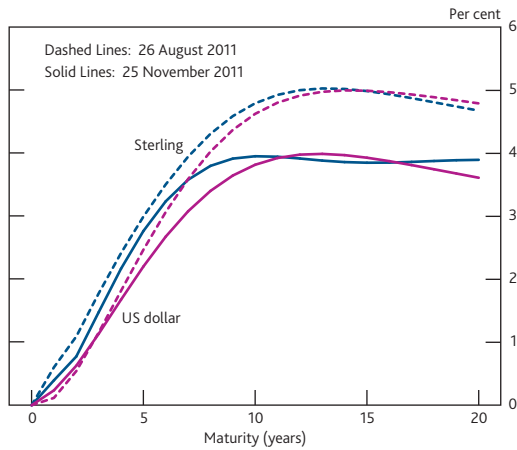
Average spreads on sterling-denominated CP over the review period were broadly stable and remain well below the levels seen in early 2009.

### 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.<sup>(7)</sup> 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](http://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](http://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](http://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](http://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](http://www.bankofengland.co.uk/markets/marketnotice090730.pdf).

**Chart 4** International nominal government bond forward yield curves<sup>(a)</sup>

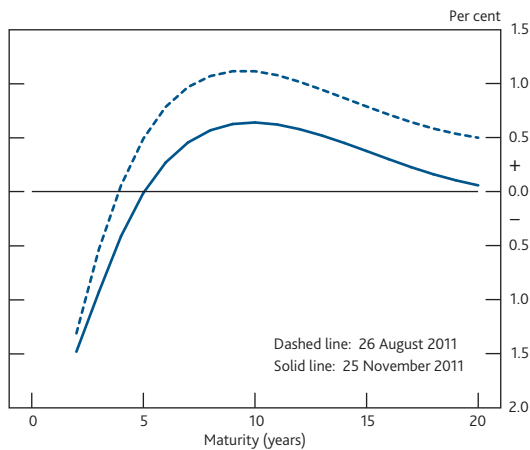


Source: Bank calculations.

(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.

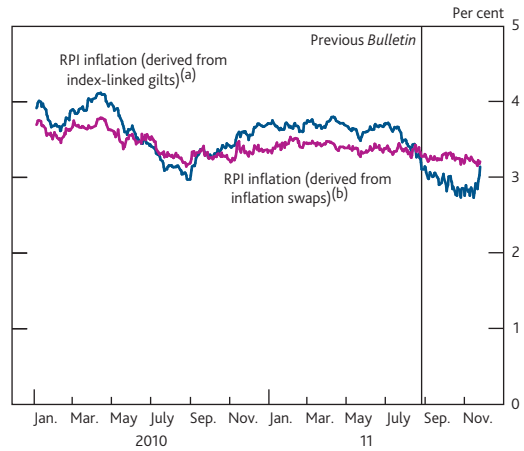
**Chart 5** UK forward real yield curve<sup>(a)</sup>



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.

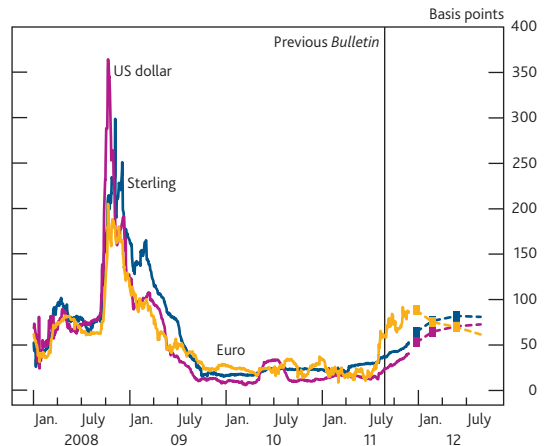
(a) Derived from the Bank's government liability curve.  
(b) Derived from the Bank's inflation swap curve.

**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<sup>(a)(b)</sup>



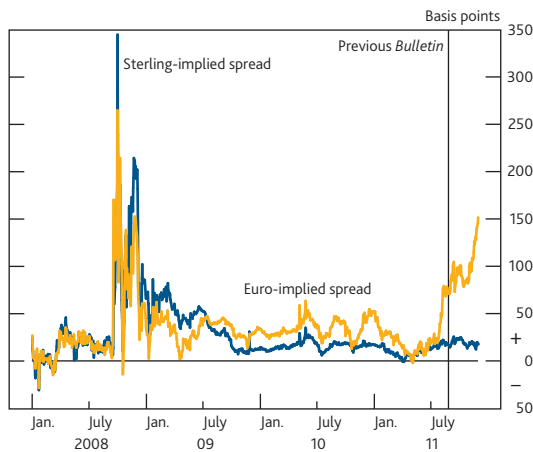
Sources: Bloomberg, British Bankers' Association and Bank calculations.

(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<sup>(a)</sup>



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

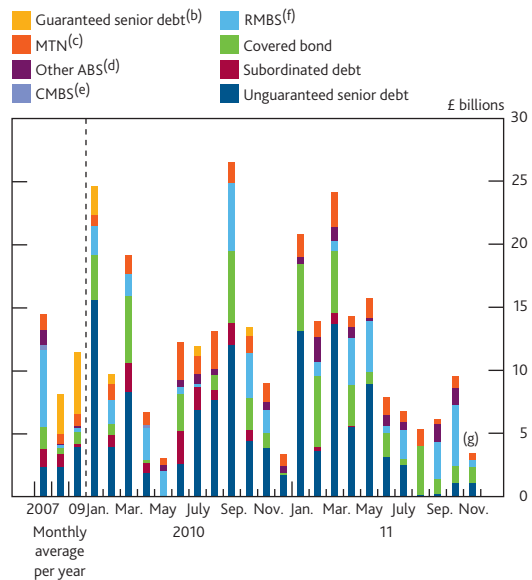
(a) Spread of three-month US dollar Libor implied from foreign exchange forwards over actual three-month US dollar Libor. For more details on the construction of these measures, see *Bank of England Quarterly Bulletin*, Vol. 48, No. 2, page 134, Chart 26 and *BIS Quarterly Review*, March 2008, pages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



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.

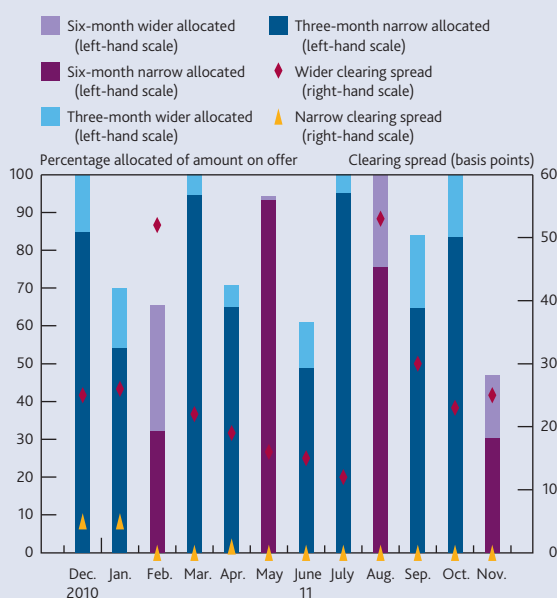
Table 1 Indexed long-term repo operations

	Total	Collateral set summary	
		Narrow	Wider
<b>13 September 2011 (three-month maturity)</b>			
On offer (£ millions)	5,000		
Total bids received (£ millions) <sup>(a)</sup>	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) <sup>(b)</sup>	30		
<b>11 October 2011 (three-month maturity)</b>			
On offer (£ millions)	5,000		
Total bids received (£ millions) <sup>(a)</sup>	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) <sup>(b)</sup>	23		
<b>15 November 2011 (six-month maturity)</b>			
On offer (£ millions)	2,500		
Total bids received (£ millions) <sup>(a)</sup>	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) <sup>(b)</sup>	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*.<sup>(1)</sup>

### Other operations

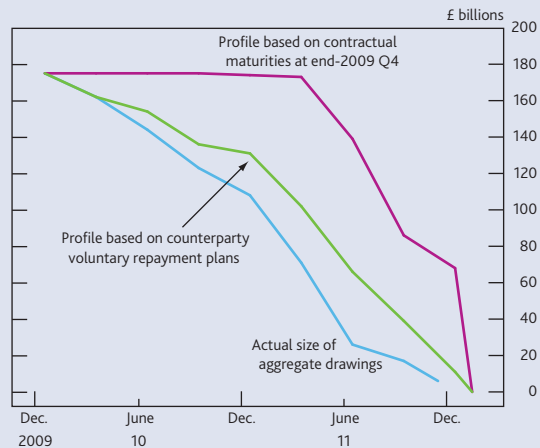
#### Special Liquidity Scheme

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.



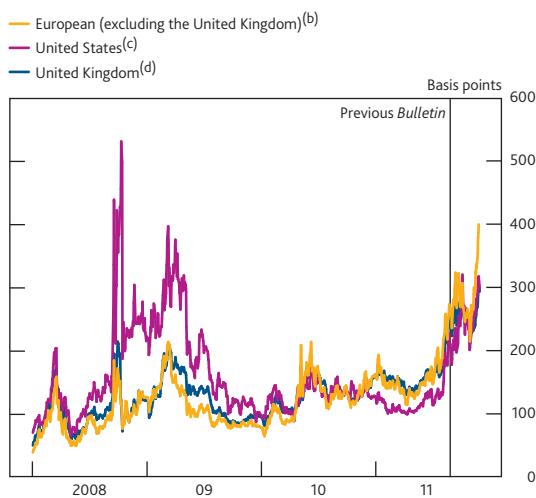
### Bank of England balance sheet: capital portfolio

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](http://www.bankofengland.co.uk/markets/money/ectr/index.htm).

**Chart 10** Selected international banks' CDS premia<sup>(a)</sup>



Sources: Markit Group Limited and Bank calculations.

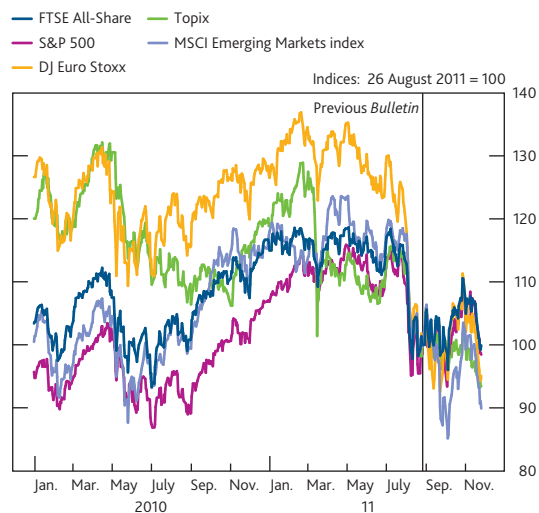
- (a) Unweighted averages of five-year, senior CDS prices.  
 (b) Average of Banco Santander, BBVA, BNP Paribas, Crédit Agricole, Credit Suisse, Deutsche Bank, Société Générale, UBS and UniCredit.  
 (c) Average of Bank of America, Citi, Goldman Sachs, JPMorgan Chase & Co. and Morgan Stanley.  
 (d)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

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

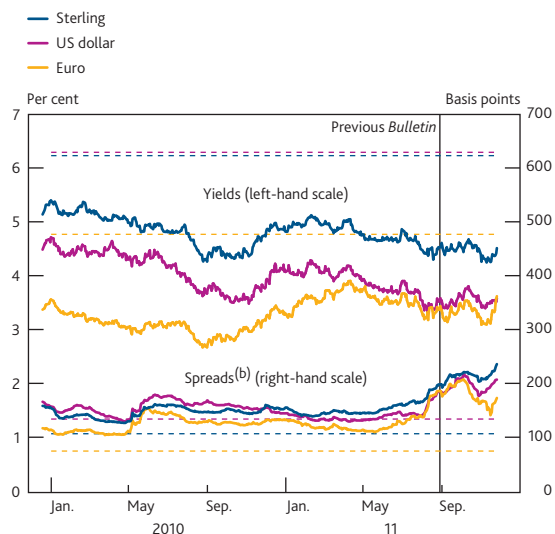
**Chart 11** International equity indices<sup>(a)(b)</sup>



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.

**Chart 12** International investment-grade, non-financial corporate bond yields and spreads<sup>(a)</sup>



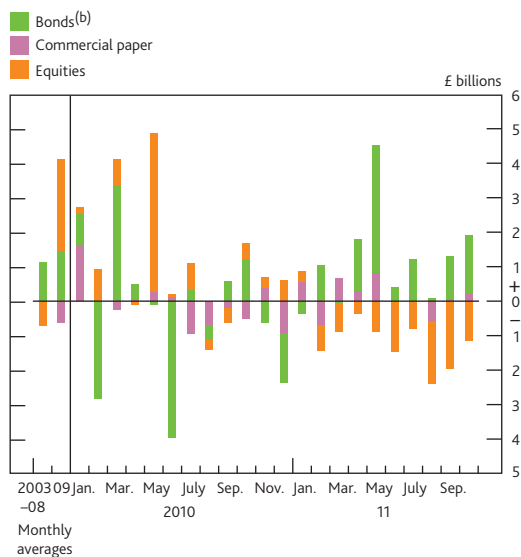
Sources: Bank of America/Merrill Lynch and Bank calculations.

- (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 PNFs<sup>(a)</sup>



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

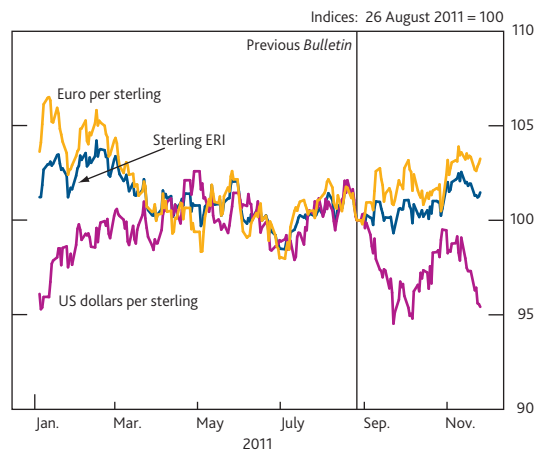
Some contacts noted the emergence of new non-bank lenders to corporates. But small and medium-sized enterprises without access to capital markets continued to have difficulty raising finance. After the end of the review period, in the Autumn Statement, the Government announced a package of interventions 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.

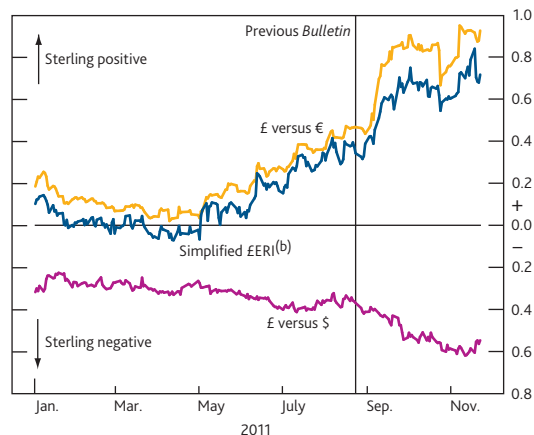
**Chart 14** Sterling ERI and bilateral exchange rates



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<sup>(a)</sup>



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.<sup>(1)</sup> 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.<sup>(2)</sup>

#### 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](http://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/mkctc05.htm](http://www.bis.org/publ/mkctc05.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.