Credit spreads: capturing credit conditions facing households and firms

By Nick Butt and Alice Pugh of the Bank's Monetary Assessment and Strategy Division.[1]

- Changes in credit conditions have been one of the main headwinds affecting the UK recovery since the financial crisis.

- The likely path of credit spreads is a key determinant of the Monetary Policy Committee's projections for output and inflation.

- This article explains how staff at the Bank of England calculate measures of credit spreads which can be used to help inform the Monetary Policy Committee's central macroeconomic projections.
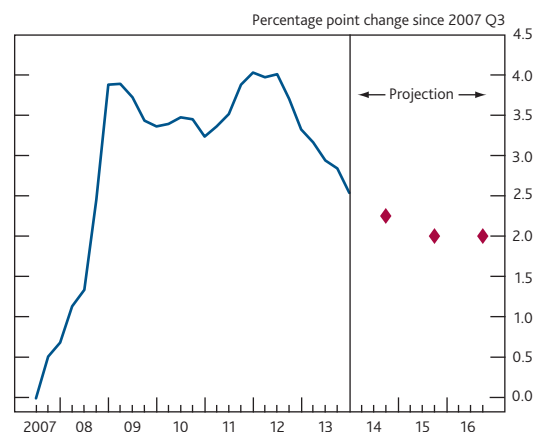
Overview

Following the onset of the financial crisis in 2007, the interest rates facing households and firms diverged from the Bank of England's policy rate, Bank Rate. The wedge which resulted is known as a credit spread. Despite sharp cuts to Bank Rate in 2008 and 2009, the cost of finance remained elevated and credit spreads widened, weighing on the economic recovery.

This article describes how staff at the Bank of England calculate movements in credit spreads for households and firms, which can be weighted together to form a summary measure of credit conditions in the United Kingdom. The blue line in the **summary chart** shows the change in this summary measure since the start of the financial crisis.

The Bank of England's measures of credit conditions are largely based on changes in the cost of credit for households and firms. But there are many dimensions to credit conditions, including price and non-price terms and the quantity of credit supplied for given terms and conditions. Attempts are made to capture variation in credit availability, but they are likely to do so imprecisely. The methodology has evolved over time, as more has been learned about the evolution of credit conditions and their impact on the UK economy.

Changes in credit conditions are likely to continue to influence economic activity in the future. Staff at the Bank of England form a projection for credit spreads by considering both near-term indicators and the likely long-run level of credit spreads. This level will be influenced by conditions in

Summary chart The summary measure of credit spreads[a]

Percentage point change since 2007 Q3

Sources: Bank of England, BDRC Continental *SME Finance Monitor*, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey, Department for Business, Innovation and Skills and Bank calculations.

(a) The diamonds show the profile of the summary credit spread at one, two and three years ahead that was published in the May 2014 *Inflation Report*. The blue line shows the back data.

the banking sector, including the cost of bank funding in the longer run.

The diamonds in the **summary chart** show the projection for credit spreads at the one, two and three-year horizons that was published in the May 2014 *Inflation Report*. This projection is used to inform the Monetary Policy Committee's central projections for inflation, GDP and unemployment.

Click here for a short video that discusses some of the key topics from this article.

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

Following the onset of the financial crisis in 2007, the interest rates facing households and firms diverged from the Bank of England's policy rate, Bank Rate. Despite sharp cuts to Bank Rate in 2008 and 2009, the cost of finance remained elevated and so credit spreads widened. Tighter credit conditions have weighed on the recovery in economic activity by constraining consumption and investment.

Changes in credit conditions are likely to continue to influence economic activity in the future. In recent *Inflation Reports*, the estimated future path of credit spreads has helped determine the Monetary Policy Committee's (MPC's) 'Key Judgements' which underpin their central economic forecasts. The May 2014 *Inflation Report* contained the judgement that improving credit conditions would aid a revival in productivity and real incomes that would, in turn, help to underpin a sustained expansion in demand.

This article focuses on credit spreads as a measure of credit conditions. It starts by defining credit spreads and explains why they matter for economic forecasting. It then explains how the Bank's preferred measures of credit spreads are constructed. The final section outlines a framework for forming projections of credit spreads — and the role of such projections in the MPC's forecasts for output and inflation. A short video explains some of the key topics covered in this article.[1]
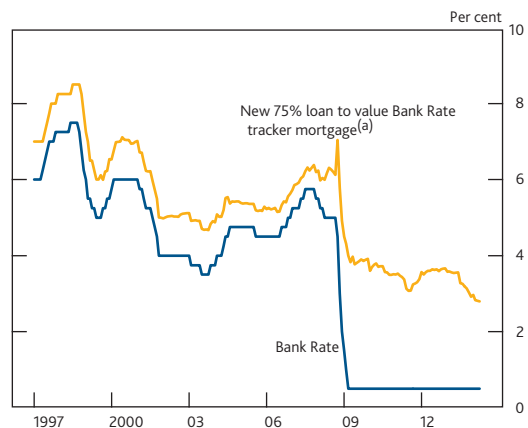
What are credit spreads and why do they matter for economic forecasting?

The cost of new borrowing and saving is an important determinant of households' and firms' consumption and investment decisions. A key feature of the recent crisis has been the divergence between the policy rate and interest rates facing households and firms. This wedge is known as a credit spread. **Chart 1** illustrates the change in the credit spread — shown as the gap between the blue and orange lines — over time for a new Bank Rate tracker mortgage. In the period shortly before the onset of the crisis, the credit spread for tracker mortgages was typically small and stable. But that spread has widened significantly since the start of the financial crisis: despite significant cuts to Bank Rate — from 5% in September 2008 to 0.5% in March 2009 — borrowing costs have remained elevated.

Estimates by Bank staff suggest that tighter credit conditions played an important role in explaining the weakness in output seen during the crisis. For example, the estimates outlined in Barnett and Thomas (2013) suggest that, between 2007 and 2012 Q3, credit supply shocks could account for between a third and a half of the observed fall in GDP relative to pre-crisis trends.

Given their importance for consumption and investment, the inclusion of variables that capture changes in credit conditions

Chart 1 A representative household borrowing rate and Bank Rate

(a) Quoted rates on 75% loan to value Bank Rate tracker mortgage. The Bank's quoted interest rates series are weighted averages of interest rates derived from relevant products offered by a sample of the largest banks and building societies.

improves the ability of macroeconomic models to explain, and forecast, economic developments. There are a variety of mechanisms outlined in the economic literature through which credit conditions may affect demand and potential output.[2] But there is no clear consensus about how best to capture credit conditions in the models used by central banks and other macroeconomic forecasters. When credit spreads are low and stable — for example, in the period leading up to the financial crisis — movements in loan rates can be approximated by changes in Bank Rate. During times when the rates facing households and companies diverge from policy rates, however, a more sophisticated approach is required.

Staff at the Bank of England construct measures of credit spreads for households and firms. These can be weighted together to form a summary measure of the change in credit spreads for the 'average' borrower in the United Kingdom since the start of the financial crisis.[3] And since the end of 2007, staff projections for credit spreads have also been used to help the MPC formulate its macroeconomic projections.

Calculating measures of credit spreads

Staff at the Bank of England construct measures of credit spreads for households and firms. These are based on spreads between the interest rates offered by banks and building societies (hereafter referred to as 'banks') on new lending and deposits, and appropriate risk-free rates.

To calculate the measure of household credit spreads, households are grouped together depending on the source of finance they would be most likely to use if they were to

(1) See http://youtu.be/3vpDKQ7FWdk.
(2) See, for example, Bernanke, Gertler and Gilchrist (1999), Kiyotaki and Moore (1997) and Gertler and Karadi (2011).
(3) The summary measure of credit spreads was referred to as the 'credit spread adjustment' in Burgess *et al* (2013).

increase spending: high and low loan to value (LTV) secured borrowers, unsecured borrowers and savers. For each of these groups, credit spreads are calculated using 'quoted' interest rates — that is, the rates advertised for new lending and savings products. Appropriate risk-free rates are subtracted from each of these loan and deposit rates to form a credit spread. More detail on how the household credit spread is calculated can be found in the box on pages 140–41.

The measure of corporate credit spreads groups businesses together depending on their size. Loans to smaller businesses have tended to be riskier than loans to large firms, meaning that interest rates have typically been higher in order to compensate banks for bearing additional risk. Calculating credit spreads for companies requires more judgement than for households because data on the cost of new bank loans to companies are limited. This means that the corporate credit spread is calculated using a range of data, including from surveys. More detail on how the corporate credit spread is calculated can be found in the box on pages 142–43.
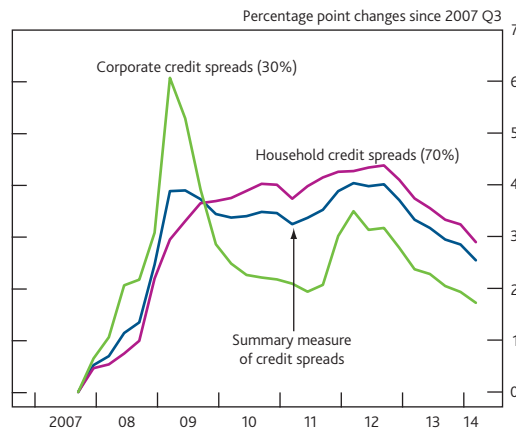
The methodology used by Bank staff to calculate these measures of credit spreads may be revised over time as more is learned about the evolution of credit conditions and their impact on the UK economy. Indeed, several alterations have been made since the measures were first constructed following the onset of the financial crisis, reflecting, for example, the availability of new data series and findings from staff analysis.

The household and corporate credit spread components can be weighted together, according to their relative share in the stock of lending, to form a single summary measure of credit spreads.[1] The weights are fixed over time, at 70% and 30%, respectively, to avoid capturing any endogenous response of the relative shares of household and corporate lending to changes in credit spreads. For example, suppose that credit conditions tightened by more for companies than for households over the crisis, and corporate credit demand consequently fell by more than that of household demand in response. If weights were allowed to vary in line with lending, then the associated reduction in the weight placed on the corporate credit spread could mean underestimating the effect of the crisis on credit conditions.

Chart 2 illustrates the change in the summary measure of credit spreads, together with the household and corporate components, since 2007 Q3. While by definition this means that credit spreads are set equal to zero in 2007 Q3, this does not mean that credit conditions were normal at that time. Spreads were in fact unsustainably compressed at the start of the crisis. Rather, 2007 Q3 is used as a reference point to show how conditions have evolved since then.

Credit spreads rose sharply following the onset of the financial crisis, driven by a higher cost of bank funding, an increase in

Chart 2 Measures of credit spreads[a]

Sources: Bank of England, BDRC Continental *SME Finance Monitor*, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey, Department for Business, Innovation and Skills and Bank calculations.

(a) Figures in parentheses show the weights used to construct the summary measure of credit spreads from the measures for households and companies. These weights are calculated using the shares of loans to households and to companies in the outstanding stock of sterling loans, calculated using M4 lending data.

expected losses on bank lending and a re-evaluation of the loss absorbency of their capital positions. The increase was more pronounced for corporates than for households, possibly because of a greater increase in perceived default risk. But although corporate credit conditions loosened between 2009 and mid-2011, particularly for large companies, household credit conditions remained tight. Since mid-2012, credit spreads have fallen continuously following the introduction of new policy measures in both the euro area and the United Kingdom. These policies — including the Funding for Lending Scheme (FLS) in the United Kingdom and the announcement of Outright Monetary Transactions in the euro area — are likely to have contributed towards a fall in banks' funding costs, which in turn led to lower lending rates.[2]

Capturing non-price terms and credit availability

It is likely that some of the tightening in credit conditions in the aftermath of the financial crisis came about through a fall in the *quantity* of credit supplied as well as through an increase in the cost of credit. Evidence for this includes a sharp reduction in high LTV mortgage lending in the immediate post-crisis period. Surveys of corporate credit conditions also suggest that the availability of credit for businesses fell after the onset of the crisis.

Although the measures of credit spreads are based on the price, rather than the quantity, of credit, they are likely broadly to reflect changes in credit availability. Evidence of that can be seen in the correlation between the cumulated survey balances for credit availability from the Bank of England's *Credit Conditions Survey* (*CCS*) and secured household credit

(1) The summary measure of credit spreads aims to capture the impact of a change in credit spreads on spending. It should not be confused with the cost of bank intermediation (the wedge between borrowing and saving rates).
(2) See the box on pages 14–15 of the May 2014 *Inflation Report* and Churm *et al* (2012).

The household credit spread

To calculate the measure of household credit spreads, households are grouped together depending on the source of finance they would be most likely to use if they were to increase spending. The four groups of households considered are:

Low loan to value (LTV) secured borrowers: homeowners who hold mortgages with LTV ratios of 75% or below. These households are able to borrow against the value of their home. Lower LTV ratios mean that less risk is borne by the lender and so the loan rate is likely to be lower.

High LTV secured borrowers: as above, but for homeowners with LTV ratios of above 75%. High LTV ratios mean that more risk is borne by the lender and so the loan rate is likely to be higher.

Unsecured borrowers: this group represents individuals who do not own a home or have insufficient savings to finance additional spending. Extra spending must then be financed through unsecured borrowing using credit cards, overdrafts or personal loans.

Savers: the gap between savings rates and reference rates is not strictly a 'credit spread'. Nevertheless, for households with sufficient savings, the opportunity cost of additional spending may be the deposit rate they could have earned had they continued to save rather than spend. It therefore makes sense to consider this within the household credit spread.

Within each of these four categories of households, a range of representative interest rates (shown in the third column of **Table 1**) are weighted together according to their share of gross new lending. These weights vary over time.[1][2] The rates are taken from 'quoted' rates data, which are a weighted average of the rates advertised by banks and building societies for new lending or saving products.

Each rate is then expressed as a spread over the appropriate risk-free reference rate (fourth column of **Table 1**). The risk-free rates used are Bank Rate or, for longer-maturity products, overnight index swaps (OIS) of the appropriate maturity.[3][4]

The four components of the household credit spread are shown in **Chart A**. The red line, for example, takes the quoted rate for high LTV borrowers and subtracts the appropriate reference rate (in this case the two-year OIS, as shown in the last column of **Table 1**). **Chart A** shows that spreads on all products rose sharply at the beginning of the financial crisis, reflecting a higher cost of bank funding, an increase in expected losses on bank lending and a re-evaluation of the loss

Table 1 Interest rates used to estimate the household credit spread

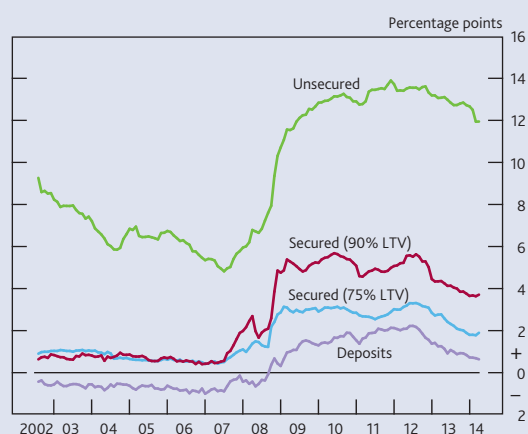| Household category	Proportion of households[a] (per cent)	Interest rate	Risk-free reference rate[b]
Low LTV borrowers	21	75% LTV two-year fixed-rate mortgage	Two-year OIS
		75% LTV five-year fixed-rate mortgage	Five-year OIS
		75% LTV Bank Rate tracker mortgage	Bank Rate
High LTV borrowers	4	90% LTV two-year fixed-rate mortgage	Two-year OIS
Unsecured borrowers	25	Credit card	Bank Rate
		Overdraft	Bank Rate
		£5,000 personal loan	Weighted average[c]
		£10,000 personal loan	Weighted average[c]
Depositors	50	One-year fixed-rate bond	One-year OIS
		Three-year fixed-rate bond	Three-year OIS
		Instant access deposit	Bank Rate

Sources: British Household Panel Survey and Bank calculations.

(a) Figures show the weights used to construct the overall household credit spread from the credit spread for each group. These weights reflect the proportions of households that are most likely to rely on each type of finance to fund extra spending, estimated using responses to the British Household Panel Survey.
(b) Prior to the August 2008 *Inflation Report* forecast, nominal gilt yields were used in place of OIS since OIS data were not available.
(c) Weighted average of Bank Rate, two-year and five-year OIS according to the proportions of fixed and floating, and the average maturity, of personal loans in the stock of lending each month.

Chart A The household credit spread components[a]

Sources: Bank of England, Bloomberg and Bank calculations.

(a) Spreads in **Chart A** are shown as absolute values, however, the overall household and summary credit spread measures are calculated as changes since 2007 Q3 (see **Chart 2**).

absorbency of their capital positions. Spreads have fallen since mid-2012, following the introduction of new policy measures in both the euro area and the United Kingdom, including the Funding for Lending Scheme.

Weighting the groups together

The four components of the household credit spread are weighted together, according to the importance of these different types of credit for spending. The weights are taken from the 2005 British Household Panel Survey, and reflect the share of households facing different marginal sources of finance (the weights are shown in the second column of **Table 1**).

The components of the household credit spread could instead be weighted according to the outstanding stock of loans in each category. But this method would be likely to underestimate the level of household credit spreads. This is because unsecured loans — which tend to be priced at higher rates — form a relatively small proportion of the stock of lending, but are likely to be the marginal borrowing rate for a larger proportion of households. Any change in new unsecured borrowing rates is therefore likely to have a larger impact on consumption than implied by the share of unsecured loans in the total outstanding stock of loans.[5]

Once weighted together, the four components of the household credit spread form an estimate of the cost of finance for UK households as a whole. The household credit spread is shown in the magenta line in **Chart 2** in the main text of the article.
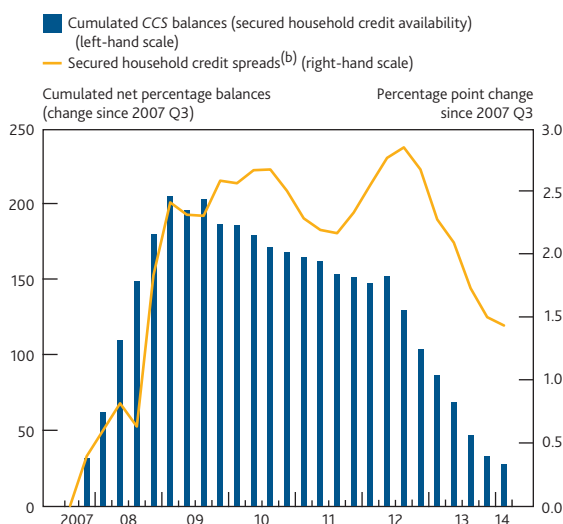
Capturing changes in non-price aspects of credit conditions

The household credit spread contains additional allowances for the effect of 'quantity rationing' — a reduction in the availability of certain loan products — on credit spreads. These are made through variations in the weights attached to each category of household borrower (see column 2 of **Table 1**). For example, when many banks stopped offering high LTV

mortgage products in 2008, the weight on high LTV mortgage lending was reduced from 4% to 0% and the weight on unsecured borrowing was increased by the same amount. In other words, it was assumed that households who would previously have borrowed at high LTV rates could only borrow at unsecured rates (which are higher on average). As high LTV products have become increasingly available since then, the weight on these products has been increased.

(1) The weights are ideally based on each product's share of gross new lending so as to capture changes in the quantity borrowed over time. But due to a lack of suitable data, some weights are based on the stock of lending. These weights will vary more slowly over time.
(2) The weights on products within each category of households (third column of **Table 1**) are time-varying, since households of the same category — for example low LTV borrowers — may switch between lending products within that category — for example between two-year and five-year fixed-rate mortgages. But the overall weights on each category of households (second column of **Table 1**) and on the relative shares of households and businesses in the summary measure of credit spreads are generally kept constant to reflect the fact that it is difficult to switch between these categories.
(3) OIS is an interest rate swap where the floating leg of the swap pays SONIA (the sterling overnight index average), a daily weighted average of unsecured trades brokered by members of the Wholesale Markets Brokers' Association. Jackson and Sim (2013) provide a summary of recent developments in these overnight money markets.
(4) Prior to the August 2008 *Inflation Report* forecast, nominal gilt yields were used in place of OIS since OIS data were not available. This is consistent with the MPC judgement at the time that gilt yields provided an adequate indication of Bank Rate expectations.
(5) Other potential methods of weighting include weighting by households' shares of income; according to whether households are net debtors; and — since some households hold more than one loan product — by assuming that households' marginal borrowing rate is either the highest or the lowest cost of credit which they hold. Previous estimates suggested that the household credit spread falls within this range of methods.

Chart 3 Credit spreads and availability: secured household lending[a]

Sources: Bank of England, Bloomberg, British Household Panel Survey and Bank calculations.

(a) The question asked in the *Credit Conditions Survey* is 'Has the availability of credit which you provide to households become tighter or looser over the latest three months relative to the previous three months?'.
(b) The orange line is calculated as the weighted sum of the low and high LTV components of the household credit spread, where the weights are equal to those in the second column of **Table 1** in the box on pages 140–41. At times, these weights have been altered to attempt to capture changes in credit availability as discussed in the box on pages 140–41.

spreads (**Chart 3**).[1][2] The profile for mortgage spreads has correlated well with the availability of household secured credit reported by banks in the *CCS*, especially at times when there have been large movements in credit spreads, for example in the early years of the crisis and since mid-2012. The measures were less well correlated in between these periods.

Provided that credit spreads are correlated with such measures of non-price terms and conditions, both the price terms (directly captured in the measures of credit spreads) and non-price terms are likely to be captured in the Bank of England's forecasting model. This is discussed in the following section.

Additional allowances for changes in credit availability are made within the calculation of the household and corporate credit spread measures. These are discussed further in the boxes on pages 140–43.

(1) The *Credit Conditions Survey* is a survey of UK banks which collects information on recent and expected developments in credit conditions. The latest survey can be found at www.bankofengland.co.uk/publications/Pages/other/monetary/creditconditions.aspx.
(2) The *CCS* balances refer to the change in credit conditions over the past three months. They are not normally cumulated, since this requires the assumption that a linear relationship holds between the different answer categories to each survey question, and could be biased by the entry and exit of certain banks from the sample. Nevertheless, the cumulated balances give a crude proxy of the change in the level of credit conditions over time.

The corporate credit spread

Calculating credit spreads for companies requires more judgement than for households because data on the cost of new bank loans to companies are limited. In particular, since corporate borrowing rates tend to be bespoke (in contrast to the more standardised loan products offered to household borrowers), there are no 'quoted' interest rates for businesses.

Data on 'effective' loan rates capture the average interest rates paid by companies that have successfully obtained finance. However, these data have several limitations. Effective rates may be affected by changes in the risk profile of borrowers, which could vary over time. This means that it is difficult to know whether an increase in effective rates represents a tightening or a loosening in credit conditions: for example, rates may rise because banks have charged higher interest rates to a given subset of borrowers, or because they have started to lend to a more risky category of borrowers who could not previously access credit. In addition, the variation in spreads over time calculated using effective interest rates appears small relative to other information on the cost of credit for businesses wishing to borrow. Therefore a range of other data, including information from surveys, is used to inform the corporate credit spread.

Corporate credit spreads are constructed using separate estimates for large businesses and for small and medium-sized enterprises. Borrowing rates tend to vary by firm size for a variety of reasons. In the past, rates on loans to smaller businesses have tended to be higher than those charged on loans to large companies, since smaller businesses are likely to be less established in their market and are less likely to have credit ratings. This means that banks tend to charge higher rates to smaller businesses in order to compensate for bearing that additional risk or uncertainty.

In contrast to the household credit spread, the corporate credit spread does not contain a deposit rate component. Companies typically need to maintain some cash holdings, for example to facilitate financial transactions or for a precautionary motive. And it appears that over the past decade UK companies have increased their cash holdings due to structural reasons, including increased substitution of cash for inventories and an increased volatility of firms' cash flow. But because holding cash incurs an opportunity cost, companies may be expected to return any excess cash to shareholders.

Groups of businesses
Large businesses
The corporate credit spread is designed to measure credit spreads on bank borrowing for firms. But many large companies issue corporate bonds as well as, or in place of, borrowing from banks. Credit spreads for large businesses are therefore estimated as the spread between the yield on corporate bonds and a risk-free rate of similar maturity.[1] This is assumed to be a reasonable proxy for the spread on bank borrowing for large businesses.

At times, however, conditions in corporate bond markets have differed from those in the market for bank credit. One example is following the launch of the MPC's programme of asset purchases or 'quantitative easing' (QE), including the Corporate Bond Secondary Market Scheme in March 2009,[2] when corporate bond spreads fell considerably more than spreads on bank lending. At these times, Bank staff have applied additional judgement based on information on credit spreads from the *Credit Conditions Survey* (*CCS*), in order to bring the level of corporate credit spreads closer to those on bank lending.

Corporate bonds are separated into different ratings categories depending on their riskiness. Investment-grade bonds (those with a rating between AAA and BBB-)[3] are viewed as less risky — since the issuer is considered less likely to default — and have a lower yield. High-yield bonds (with a rating below BBB-) are viewed as higher risk. Both types of corporate bonds are weighted together by market value to form the main component of the credit spread for large companies.

Small and medium-sized enterprises
Small and medium-sized enterprises (SMEs) do not typically obtain funds by issuing bonds.[4] Credit spreads for SMEs are therefore calculated using Department for Business, Innovation and Skills (BIS) interest rate data for SMEs and quoted credit card rates.[5][6] Credit card rates are used reflecting evidence from the *SME Finance Monitor* on the proportion of SMEs that use credit cards as a borrowing instrument. The use of credit card rates may also help to capture the subset of SMEs that borrow at very high rates from non-bank lenders.

The BIS interest rate data have remained fairly flat since mid-2009, at a relatively low level. This pattern does not appear wholly consistent with some other measures of credit conditions for SMEs, which tend to indicate a sharper increase in the cost of credit at the start of the crisis and in 2012.

In order to try to capture more of the variation in SME credit conditions since the start of the crisis, the SME component of the credit spread also incorporates the spreads balances for small and medium-sized businesses from the *CCS*. The net percentage balances of lenders reporting changes in spreads on lending to small and medium-sized businesses each quarter are cumulated over the period since 2007 Q3.[7] This

cumulated series provides a crude measure of the change in the cost of credit to SMEs since the start of the crisis.

Weighting the groups together

The two components — those for SMEs and large businesses — are weighted together to form the overall corporate credit spread, according to the share of both of these sectors in the stock of corporate lending (second column of **Table 1**). An alternative method would be to weight the two categories according to their share of corporate investment. But since large businesses account for around 60% of investment, these weights would be very similar to the weights based on the stock of lending. The corporate credit spread is shown by the green line in **Chart 2** in the main text of the article.

Capturing changes in non-price aspects of credit conditions

The corporate credit spread may not fully capture the impact of tighter non-price terms and lower credit availability for businesses. In particular, the BIS and effective rates data are likely to be poor proxies for the rates faced by potential borrowers, since they represent the cost of credit for companies that have been able to borrow rather than those that have been seeking, but may struggle to obtain, additional finance. Nevertheless, the inclusion of spreads on high-yield bonds and credit card rates may help to capture the subset of firms for whom bank credit is less easily available.

Table 1 Interest rates used to estimate the corporate credit spread

Corporate category	Proportion of the stock of lending to firms[a] (per cent)	Interest rate	Risk-free reference rate
Large corporates	63	Investment-grade bonds	Maturity-matched government curve, adjusted for the gilt-OIS spread at five-year maturity.[b]
		High-yield bonds	Maturity-matched government curve, adjusted for the gilt-OIS spread at five-year maturity.[b]
		Judgement based on the CCS	
SMEs	37	BIS indicative SME interest rates	Bank Rate
		Credit card rates	Bank Rate
		Judgement based on the CCS	

Sources: Bank of England and Bank calculations.

(a) Weights are calculated as averages over 2013.
(b) Spreads over the maturity-matched government curve are adjusted for the spread between gilts and OIS at the five-year maturity (Bank of England adjustment).

(1) The spreads are obtained from BofA Merrill Lynch (spreads are option-adjusted, and apply to UK non-utilities companies). Spreads over the maturity-matched government curve are adjusted for the spread between gilts and OIS at the five-year maturity (Bank of England adjustment).
(2) See www.bankofengland.co.uk/markets/Pages/apf/corporatebond/default.aspx.
(3) Ratings definitions vary by ratings agency. The lowest rating for investment-grade bonds is BBB-, or Baa3 for Moody's.
(4) See the box 'Characteristics of companies with access to capital markets' on page 367 of Farrant *et al* (2013).
(5) The BIS rates data are only available from November 2008. Therefore the BIS data are spliced on to the Bank of England effective rates series for loans of less than or equal to £1 million in the quarters preceding 2009 Q1. The level of these two series is very similar.
(6) The credit card quoted rates are the same as those used in the household credit spread.
(7) See footnote 2 on page 141 for a discussion of some problems associated with cumulating the CCS balances.
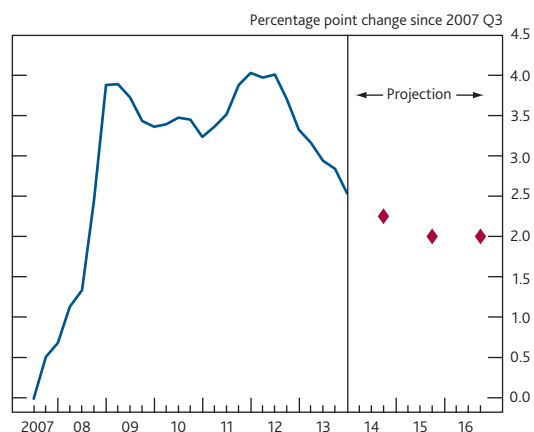
Forecasting credit spreads

Changes in credit conditions are likely to play an important role in influencing future economic activity. Projections for credit spreads are produced by Bank staff and are an important input into the MPC's macroeconomic forecasts. The diamonds in **Chart 4** show the projection of the summary measure that was published in the May 2014 *Inflation Report*. This section outlines the general approach used by Bank staff to project credit spreads, before discussing the forecast performance of the credit spread projections and how they are used to help inform the MPC's forecasts for output and inflation.

Forecasting credit spreads: the general approach

The credit spread forecast methodology has been refined over the crisis to help to improve accuracy and to provide a clearer narrative of credit conditions over the forecast. Under the current approach, Bank staff produce individual forecasts for each of the lending and savings products discussed in the boxes on pages 140–43. Although the precise forecasting approach varies by product — reflecting differences in data

Chart 4 The summary measure of credit spreads[a]

Sources: Bank of England, BDRC Continental *SME Finance Monitor*, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey, Department for Business, Innovation and Skills and Bank calculations.

(a) The diamonds show the profile of the summary credit spread at one, two and three years ahead that was published in the May 2014 *Inflation Report*. The blue line shows the back data.

availability for households and firms, for example — the general process can be summarised in four steps. These are discussed in turn below.

Step 1: the near-term forecast

The latest data, together with other relevant indicators and market intelligence, are used to inform the near-term forecast for credit spreads. For example, if banks' funding costs rise sharply but the latest mortgage rates data remain unchanged, Bank staff would draw on market intelligence and evidence from surveys (such as the *Credit Conditions Survey* and *Bank Liabilities Survey*)[1] to assess whether mortgage rates were likely to rise in the near term.

Step 2: the loan price framework and the end-point of the forecast

The projected level of credit spreads at the end of the forecast horizon is based on estimates of the factors affecting banks' pricing of loans and deposits over the longer term. Using the loan pricing framework outlined in Button, Pezzini and Rossiter (2010), new lending rates can be decomposed into the following main factors:

- **Banks' funding costs.** These include the spreads on long-term wholesale funding (typically senior unsecured bonds) and the costs of interest rate swaps (hereafter 'swap costs').[2] Funding costs are likely to be affected by investors' perceptions of the riskiness of bank debt as well as the extent of implicit government guarantees.

- **Compensation for the risk that firms or households may not repay their loans in full (that is, 'credit risk').** This risk can be thought of as the sum of (i) the average expected losses associated with a given loan, and (ii) the cost of capital to cover losses that exceed banks' central expectations. The cost of capital will be affected by national and international regulation, including the Basel III minimum capital requirements.[3]

- **Other factors including banks' operating costs and mark-ups.** Banks will incur operating costs associated with the origination and servicing of loans. The mark-up ensures that new loans generate an expected rate of return over their lifetime.

Some of these components can be obtained from forward-looking financial market indicators.[4] But others, such as banks' term funding spreads, capital positions, the cost of capital and expected loan performance,[5] are estimates based on analysis by Bank staff. This analysis takes account of the impact of regulation, for example by incorporating the likely transition path of banks to the new Basel III capital regime.

Policy actions or other macroeconomic developments may also impact the likely path of credit spreads over the forecast.

One example of this was the launch of the FLS in 2012, which was designed to incentivise banks and building societies to supply more credit by making more (and cheaper) funding available to them if they lent more to UK households and firms. The FLS was estimated to affect the profile, but not the steady-state level, of credit spreads, since the Scheme is temporary.[6] The use of any macroprudential tools that are expected to affect the credit conditions facing households and firms can also be considered when forecasting credit spreads. The projection for credit spreads is a key channel through which policies announced by the Financial Policy Committee can enter the MPC's forecast.[7]

Step 3: speed of adjustment of credit spreads

The remainder of the forecast profile is based on an assessment of how quickly changes in the factors outlined above, such as banks' funding costs, feed through into rates on new loans and deposits. The likely speed of pass-through is determined by estimating equations of the form:[8]

$$\Delta r_t = \alpha + \beta_1\, ECM_{t-1} + \beta_2 \Delta swaps_t + \beta_3 X_t + \varepsilon_t$$

where Δr_t is the change in the interest rate charged on the loan or deposit product in question; $\Delta swaps$ captures changes in swap costs; X_t is a vector of control variables specific to each loan or deposit rate, α is a constant and ε_t is the residual term in the estimation. ECM_{t-1} is an error correction term, calculated as the rate charged on the product in the previous period minus the longer-run 'equilibrium' rate based on the factors in the loan pricing framework above. The estimated coefficient for the error correction term is negative — so when the observed rate on a product is higher than the equilibrium rate suggested by the loan price framework, the equation predicts the interest rate to fall in the current period (and *vice versa*). The coefficients in the equation therefore capture the average speed of pass-through to lending rates from contemporaneous changes in swap rates, along with the more gradual pass-through of other factors that affect banks' loan pricing in the longer run via the error correction term.

(1) See Driver (2007) and Bell, Butt and Talbot (2013).
(2) The funding cost typically used by each lender's treasury is the cost of raising variable-rate long-term wholesale debt. This is the cost of issuing fixed-rate senior unsecured bonds and entering into an interest rate swap where the lender receives a series of fixed-rate cash flows and pays a series of floating-rate cash flows. This means that the funding cost has two components: the stream of variable-rate cash flows paid in the interest rate swap (the 'swap costs'), and the spread of the fixed-rate bond yield over the swap rate. See the box on page 174 of Button, Pezzini and Rossiter (2010) for more details.
(3) See Farag, Harland and Nixon (2013) for more details on expected and unexpected losses, bank capital and prudential regulation.
(4) The relevant maturity swap rate (for instance the two-year swap rate for a two-year fixed-rate mortgage), and the overnight index swap (OIS) rate used in calculating the spread (for instance the two-year OIS for a two-year fixed-rate mortgage), can be obtained from financial markets.
(5) See Burrows et al (2012) for details on a model which can be used to forecast loan performance under different macroeconomic scenarios.
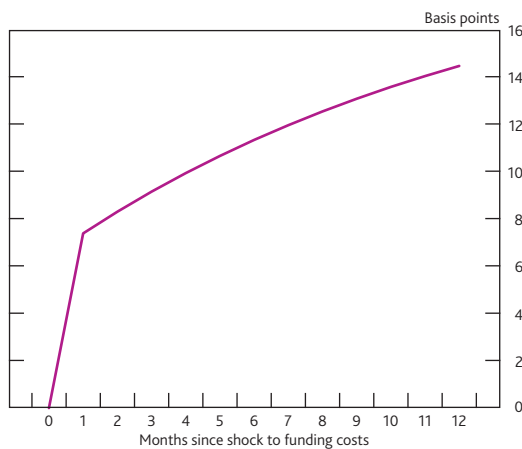(6) See pages 14–15 of the May 2014 Inflation Report for more details on the impact of the FLS on lending rates.
(7) Tucker, Hall and Pattani (2013) describe the new powers for macroprudential policymaking in the United Kingdom in the wake of the recent financial crisis.
(8) The estimation period used for most products at the time of writing is from mid-2002 to early 2014.

Chart 5 shows the estimated pass-through of a 20 basis point funding cost shock. For illustrative purposes, this is assumed to comprise a 10 basis point increase in banks' swap costs and a 10 basis point widening in banks' term funding spreads. The chart shows regression estimates of the impact of this shock over successive months: the mortgage interest rate rises immediately as changes in swap costs are assumed to pass through quickly to loan rates, while the remainder of the shock, largely accounted for by the shock to term funding spreads, is passed through more slowly via the error correction term.

Chart 5 Estimated pass-through of a 20 basis point increase in funding costs to the interest rate charged on a two-year fixed-rate mortgage[a]

Sources: Bank of England, Bloomberg and Bank calculations.

(a) Effect of a +20 basis point funding cost shock, composed of +10 basis points to swaps and +10 basis points to five-year senior unsecured bond spreads, on the interest rate on a two-year fixed-rate 75% loan to value mortgage.

Step 4: aggregating forecasts and applying judgements on credit availability

The projections for each loan and deposit rate are weighted together to produce forecasts for household and corporate credit spreads and the summary measure of credit spreads. The previous section and boxes discuss the weighting procedure and the ways in which the weights can be varied to help capture changes in credit availability.

Chart 4 shows the projection for credit spreads that was published in the May 2014 *Inflation Report*. It declines over the forecast horizon, but remains elevated relative to the pre-crisis period. This partly reflects the judgement that, relative to before the crisis, banks are likely to continue to face a higher cost of funding in the future — reflecting a shift in investors' perceptions of risk and regulatory changes, including to reduce the problem of 'too important to fail' banks — which in turn will affect the cost of borrowing for households and firms. Of course, there is considerable uncertainty around this central projection.

If credit spreads continue to remain elevated relative to the pre-crisis period then, all else being equal, the level of
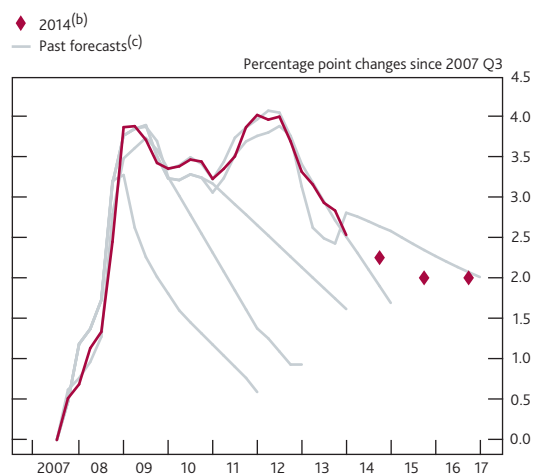
Bank Rate required to keep inflation close to the target and maintain demand in line with supply may be lower than pre-crisis. In other words, higher credit spreads are likely to be one reason why the appropriate level of Bank Rate may remain below the 5% level set on average by the Committee prior to the financial crisis for some time to come.[1]

Performance of the credit spread forecast

Bank staff have produced forecasts for credit spreads since 2007. The financial crisis created great uncertainty over this period meaning that, although each forecast incorporated the staff's best estimates of future developments in credit conditions, credit spreads often differed from the central projection due to unexpected shocks. One example is the intensification of the euro-area crisis in 2011, which led to a sharp, unanticipated rise in banks' funding costs.

Chart 6 illustrates the credit spread projections made at the start of each year for the past five years, together with the latest projection contained in the May 2014 *Inflation Report*. Earlier forecasts anticipated more of a pass-through of the cuts to Bank Rate in 2008 and 2009 into lending rates than subsequently occurred, as conditions in the banking sector remained strained.[2] And forecasts made at the beginning of 2010 and 2011 did not fully anticipate the rise in banks' funding costs which occurred as a result of the intensification of the euro-area crisis. Forecasts made after mid-2011 have coincided more closely with the subsequent changes in credit spreads. The forecasts show how the projected 'end-point' for the summary credit spread has typically been revised up over time.

Chart 6 The evolution of credit spread projections over time[a]

Sources: Bank of England, BDRC Continental *SME Finance Monitor*, Bloomberg, BofA Merrill Lynch Global Research, used with permission, British Household Panel Survey, Department for Business, Innovation and Skills and Bank calculations.

(a) Back data differ between forecasts due to data revisions and methodological changes.
(b) The diamonds show the profile of the summary credit spread at one, two and three years ahead that was published in the May 2014 *Inflation Report*.
(c) The grey lines show the summary credit spread profiles that were used to inform the MPC's modal macroeconomic projections in the February *Inflation Report* of the years 2009–13.

(1) See the box on page 40 of the February 2014 *Inflation Report*.
(2) See Bell and Young (2010) for a more detailed discussion of shocks to credit supply and the weakness of bank lending between 2007 and 2010.

Credit spreads in the MPC's forecast

The credit spread profile provides a means for the MPC to include judgements about credit conditions in their forecasts for output and inflation. But incorporating credit spreads into the Bank's central forecasting model is not straightforward.

At the time of writing there is no canonical model in the academic literature that captures all of the effects of the financial sector on the wider economy.[1] As outlined in Burgess *et al* (2013), however, the Bank's 'suite of models' contains a variety of methods that can be used to estimate the impact of developments in credit spreads (captured in the credit spread projections) on key economic variables.[2] One approach is to 'adjust' the path of Bank Rate in the forecast using the credit spread projections, in order to capture the wedge between Bank Rate and the marginal interest rates facing households and firms. A second method is a structural VAR model (described in Barnett and Thomas (2013)) which traces through the implications of shocks to credit supply and credit demand for key macroeconomic variables. The suite of models also contains a version of the Gertler-Karadi model (Gertler and Karadi (2011)) estimated for the United Kingdom by Villa and Yang (2011). This model assumes that banks face financial frictions, which result in higher interest rates on new lending for non-financial companies.

A more recent approach used by Bank staff is to estimate the impact of credit spreads separately for each sector of the economy using a vector error correction model (VECM). This allows changes in credit spreads for different sectors — for example, secured or unsecured household borrowers, or firms — to have different impacts on the economy. In addition to the price of credit, the VECM should also capture broader developments in credit conditions, such as changes in non-price terms. This is because — to the extent that unobserved changes in non-price terms are correlated with measures of credit spreads (as shown in **Chart 3**) — the estimated coefficients of the VECM should capture both of these aspects of credit conditions. This sectoral approach to

modelling the impact of credit conditions was used to inform the MPC's central macroeconomic projections published in the May 2014 *Inflation Report*.

Conclusion

This article introduced the Bank of England's preferred measures of credit spreads and the role they play in the MPC's forecasts for output and inflation. Credit spreads measure the difference between the new interest rates faced by households and firms on loans and savings products and appropriate risk-free rates. The summary measure of credit spreads provides an estimate of the extent to which credit conditions have changed for the 'average' UK borrower since the start of the financial crisis.

The summary measure suggests that credit spreads rose sharply following the onset of the financial crisis and after the intensification of the crisis in the euro area in 2011. Since mid-2012, credit spreads have fallen continuously following the introduction of new policy measures in both the euro area and the United Kingdom. These policies — including the FLS in the United Kingdom and the announcement of Outright Monetary Transactions in the euro area — are likely to have contributed towards a fall in banks' funding costs, which in turn has led to lower lending rates.

Given the importance of credit conditions for households' and firms' consumption and investment decisions, future changes in credit spreads will affect GDP growth and inflation. In the May 2014 *Inflation Report*, credit spreads were expected to ease further as conditions in the banking sector continue to normalise. But credit spreads are likely to remain higher than at the start of the crisis, partly because changes in investors' perceptions of the riskiness of bank debt and a reduction in implicit government guarantees mean that banks may continue to face higher costs of funding in the future, relative to the pre-crisis period.

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(1) This is not to say that there has not been progress in this regard. See, for example, Bernanke, Gertler and Gilchrist (1999), Kiyotaki and Moore (1997) and Gertler and Karadi (2011). Such approaches introduce market frictions, which results from an agency problem between borrower and lender, and result in higher borrowing costs than would otherwise be the case.
(2) The suite of models approach is described in detail in Burgess *et al* (2013).

References

Barnett, A and Thomas, R (2013), 'Has weak lending and activity in the United Kingdom been driven by credit supply shocks', *Bank of England Working Paper No. 482*, available at www.bankofengland.co.uk/research/Documents/workingpapers/2013/wp482.pdf.

Bell, V, Butt, N and Talbot, J (2013), 'The Bank of England *Bank Liabilities Survey*', *Bank of England Quarterly Bulletin*, Vol. 53, No. 1, pages 68–76, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130107.pdf.

Bell, V and Young, G (2010), 'Understanding the weakness of bank lending', *Bank of England Quarterly Bulletin*, Vol. 50, No. 4, pages 311–20, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb100406.pdf.

Bernanke, B, Gertler, M and Gilchrist, S (1999), 'The financial accelerator in a quantitative business cycle framework', in Taylor, J B and Woodford, M (eds), *Handbook of Macroeconomics*, Vol. 1c: Elsevier, pages 1,341–93.

Burgess, S, Fernandez-Corugedo, E, Groth, C, Harrison, R, Monti, F, Theodoridis, K and Waldron, M (2013), 'The Bank of England's forecasting platform: COMPASS, MAPS, EASE and the suite of models', *Bank of England Working Paper No. 471*, available at www.bankofengland.co.uk/research/Documents/workingpapers/2013/wp471.pdf.

Burrows, O, Learmonth, D, McKeown, J and Williams, R (2012), 'RAMSI: a top-down stress-testing model developed at the Bank of England', *Bank of England Quarterly Bulletin*, Vol. 52, No. 3, pages 204–12, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb120301.pdf.

Button, R, Pezzini, S and Rossiter, N (2010), 'Understanding the price of new lending to households', *Bank of England Quarterly Bulletin*, Vol. 50, No. 3, pages 172–82, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb100301.pdf.

Churm, R, Leake, J, Radia, A, Srinivasan, S and Whisker, R (2012), 'The Funding for Lending Scheme', *Bank of England Quarterly Bulletin*, Vol. 52, No. 4, pages 306–20, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb120401.pdf.

Driver, R (2007), 'The Bank of England Credit Conditions Survey', *Bank of England Quarterly Bulletin*, Vol. 47, No. 3, pages 389–401, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb070303.pdf.

Farag, M, Harland, D and Nixon, D (2013), 'Bank capital and liquidity', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 201–15, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130302.pdf.

Farrant, K, Inkinen, M, Rutkowska, M and Theodoridis, K (2013), 'What can company data tell us about financing and investment decisions?', *Bank of England Quarterly Bulletin*, Vol. 53, No. 4, pages 361–70, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130407.pdf.

Gertler, M and Karadi, P (2011), 'A model of unconventional monetary policy', *Journal of Monetary Economics*, Vol. 58, No. 1, pages 17–34.

Jackson, C and Sim, M (2013), 'Recent developments in the sterling overnight money market', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 223–32, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130304.pdf.

Kiyotaki, N and Moore, J (1997), 'Credit cycles', *Journal of Political Economy*, Vol. 105, No. 2, pages 211–48.

Tucker, P, Hall, S and Pattani, A (2013), 'Macroprudential policy at the Bank of England', *Bank of England Quarterly Bulletin*, Vol. 53, No. 3, pages 192–200, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130301.pdf.

Villa, S and Yang, J (2011), 'Financial intermediaries in an estimated DSGE model for the United Kingdom', *Bank of England Working Paper No. 431*, available at www.bankofengland.co.uk/research/Documents/workingpapers/2012/wp431.pdf.