Markets and operations

- UK and US short-term interest rates rose a little during the review period. Euro-area short-term interest rates declined in response to growing expectations among market participants that the European Central Bank (ECB) would loosen monetary policy at its June meeting (after the end of the review period). In the event, the ECB announced a number of easing measures.
- The volatility of financial markets implied by derivatives prices remained low. Some contacts suggested that this reflected reduced uncertainty around the path of monetary policy and output growth.
- UK and US ten-year government bond yields were largely unchanged over the review period, as rises in short-term interest rates were broadly offset by lower forward rates.
- The majority of advanced-economy risky asset prices increased over the review period and were broadly unaffected by tensions between Ukraine and Russia or other global events.

Overview

UK and US short-term interest rates rose in line with the path implied by forward rates at the start of the review period. In contrast, euro-area short-term interest rates declined, reflecting market participants' growing expectation that the European Central Bank (ECB) would loosen monetary policy at its June meeting. After the end of the review period, the ECB did indeed announce cuts to its main refinancing rate and the rate on its marginal deposit facility. The ECB also announced that it would stop draining liquidity to offset purchases made under its Securities Market Programme, and that it would undertake a number of targeted long-term refinancing operations later in the year.

Sterling appreciated against a broad range of currencies, albeit less so than over the previous review period. Contacts continued to attribute sterling's strength to improvements in the United Kingdom's economic outlook relative to that of other countries, and rising interest rate differentials with the euro area.

The option-implied volatility of interest rates at short horizons increased a little, but remained low by historical standards. Some contacts suggested that the level of implied volatility reflected low realised volatility, as well as reduced uncertainty around both the path of monetary policy and near-term output growth. But there were also reports of some investors selling interest rate options in order to increase the return on their portfolios as part of a broader search for yield. Some contacts were concerned that a rapid exit of those positions could amplify any future increase in market interest rates (see the box on pages 208–10 for further discussion).

UK and US ten-year government bond yields were largely unchanged over the review period, as rises in short-term interest rates were broadly offset by lower forward rates. Euro-area sovereign bond yields continued to decline, despite a short period of limited market turbulence that saw sharp increases in the government bond yields of some periphery countries. Contacts struggled to attribute the sell-off to any specific factor, and market prices retraced those moves in the days that followed. Greece re-entered the sovereign bond market during April, having been absent from the market since March 2010, and there was successful issuance from Ireland, Portugal and Spain.

Most advanced-economy risky asset prices rose over the review period and were broadly unaffected by tensions between Ukraine and Russia or other global events. There was some volatility in US equities around the start of the review period, with a brief sell-off in technology and biotech stocks in particular. But the S&P 500 index subsequently resumed its upward trend, reaching a new all-time high.

In discharging its responsibilities to ensure monetary and financial stability, the Bank gathers information from contacts across a range of financial markets. Regular dialogue with market contacts provides valuable insights into how markets function, and provides context for the formulation of policy, including the design and evaluation of the Bank's own market operations. The Bank also conducts occasional surveys of market participants in order to gather additional information on certain markets.

The first section of this article reviews developments in financial markets between the 2014 Q1 *Quarterly Bulletin* and 29 May 2014 and includes a box that discusses the recent low levels of implied volatilities across a range of asset classes. The second section goes on to describe the Bank's own operations within the Sterling Monetary Framework.

Financial markets

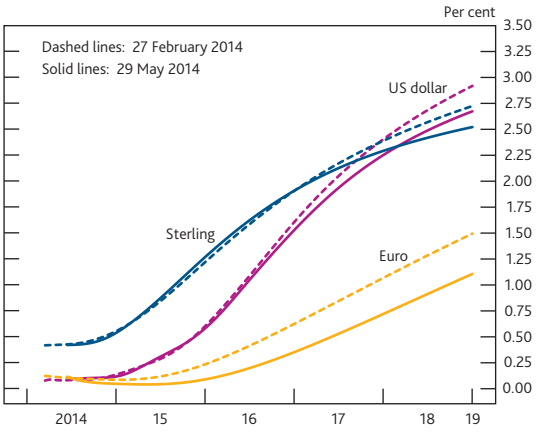
Monetary policy and interest rates

Throughout the review period, the Bank of England's Monetary Policy Committee (MPC) maintained Bank Rate at 0.5% and the stock of asset purchases financed by the issuance of central bank reserves at £375 billion. In the minutes of its May meeting, the MPC reaffirmed the guidance provided in its February *Inflation Report* that when Bank Rate did rise, it was expected to do so only gradually and to a level materially below its pre-crisis average of 5%. The MPC also used the May *Inflation Report* to clarify that it would defer sales of assets held in the Asset Purchase Facility (APF) until Bank Rate had reached a level from which it could be cut materially, were further stimulus to be required. And in line with the guidance regarding the future path of monetary policy provided by the MPC on 7 August 2013, £8.1 billion of cash flows associated with the redemption of the March 2014 gilt owned by the APF were reinvested.

During the review period the Federal Open Market Committee (FOMC) announced that it would continue to reduce — or 'taper' — the pace of its asset purchases, from US$65 billion per month in February, to US$55 billion in April and then to US$45 billion per month in May. UK forward interest rates remained higher than those of the United States over a two to three-year horizon (**Chart 1**), but US forward rates rise more steeply thereafter, reaching the same level as UK rates in the first half of 2018.

April saw some volatility in sterling overnight secured money market interest rates, with the repurchase overnight index average (RONIA) trading in the range of 31–36 basis points and reaching a level of only 10 basis points on 30 April — a record low for a day that was not a year end (**Chart 2**). Contacts pointed to the increased cost to banks of accepting customer deposits at month end, due to both their increased regulatory capital requirements and efforts to deleverage.

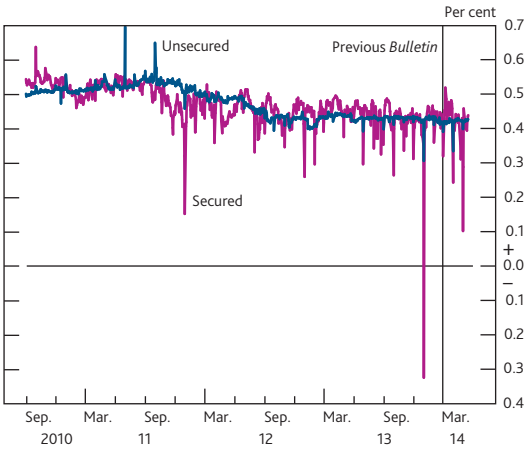
Chart 1 Instantaneous forward interest rates derived from overnight index swap (OIS) contracts[a]



Sources: Bloomberg and Bank calculations.

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

Chart 2 Weighted average sterling overnight interest rates[a]



Sources: Bloomberg and Bank calculations.

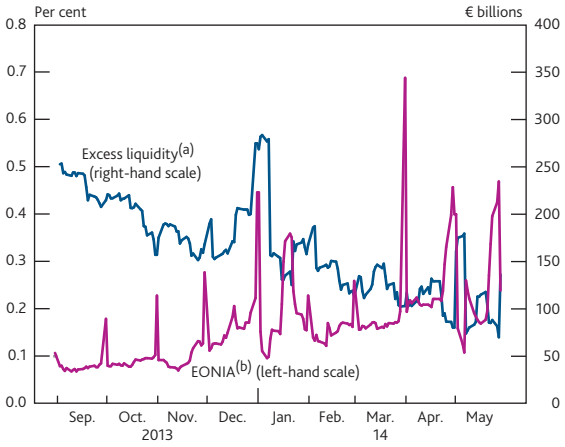
(a) The unsecured overnight interest rate is measured by the sterling overnight index average (SONIA). The secured overnight interest rate is measured by the RONIA. Both indices are provided by the Wholesale Markets Brokers' Association. For further details, see www.wmba.org.uk.

Contacts also cited a rise in demand for collateral due to a seasonal increase in equity lending at around the time of dividend payments, which may help to explain why overnight unsecured interest rates did not fall to the same extent.

There was also volatility in overnight euro-area money markets. The euro overnight index average rate (EONIA) reached 69 basis points on 31 March, the quarter end, and exhibited high levels of volatility during April (**Chart 3**). Contacts attributed this to falling excess liquidity in the euro area, reflecting ongoing repayments of funds borrowed under the European Central Bank's (ECB's) longer-term refinancing operations, as well as unanticipated changes in levels of money market liquidity stemming from 'autonomous' factors[1] such as seasonal tax payments.

(1) Autonomous factors affect the liquidity needs of the banking system but are out of the control of the ECB, and include items such as banknotes in circulation and deposits by national governments.

Chart 3 EONIA and excess liquidity in the Eurosystem

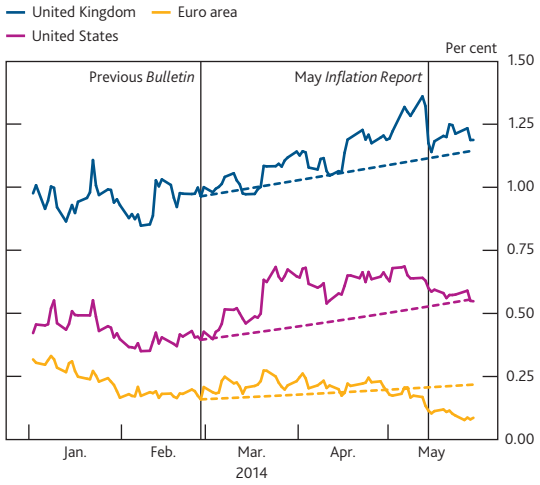


Source: Bloomberg.

(a) Excess liquidity is defined as the total amount of reserves held in Eurosystem current accounts and the deposit facility, minus average reserves requirements and use of the marginal lending facility.
(b) EONIA is the weighted average of overnight unsecured lending transactions in the interbank market undertaken in the European Union and European Free Trade Association countries.

The sterling one-year OIS rate, one year ahead, rose during the review period, but remained roughly in line with the path implied by forward rates at the time of the previous *Bulletin* (**Chart 4**). In the run-up to the publication of the May *Inflation Report*, short-term interest rates increased particularly strongly; contacts attributed this to the possibility that better-than-expected data might cause the MPC to signal a possible tightening in policy.

Chart 4 One-year OIS rates, one year ahead(a)(b)



Sources: Bloomberg and Bank calculations.

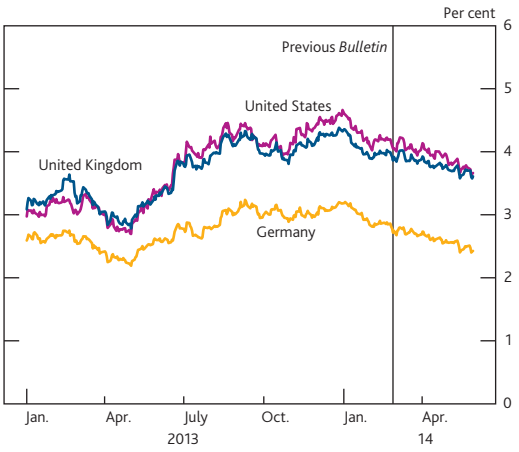
(a) Forward rates derived from the Bank's OIS curves.
(b) Dashed lines show the expected path of the one-year OIS rate, one year ahead, implied by the OIS forward curve at the start of the review period.

In the event, on the publication day of the May *Inflation Report*, sterling short-term interest rates fell sharply. Contacts pointed to weaker-than-expected labour market data released on the same day as the *Report*, and also to the MPC's forecast for the level of spare capacity in the economy (which remained around 1%–1.5% of GDP), which was slightly higher than some had expected. Contacts also noted increased interest in how steps taken by the Financial Policy Committee to counteract the risks of rising house prices might interact with the MPC's policy stance.

US and UK short-term interest rates continued to move fairly closely together for most of the review period. But the anticipated pace of recovery in the euro area continued to diverge from that of the United States and the United Kingdom. The euro-area one-year OIS rate, one year ahead, fell during the review period, which was attributed to low inflation outturns and expectations of further monetary easing by the ECB at its June meeting. In the event (and shortly after the end of the review period), the ECB announced cuts to its main refinancing rate and the rate on its marginal deposit facility. It also announced that it would stop draining liquidity to offset purchases made under its Securities Market Programme, and that it would undertake a number of targeted long-term refinancing operations later in the year.

US and UK medium-term forward interest rates fell, continuing the decline that began around the start of the year (**Chart 5**). Contacts attributed this to lower terminal policy rate expectations, a fall in risk premia due to a reduction in uncertainty around the path of future policy rates, and lower inflation expectations. Short-term interest rates increased over the review period, such that ten-year US and UK government bond yields remained largely unchanged.

Chart 5 Selected five-year government bond yields, five years forward(a)

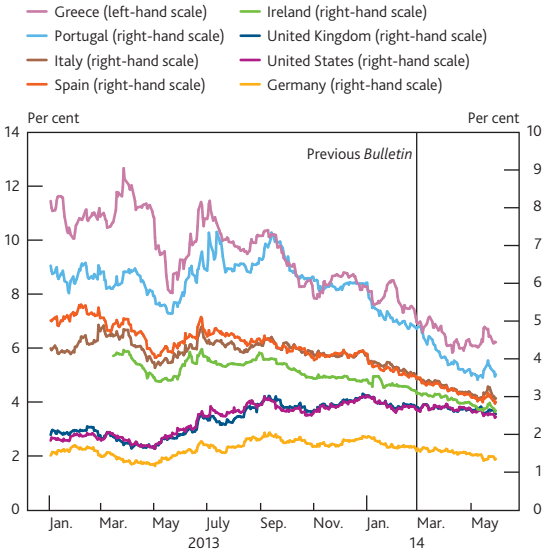


Sources: Bloomberg and Bank calculations.

(a) Yields to maturity derived from the Bank's government liability curves.

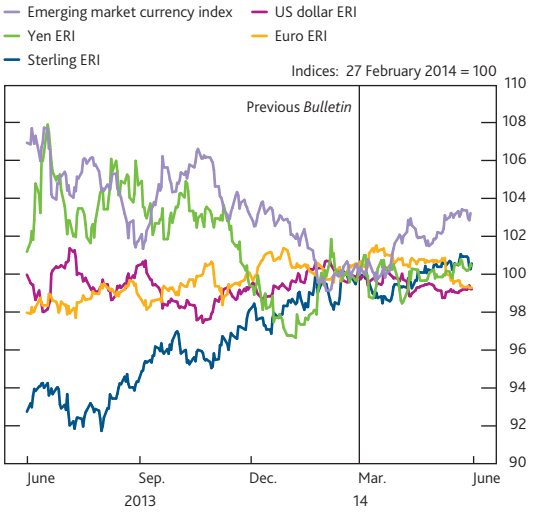
Bond yields in the euro-area periphery continued to decline relative to bunds (**Chart 6**). The Greek government re-entered the bond market for the first time since its Economic Adjustment Programme was agreed with the European Union (EU), ECB and International Monetary Fund in May 2010, and Ireland, Portugal and Spain also issued bonds. There was a temporary reversal of some of the fall in periphery government

Chart 6 Selected ten-year government bond yields



Source: Bloomberg.

Chart 7 Selected exchange rate indices



Sources: Bloomberg, European Central Bank, JPMorgan Chase & Co. and Bank calculations.

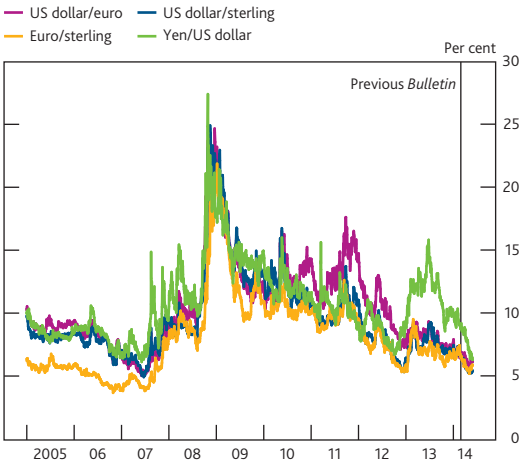
bond yields on 15 May, with spreads to bunds rising sharply — by up to around 30 basis points. Contacts struggled to attribute these moves to a specific factor. Some thought that they reflected concerns about political risk in parts of the euro-area periphery. Others suggested that a large number of investors had bought euro-area periphery sovereign debt as part of a broader 'search for yield' in response to the low level of nominal interest rates, leaving prices particularly vulnerable to a correction. A reduction in the willingness of dealers to provide liquidity — perhaps reflecting diminished appetite to offer market-making services during periods of stress — was also said to have contributed to the rapid market movement. Contagion to other markets was limited, however, and the moves largely reversed over the days that followed.

Foreign exchange

The sterling effective exchange rate index (ERI) appreciated a little over the review period, albeit by less than over the previous review period (**Chart 7**). The majority of the rise in sterling was driven by an appreciation against the euro, although the pound also appreciated against a broad basket of currencies. Contacts continued to attribute the ongoing rise in sterling to improvement in the UK economic outlook, relative to that of other countries, as well as the widening difference in interest rates in the United Kingdom versus the euro area. But some foreign exchange strategists felt that recent good news about the UK economy was now fully incorporated in the level of the exchange rate, and suggested that the risks to sterling were mainly to the downside. In particular, they thought that disappointing macroeconomic news had the potential to push down on the currency, and some also suggested that the sizable UK current account deficit would tend to cause sterling to depreciate over the medium term.

Some commentators suggested that there had been a return of emerging market 'carry trades', whereby investors borrow in low-yielding advanced-economy currencies in order to invest in higher-yielding assets in developing markets. This had been encouraged by low levels of exchange rate volatility (**Chart 8**), which served to reduce the perceived riskiness of such investment strategies (for a general discussion of recent developments in asset price volatility see the box on pages 208–10). Such carry trades were thought to have contributed to the appreciation of some emerging market currencies, with the JPMorgan emerging market currency index rising by 3% over the review period.

Chart 8 Three-month option-implied volatility of foreign exchange rates



Source: Bloomberg.

Implied volatility

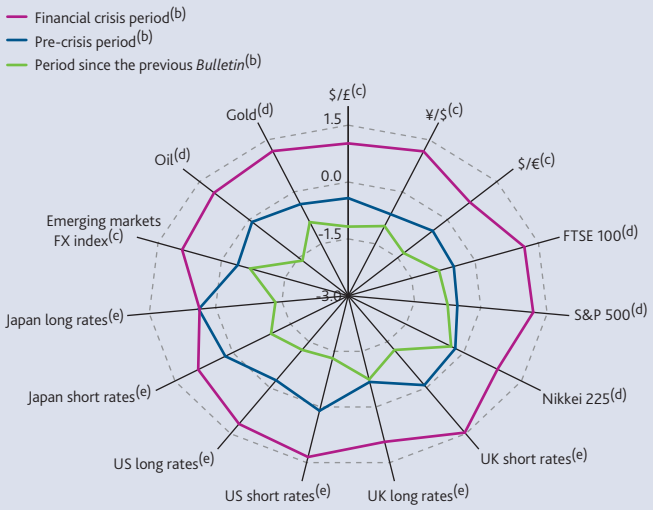
What is implied volatility?

Options are contracts that give investors the right to buy or sell an asset at a specified price — or 'strike price' — on (or before) a specified future date. An option's price therefore reflects investors' views as to the likelihood that the option will expire with positive value, and so offers an indication of the probability investors attach to the underlying asset price reaching the option strike price. This, in turn, implies something about the variability investors expect the price of the underlying asset to exhibit over the lifetime of the option. This is known as 'implied volatility'.

Recent trends in implied volatility

Short-term implied volatilities (derived from options with a three-month maturity) are currently low relative to their historical levels across a range of asset classes, including equities, interest rates, currencies and commodities. **Chart A** shows that implied volatilities derived from options with a three-month maturity are, on average, at or below pre-crisis levels across various asset classes.

Chart A Implied volatilities at the three-month horizon for international interest rates, equities, exchange rates and commodities(a)

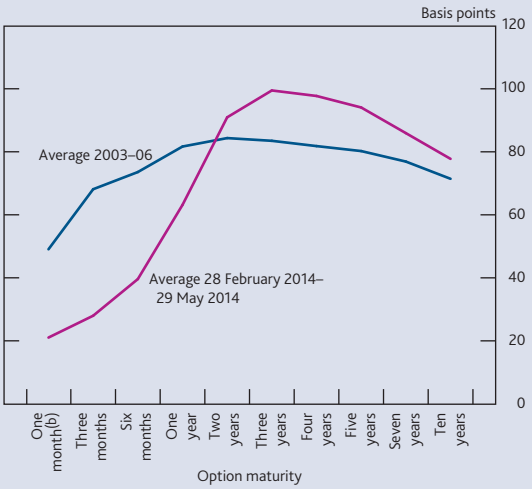


Sources: Bank of England, Barclays Live, Bloomberg and Bank calculations.

(a) The chart shows differences, in number of standard deviations, between the values of these indicators and their averages between 2 January 2003 and 29 May 2014, averaged over three different time periods. The averages are based on daily data.
(b) Pre-crisis period refers to 2 January 2003 to 8 August 2007. Financial crisis period refers to 9 August 2007 to 31 December 2009. The period since the previous *Bulletin* refers to 28 February 2014 to 29 May 2014.
(c) $/£, ¥/$ and $/€ refer to implied volatilities from three-month options on the respective exchange rates. Emerging markets FX index refers to the JPMorgan implied volatility index.
(d) Implied volatilities from three-month options on the FTSE 100, S&P 500, Nikkei 225, oil and gold.
(e) Implied volatilities from three-month options on one-year and ten-year interest rate swaps.

Implied volatilities are, however, somewhat higher at longer horizons. **Chart B** shows that, based on options of different maturities on a one-year interest rate swap, UK short-term interest rate implied volatility is well below average at a six-month horizon, but at a two-year horizon is closer to the average. The same is true of implied volatilities on US short-term interest rates. This might suggest that financial market participants expect interest rate volatility to pick up in future — perhaps due to anticipated central bank policy tightening.

Chart B Term structure of implied volatility from options of differing maturities on sterling one-year interest rate swaps(a)



Sources: Barclays Live and Bank calculations.

(a) Normalised implied volatilities of options of varying maturities on one-year sterling interest rate swaps.
(b) Data for the one-month option is only available from 30 November 2004 onwards.

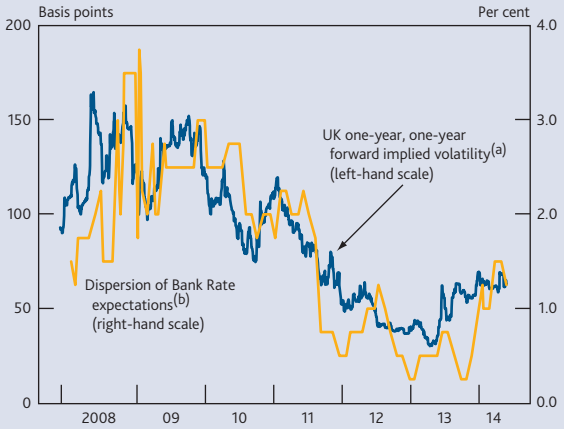
Short-maturity implied volatilities for both equities and foreign exchange are also currently at very low levels, and, as with interest rates, the term structure of implied volatility is upward sloping. Since exchange rates and equity prices are, in part, a reflection of interest rates and the differentials in interest rates between countries, it might therefore be expected that anticipated increases in the implied volatility of interest rates would be reflected in that of foreign exchange and equities.

There may, of course, be other factors serving to lower volatility in equities and exchange rates. In the foreign exchange market, for example, contacts suggest that the growth of machine-to-machine trading has served to dampen small fluctuations in prices. Contacts also note that some institutional investors and corporate end-users perceive there to be less need for active management of foreign exchange exposures in the current low-volatility environment than in the past. This will tend to have reduced implied volatility. That said, a rise in volatility may lead such market participants to reappraise the need for hedging.

What explains the low level of interest rate implied volatility?

There are a number of factors that might help explain the current low implied volatilities of interest rates at short horizons. Policy rates in the United Kingdom, the United States and the euro area have been constrained by the zero lower bound. By limiting the scope for interest rates to fall further, contacts point out that this dampens volatility. The Bank of England, Federal Reserve and ECB have also provided considerable information on their reaction functions through forward guidance, reducing uncertainty about the path of policy in the future. In the United Kingdom, for example, there does appear to be broad correlation between the dispersion of survey-based expectations of the future level of Bank Rate and implied volatility from one-year options on the one-year swap rate (**Chart C**). A reduction in the uncertainty that investors ascribe to the future path of monetary policy may therefore have helped to lower implied volatility at short horizons.

Chart C Implied volatility from a one-year option on a one-year interest rate swap versus dispersion of survey expectations for Bank Rate



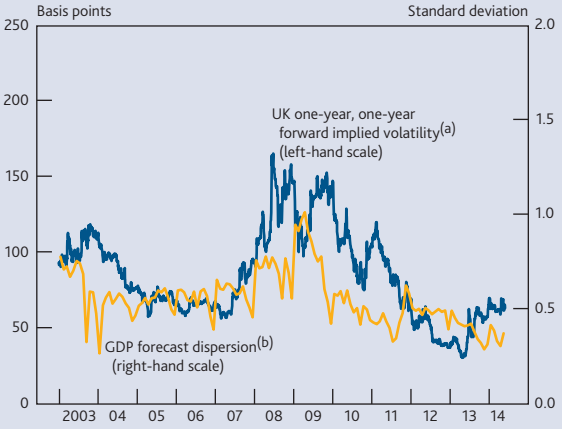
Sources: Barclays Live, Reuters and Bank calculations.

(a) Normalised implied volatility from one-year options on one-year interest rate swaps.
(b) Range of Bank Rate expectations six quarters ahead.

The low level of short-term implied volatilities might also reflect reduced uncertainty about the near-term macroeconomic outlook. But while there is some correlation between the dispersion of Consensus forecasts for GDP growth and implied volatility, both in the United Kingdom (**Chart D**) and the United States, it is not particularly strong.

Market participants may have become accustomed to the low level of observed, or 'realised', volatility in financial asset prices in the recent past, and expect it to persist. If implied volatility is largely a backward-looking measure of variability in asset prices, however, it might not be a useful predictor of future volatility at the current point in the interest rate cycle. And contacts suggest that some market participants may have

Chart D Implied volatility from a one-year option on a one-year interest rate swap versus dispersion of forecasts for annual growth in real UK GDP



Sources: Barclays Live, Consensus Economics Inc., Thomson Reuters Datastream and Bank calculations.

(a) Normalised implied volatility from one-year options on one-year interest rate swaps.
(b) Standard deviation of Consensus Economics survey of forecasters' projections for next-year real GDP growth.

underpriced the likelihood that volatility will rise. They note that there has been some sizable selling of options in the belief that interest rates and volatility would remain low for a long time and suggest that it could be difficult for option sellers to exit these positions without adding to upward pressure on options prices and causing volatility to rise further.

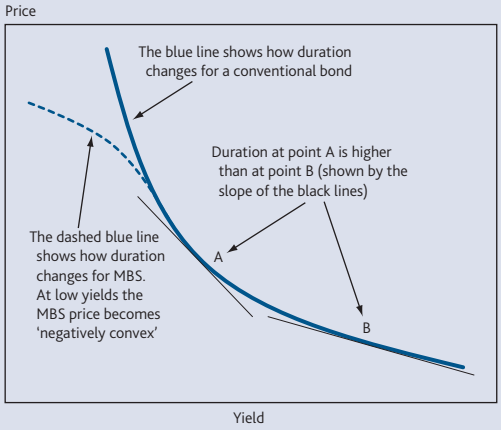
Structural changes to the US interest rate volatility market

In addition to the factors mentioned above, there may also have been a reduction in demand for protection against a rise in volatility due to changes to the US mortgage-backed securities (MBS) market. This will tend to have lowered option prices and reduced the implied volatility of long-term US interest rates.

Other things being equal, MBS prices vary inversely with financial market interest rates, or yields. A fall in the market interest rate increases the current value to the MBS holder of all of the future coupon payments accruing to the instrument. A fall in interest rates will therefore increase the current value of an MBS, pushing up its price (see **Chart E** for a simple illustration). The sensitivity of the price of an instrument to changes in interest rates is referred to as 'duration'.

Duration is a function of the level of yields. For a conventional bond, duration rises as the yield falls (see the difference in the slope of the blue line in **Chart E** at points A and B). But in the case of an MBS, duration is also affected by the fact that a decline in interest rates will induce some borrows to repay their mortgages early (by re-mortgaging). If interest rates fall materially, the loss of future income resulting from early repayments will begin to offset the effect of decreasing market

Chart E Illustrative diagram of the relationship between bond and MBS prices and yields



rates on the current value of the remaining coupons. And, at a certain point, the price of the MBS will become less, rather than more, sensitive to further declines in rates. Duration will then fall as the yield falls (the dashed blue line in **Chart E**).

This feature of the duration of MBS is referred to as 'negative convexity' and has implications for the hedging of interest rate risk associated with holding MBS. The risk of small changes in interest rates can be hedged by, for example, entering into an interest rate swap to receive floating interest rates and pay fixed. Then, if rates fall, income from the floating-rate leg of the swap will fall, offsetting the increase in the value of the MBS. As a result, the duration of the portfolio overall is held broadly constant.

However, because of negative convexity, once rates have fallen sufficiently far from where they began, the duration of the MBS will also begin to fall. To maintain the hedge, the MBS holder will then need to increase the duration of the portfolio, perhaps by receiving fixed and paying floating in swaps (putting downward pressure on swap rates), or buying US Treasuries (putting downward pressure on yields).

So, convexity hedging will tend to reinforce the initial decline in the market interest rate. But, once rehedged, as rates begin to rise, and the MBS duration begins to rise, convexity hedging will then induce the MBS holder to enter into swap agreements to receive floating and pay fixed, or to sell assets that are long duration. Thus, in a rising rate environment, convexity hedging will tend to amplify the impact of the initial movement in market interest rates — resulting in sharper rises in interest rates and volatility than would have occurred otherwise.

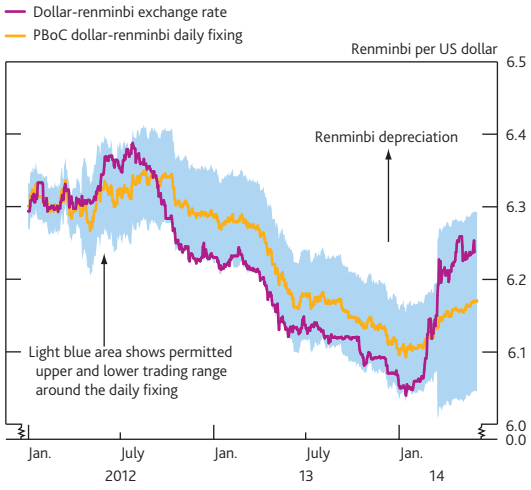
Contacts suggest that this amplification mechanism has exacerbated increases in volatility during past tightening cycles. However, they also report that the effects of convexity hedging might be less potent than in previous rate-rising cycles. In large part, that is because asset purchases by the US Federal Reserve have significantly reduced the amount of MBS held by private investors. While MBS investors, such as government-sponsored enterprises, typically hedge at least some of their exposure to changes in duration, the Federal Reserve does not. Bank holding companies also now hold more MBS in their hold-to-maturity portfolios than was previously the case, and do not need to hedge these exposures against convexity risk.

Separately, changes to mortgage-servicing practices are thought to have significantly reduced interest rate hedging activity. Contacts note that a large amount of mortgage-servicing activity has migrated to non-bank mortgage originators, adding that these institutions tend to rely on revenue from new mortgage origination to offset the effect of pre-payments on revenues from mortgage servicing. Indeed, contacts suggest that mortgage servicing-related hedging flows are now a fraction of what they were a few years ago.

The shift in the structure of the US MBS market described above — and associated changes in interest rate hedging behaviour — may have lowered option prices and implied volatilities. And, while it remains to be seen, it might also have reduced the extent to which a rise in volatility will become self-reinforcing in the future. Given the high degree of substitutability of US and UK government bonds, there may be material spillovers to UK rates as well.

One notable exception to this was the Chinese renminbi, which declined fairly steadily over the course of the review period. In February, the People's Bank of China (PBoC) began to lower the value of the renminbi versus the US dollar, by raising the daily dollar-renminbi fixing. This introduced more 'two-way risk' into the currency, following a prolonged period of steady appreciation. Commentators suggested at the time that this might presage a move towards a widening of the daily trading band versus the US dollar, in an effort to introduce a greater role for market forces in determining the exchange rate. During the current review period, the PBoC did indeed widen the daily trading band from ±1% to ±2%. Having typically traded towards the bottom of the band during the period of renminbi appreciation, the dollar-renminbi exchange rate has traded towards the upper end of that range since the PBoC's actions in February (**Chart 9**).

Chart 9 Chinese renminbi per US dollar and daily renminbi trading bands



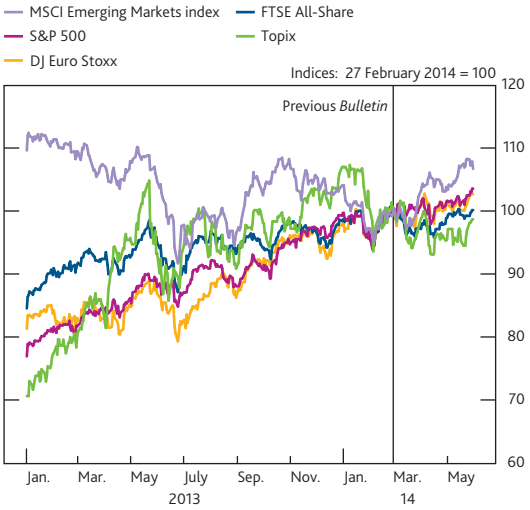
Source: Thomson Reuters Datastream.

Corporate capital markets

The majority of advanced-economy equity indices rose over the review period as a whole (**Chart 10**), with limited reaction to tensions in Ukraine or political developments in other parts of the world. That said, around the start of the review period, there was a reappraisal of the value of US stocks, with technology, homebuilder and biotech shares particularly affected. Contacts thought that these stocks had become expensive-looking and prone to repricing. Nevertheless, US equities subsequently resumed their upward trend, with the S&P 500 reaching an all-time high during the review period.

The UK initial public offering (IPO) market remained buoyant, with the review period seeing the flotation of 35 companies in deals worth a total of US$8.6 billion. There was, however, a slowing of this market compared with the end of 2013 and Q1 of this year (**Chart 11**). There were also some signs of a diminishing investor appetite for new issues, with contacts

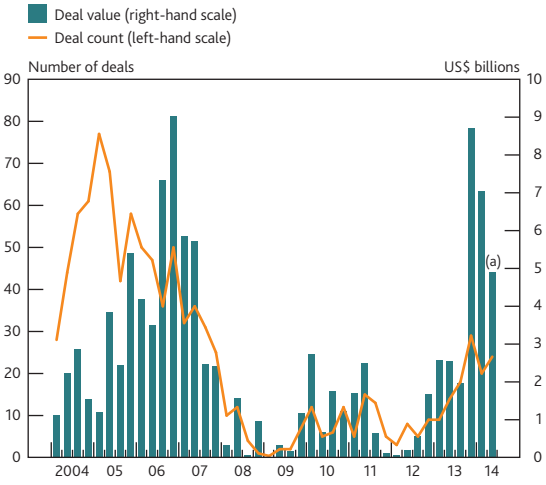
Chart 10 International equity indices[a][b]



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 free-float weighted index that monitors the performance of stocks in global emerging markets.

Chart 11 Total value and number of IPOs by UK firms



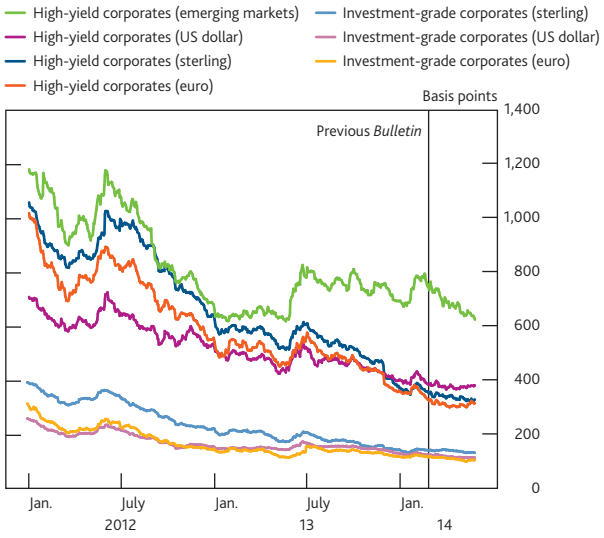
Source: Dealogic.

(a) Data to 29 May 2014.

pointing to underperformance of some recently listed shares. In particular, contacts noted that retail stocks may have become harder to list relative to those of other sectors, given the large number of recent flotations of retailers.

In corporate bond markets, advanced-economy investment grade and high-yield credit spreads continued to fall (**Chart 12**). As with equities, events in Ukraine and elsewhere did little to interrupt the broad trend in credit spreads, suggesting that markets perceived there to be limited spillover from political tensions to corporate credit risk in developed markets. Demand for euro-denominated high-yield debt was particularly strong, reflecting investor appetite for assets offering high returns. Some corporates based in euro-area periphery countries were able to return to the bond market.

Chart 12 International corporate bond option-adjusted spreads

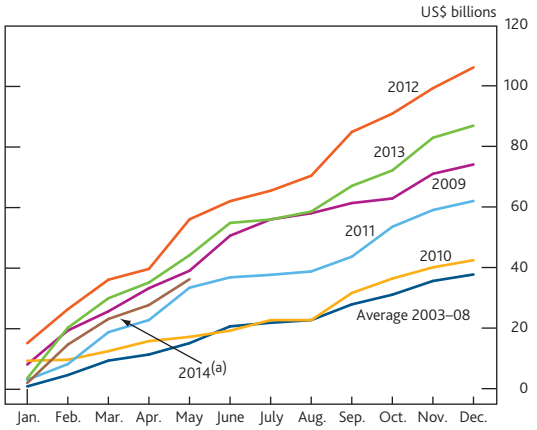


Sources: BofA Merrill Lynch Global Research and Bank calculations.

As well as tightening spreads, there had been a loosening in some non-price terms, such as loan covenants.

Bond issuance by UK private non-financial corporations (PNFCs) since the start of the year was broadly in line with the same period in 2013 (**Chart 13**). Contacts expected the current pace of issuance to continue into the summer, as issuers sought to take advantage of current favourable pricing conditions.

Chart 13 Cumulative gross bond issuance by UK PNFCs



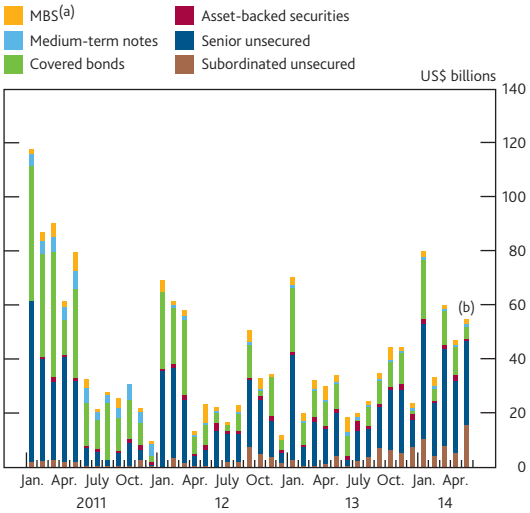
Sources: Dealogic and Bank calculations.

(a) Data to 29 May 2014.

Bank funding markets

There was a marked rise in issuance by European banks compared with the same period in 2013 (**Chart 14**). Among the issuers were several banks from periphery euro-area countries. Sterling-denominated issuance also rose compared with the same period last year.

Chart 14 Term issuance by European (excluding UK) lenders in public markets



Sources: Dealogic and Bank calculations.

(a) Commercial and residential mortgage-backed securities.
(b) Data to 29 May 2014.

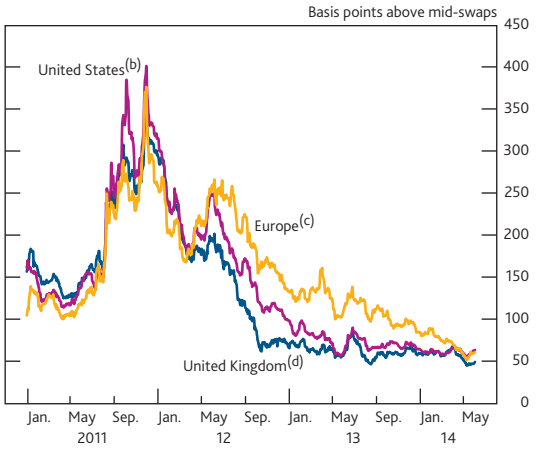
There continued to be strong demand for contingent convertible capital instruments. Issuance of additional Tier 1 (AT1) capital instruments since the start of the year overtook the total for the whole of 2013, and March saw the largest single week of contingent convertible capital issuance to date. Some contacts suggested that the prices paid for AT1 instruments looked high; others felt that yields were still attractive relative to those on other assets. Contacts also expressed concern that some investors might be buying AT1 instruments on the basis of the strength of the issuer, with little attention paid to the structure of the instruments themselves.

In the secondary market, the gap between senior unsecured bank bond spreads for UK, US and European banks narrowed, as European spreads continued to fall more quickly than those for the United Kingdom and the United States (**Chart 15**). For the first time since April 2012 an indicative measure of European senior unsecured bank bond spreads dipped below that of the United States.

On 29 April the Bank announced details of the scenario for the stress tests proposed in October 2013 to assess the capital adequacy of the UK banking system.(1) The Bank of England will add a number of additional UK layers to the EU-wide stress test, the details of which were announced by the European Banking Authority in January 2014,(2) in order to explore particular vulnerabilities facing the UK banking system. Overall, contacts felt that both of the stress tests, and the ECB's asset quality review, would help to increase transparency and capital resiliency in the banking sector.

(1) www.bankofengland.co.uk/publications/Pages/news/2014/071.aspx.
(2) www.eba.europa.eu/-/eba-announces-key-features-of-the-2014-eu-wide-stress-test.

Chart 15 Indicative senior unsecured bank bond spreads[a]



Sources: Bloomberg, Markit Group Limited and Bank calculations.

(a) Constant-maturity unweighted average of secondary market spreads to mid-swaps of banks' five-year senior unsecured bonds, where available. Where a five-year bond is unavailable, a proxy has been constructed based on the nearest maturity of bond available for a given institution and the historical relationship of that bond with the corresponding five-year bond.
(b) Average of Bank of America, Citi, Goldman Sachs, JPMorgan Chase & Co., Morgan Stanley and Wells Fargo.
(c) Average of Banco Santander, BBVA, BNP Paribas, Crédit Agricole, Credit Suisse, Deutsche Bank, ING, Intesa, Société Générale, UBS and UniCredit.
(d) Average of Barclays, HSBC, Lloyds Banking Group, Nationwide, Royal Bank of Scotland and Santander UK.

Operations

Operations within the Sterling Monetary Framework and other market operations

This section describes the Bank's operations within the Sterling Monetary Framework (SMF) over the review period, and other market operations. The level of central bank reserves is determined by (i) the stock of reserves injected via the Asset Purchase Facility (APF); (ii) the level of reserves supplied by operations under the SMF; and (iii) the net impact of other sterling ('autonomous factor') flows across the Bank's balance sheet.

Operational Standing Facilities

Since 5 March 2009, the rate paid on the Operational Standing Deposit Facility has been zero, while all reserves account balances have been remunerated at Bank Rate. As a consequence, average use of the deposit facility was £0 million in each of the February, March and April maintenance periods. Average use of the lending facility was also £0 million.

Indexed Long-Term Repo open market operations

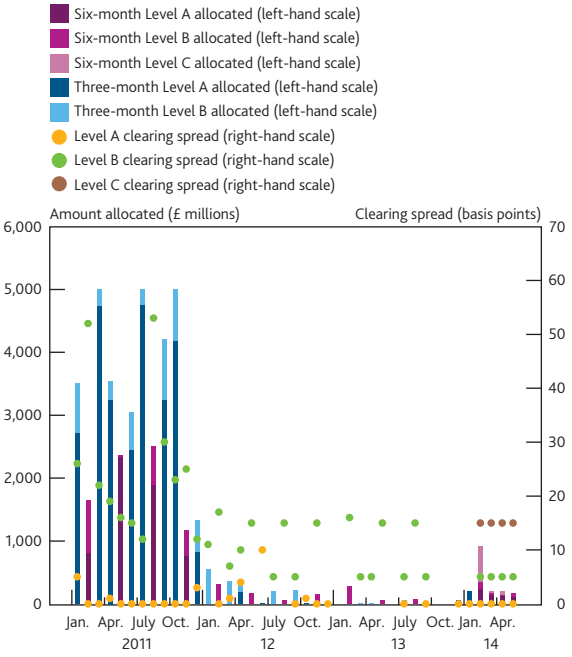
The Bank conducts Indexed Long-Term Repo (ILTR) operations as part of its provision of liquidity insurance to the banking system. These typically occur once every calendar month. During the review period, the Bank offered a minimum of £5 billion via six-month ILTR operations on 11 March, 8 April and 13 May 2014 (**Table A**).

Over the quarter, and in line with recent quarters, the aggregate level of reserves supplied by the Bank through quantitative easing (QE), remained in excess of the level that would otherwise be demanded by market participants. Usage of the facility therefore remained limited, though the launch of the revised operations in February 2014 prompted some additional interest (**Chart 16**).

Table A Indexed Long-Term Repo operations

	Total	Collateral set summary		
		Set A	Set B	Set C
11 March 2014 (six-month maturity)				
Minimum on offer (£ millions)	5,000			
Total bids received (£ millions)	203	148	25	30
Amount allocated (£ millions)	203	148	25	30
Clearing spread (basis points)		0	5	15
8 April 2014 (six-month maturity)				
Minimum on offer (£ millions)	5,000			
Total bids received (£ millions)	200	125	20	55
Amount allocated (£ millions)	200	125	20	55
Clearing spread (basis points)		0	5	15
13 May 2014 (six-month maturity)				
Minimum on offer (£ millions)	5,000			
Total bids received (£ millions)	160	110	50	0
Amount allocated (£ millions)	160	110	50	0
Clearing spread (basis points)		0	5	15

Chart 16 ILTR reserves allocation and clearing spreads[a]



(a) Where there has not been any allocation to a collateral set, no clearing spread is marked.

Contingent Term Repo Facility

The Contingent Term Repo Facility (CTRF) is a contingent liquidity facility, designed to mitigate risks to financial stability arising from a market-wide shortage of sterling liquidity.[1] The Bank judged that in light of market conditions, CTRF auctions were not required during the review period.

(1) Further details are available at www.bankofengland.co.uk/markets/Pages/money/ctrf/default.aspx.

Discount Window Facility

The bilateral on-demand Discount Window Facility (DWF) is aimed at banks experiencing a firm-specific or market-wide shock. It allows participants to borrow highly liquid assets in exchange for less liquid collateral in potentially large size and for a variable term. The average daily amount outstanding in the DWF in the three months to 31 December 2012, lent with a maturity of more than 30 days was £0 million.

Other operations

Funding for Lending Scheme

The Funding for Lending Scheme (FLS) was launched by the Bank and HM Treasury on 13 July 2012. The initial drawdown period for the FLS ran from 1 August 2012 until 31 January 2014, and the drawdown period for the FLS extension opened on 3 February 2014 and will run until 30 January 2015. The quantity each participant can borrow in the FLS extension is linked to its performance in lending to the UK real economy, with the incentives skewed towards supporting small business lending.(1)

The Bank publishes quarterly data showing, for each group participating in the FLS extension, the amount borrowed from the Bank and the net quarterly flows of lending. In the first two months of the second part of the Scheme ending 31 March 2014, four of the 36 groups participating in the FLS extension made drawdowns totalling £2 billion. Participants also repaid £0.6 billion from the first stage of the FLS. This took outstanding aggregate drawings under the Scheme to £43.3 billion.(2)

US dollar repo operations

Since 11 May 2010, in co-ordination with other central banks, the Bank has offered weekly fixed-rate tenders with a seven-day maturity to offer US dollar liquidity. From 12 October 2011 to 23 April 2014 the Bank also offered US dollar tenders with a maturity of 84 days.

On 24 January 2014 the Bank, in co-ordination with other central banks, announced that in view of the improvement in US dollar funding conditions and the low demand for US dollar liquidity-providing operations, the current US dollar repo operations would be phased out. Consistent with this, monthly 84-day operations ceased on 23 April 2014. The network of bilateral central bank liquidity swap arrangements provides a framework for the reintroduction of US liquidity operations if warranted by market conditions.(3) There was no use of the Bank's US dollar facilities during the review period.

Bank of England balance sheet: capital portfolio

The Bank holds an investment portfolio that is approximately the same size as its capital and reserves (net of equity holdings, for example in the Bank for International Settlements, and the Bank's physical assets) and aggregate cash ratio deposits. The portfolio consists of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity, though sales may be made from time to time, reflecting, for example, risk or liquidity management needs or changes in investment policy. The portfolio currently includes around £5.0 billion of gilts and £0.3 billion of other debt securities.

Asset purchases

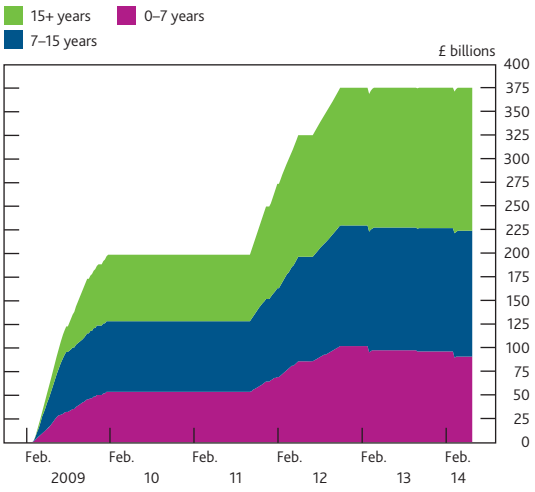
As of 31 May 2014, outstanding asset purchases financed by the issuance of central bank reserves under the APF were £375 billion, in terms of the amount paid to sellers.

Gilts

Alongside the publication of the *Inflation Report* on 12 February 2014, the MPC announced that it intends to maintain the stock of purchased assets, including reinvesting the cash flows associated with all maturing gilts held in the APF, at least until Bank Rate has been raised from its current level of 0.5%.(4) In line with this, the cash flows associated with the redemption of the March 2014 gilt owned by the APF were reinvested. Reinvestment operations took place over the three-week period after the gilt matured on 7 March.

The total stock of gilts outstanding, in terms of the amount paid to sellers, was £375 billion, of which £90.5 billion of purchases were made in the 3–7 years residual maturity range, £133.2 billion in the 7–15 years residual maturity range and £151.3 billion with a residual maturity of greater than 15 years (**Chart 17**).

Chart 17 Cumulative gilt purchases by maturity(a)(b)



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

(1) Further details are available at www.bankofengland.co.uk/markets/Pages/FLS/default.aspx.
(2) Further details are available at www.bankofengland.co.uk/markets/Pages/FLS/extensiondata.aspx.
(3) Further details are available at www.bankofengland.co.uk/markets/Documents/marketnotice140124.pdf.
(4) Further details are available at www.bankofengland.co.uk/publications/Documents/inflationreport/2014/ir14febo.pdf.

Gilt lending facility[1]

The Bank continued to offer to lend some of its gilt holdings via the Debt Management Office in return for other UK government collateral. In the three months to 31 March 2014, a daily average of £385 million of gilts was lent as part of the gilt lending facility. Average daily lending in the previous quarter was £225 million.

Corporate bonds

There were no purchases of corporate bonds during the review period and future purchase or sale operations will be dependent on market demand, which the Bank will keep under review in consultation with its counterparties in the Corporate Bond Scheme.[2] The Scheme currently holds no bonds.

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.[3] The facility remained open during the review period but no purchases were made.

(1) For more details on the gilt lending facility see the box 'Gilt lending facility' on page 253 of the *Bank of England Quarterly Bulletin*, Vol. 50, No. 4.
(2) More information can be found in the Market Notice at www.bankofengland.co.uk/markets/Documents/marketnotice130627.pdf.
(3) The SCP facility is described in more detail in the Market Notice available at www.bankofengland.co.uk/markets/Documents/marketnotice120801.pdf.