

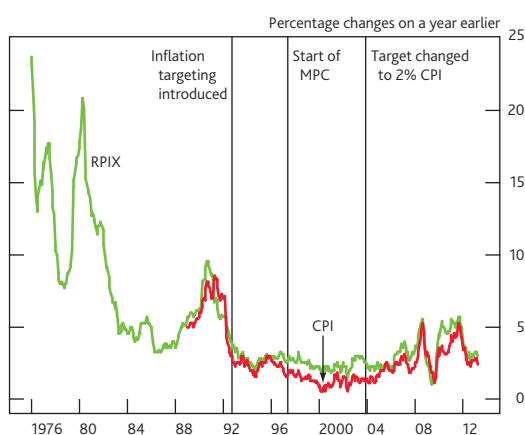
Do inflation expectations currently pose a risk to the economy?

By Becky Maule and Alice Pugh of the Bank's Monetary Assessment and Strategy Division.⁽¹⁾

People's expectations about future inflation play an important role in determining the current rate of inflation. There is a risk that the recent prolonged period of above-target inflation, which the Monetary Policy Committee (MPC) judges is more likely than not to continue over much of the next two years, may cause inflation expectations to become less well anchored. By pushing up wages and prices, higher inflation expectations could lead to inflation becoming more persistent. At the moment, most indicators are consistent with inflation expectations remaining anchored to the target, although there is tentative evidence that financial market measures of inflation expectations have become a little more responsive to developments in the economy. There are currently few signs to suggest that prices and wages have increased as a result of higher inflation expectations. The MPC will continue to monitor and assess indicators closely.

Since 2006, inflation, as measured by the consumer prices index (CPI), has been frequently above the 2% target set by the Government. Between 2010 and April 2012, inflation was at least 1 percentage point above the target (Chart 1). And although the rate of inflation has fallen since then, it has remained above 2%. While the outlook is uncertain, the Monetary Policy Committee's (MPC's) latest forecasts contained in the May 2013 *Inflation Report* project that inflation is more likely than not to remain above the target over much of the next two years.

Chart 1 Inflation^(a)



(a) CPI is the consumer prices index, RPIX is the retail prices index excluding mortgage interest payments.

The MPC's remit is to deliver price stability, but to do so in a way that avoids undesirable volatility in output. In the recent past, the MPC has judged that, so long as domestic cost and price pressures have remained consistent with inflation

returning to target in the medium term, it has been appropriate to look through the temporary, albeit protracted, period of above-target inflation. Attempting to bring inflation back to the target too quickly would risk derailing the recovery and undershooting the inflation target in future.

There is a risk, however, that the prolonged period of above-target inflation could lead households, companies and financial market participants to expect inflation to remain above 2% in the medium term. Prolonged above-target inflation could also lead to a change in perceptions of the way in which the MPC responds to deviations of inflation from the target. In particular, it might lead to expectations of a slower return towards the target than is consistent with the MPC's policy stance. If inflation expectations were to become less well anchored in either of these ways, households and companies might change their wage and price-setting behaviour, as well as their spending decisions. That could cause inflation to persist above the target for longer, which could, in turn, require tighter monetary policy than would otherwise be the case in order to return inflation to the target.

It is worth noting, however, that the prolonged period of above-target inflation is unlikely to be the only economic factor influencing inflation expectations. For example, the degree of spare capacity in the economy may act to reduce inflation expectations, since a higher degree of spare capacity is likely to reduce the extent of future price rises as spending increases.

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

A previous article in the 2012 Q2 *Quarterly Bulletin* concluded that, while there was still a risk of inflation expectations becoming less well anchored while inflation remained above the target, there were few signs that the risk had materialised so far.⁽¹⁾ Over the past year, most indicators have not suggested that public perceptions of the MPC’s commitment to bring inflation back to the target have altered, and consequently there is little evidence to suggest that wages and prices have changed as a result. But the responsiveness of financial market measures of inflation expectations to developments in the economy seems to have increased a little. The MPC will continue to monitor these indicators and they remain an important factor in policy decisions.⁽²⁾

The first part of this article discusses recent movements in inflation expectations, and assesses the extent to which they remain anchored by monetary policy. The second section analyses the extent to which a change in inflation expectations might encourage inflation to become more persistent through changes in price and wage-setting behaviour, changes in consumption and investment decisions, or via the exchange rate. The final section concludes.

Assessing the extent to which expectations remain anchored

The MPC monitors a range of measures of inflation expectations, including measures from surveys of households, forecasts by professional economists and indicators based on financial market instruments, for both shorter and longer-term horizons.⁽³⁾ Shorter-term inflation expectations might become less well anchored if people believe that the MPC has become more tolerant of deviations of inflation from the target, even if they expect inflation to return to the target eventually. And longer-term inflation expectations might become less well anchored if people doubt the determination of the MPC to return inflation to the target in the long run. At both horizons, expectations becoming less well anchored might become apparent in a few ways:

- The levels of inflation expectations might change in ways that are not consistent with developments in the economy.
- Uncertainty about future inflation might increase.
- Expectations might become more responsive to economic news.

The remainder of this section reviews each of these in turn to assess whether expectations have become less well anchored over the past year.

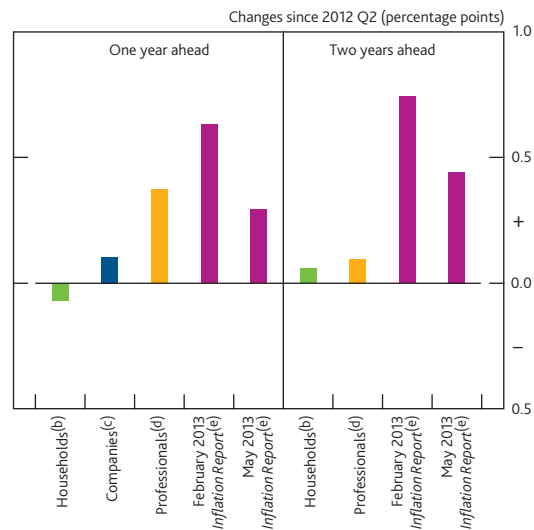
Movements in the level of shorter-term inflation expectations

Shorter-term inflation expectations are likely to move over time. If inflation expectations are anchored, we would expect those movements to reflect news about economic variables —

such as GDP and wages — that are likely to affect prices over the next year or so. One way to assess whether movements in shorter-term inflation expectations reflect economic news is to compare them to changes in the MPC’s forecast for inflation, which capture the Committee’s judgement about how developments have affected the outlook for inflation.

Over the past year, the MPC’s central projection for inflation in the *Inflation Report* has been revised up markedly, especially at the two-year horizon (Chart 2). Those revisions partly reflect the MPC’s assessment of how economic developments are likely to affect the outlook for inflation. They also reflect the Committee’s judgement about the appropriate timeframe over which to bring inflation back to the target, given the persistent nature of the shocks affecting the economy. Given the current economic circumstances, the MPC has judged that it is appropriate to continue to look through the period of above-target inflation in order to support the recovery in growth and employment, subject to meeting the inflation target in the medium term.

Chart 2 Changes in shorter-term inflation expectations since 2012 Q2^(a)



Sources: Bank of England, Bank/GfK NOP, Barclays Capital, Citigroup, Confederation of British Industry (CBI), HM Treasury, YouGov and Bank calculations.

- (a) Some surveys do not contain the latest 2013 Q2 data (see below).
- (b) Based on an average of expectations for inflation from the Bank/GfK NOP, Barclays Basix and, for the one year ahead measure, YouGov/Citigroup surveys. These surveys do not reference a specific price index and are based on the median estimated price changes. Change is between 2012 Q2 and 2013 Q1 for the Basix survey.
- (c) Based on CBI data for the manufacturing, business/consumer services and distribution sectors, weighted using nominal shares in value added. Companies are asked about the expected percentage change over the coming twelve months in the markets in which they compete. Change is between 2012 Q2 and 2013 Q1.
- (d) Based on an average of expectations of CPI inflation from the HM Treasury and Bank of England surveys.
- (e) Based on changes in the modal CPI inflation projections under market interest rates since the May 2012 *Inflation Report*.

In contrast, the levels of shorter-term inflation expectations of households and companies have changed little over the past year (Chart 2), and by considerably less than the movement in

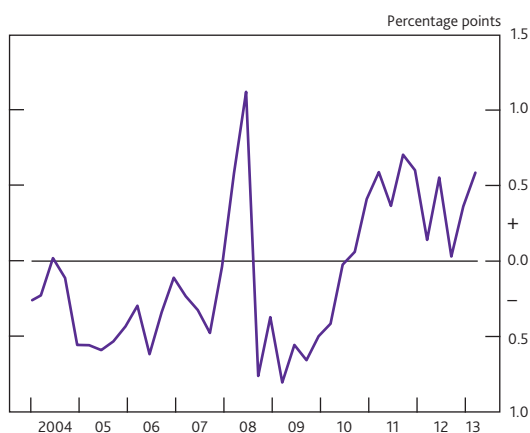
(1) See Harimohan (2012).
 (2) See May 2013 *Inflation Report*, pages 36–37.
 (3) The available measures are described in more detail in the annex.

the MPC's central inflation projection. Survey measures of professional forecasters' one year ahead inflation expectations have risen more substantially, but by less than the revision contained in the February 2013 *Inflation Report*.

An alternative approach to assess whether movements in short-term expectations are consistent with developments in the economy is to use a statistical model, such as a structural vector autoregression (SVAR). The SVAR approach involves estimating a set of equations in which each variable is regressed on past values of itself and the other variables in the system. Under certain economic assumptions,⁽¹⁾ we can decompose the observed movement in inflation expectations into a component explained by movements in the other variables, and an unexplained 'shock' to inflation expectations.⁽²⁾ The other variables included in the model are the ones thought to be most likely to affect inflation expectations: GDP growth, wage growth, CPI inflation, Bank Rate and real oil price inflation.

The unexplained component for two year ahead inflation expectations — using a version of the model estimated between 1993 and 2013 Q1 — has been broadly unchanged over the past year (**Chart 3**), consistent with households not having reassessed the MPC's commitment to bring inflation back to target over that period. But it has been positive since the second half of 2010, suggesting that inflation expectations have been higher than explained by the other economic variables in the model. To the extent that this persists, it might suggest that inflation may return to the target more slowly than it otherwise would. But it could also reflect the impact of factors that have been omitted from the model.

Chart 3 SVAR model estimate of the unexplained component of two year ahead inflation expectations^{(a)(b)}



Sources: Bank/GfK NOP, Barclays Capital, Bloomberg, ONS and Bank calculations.

- (a) The SVAR model includes: CPI inflation, GDP growth, Bank Rate, wage growth, real oil price inflation and two year ahead inflation expectations. The model is estimated using data from 1993 Q1 to 2013 Q1. The inflation expectations series is based on the Barclays Basix series until 2009 Q4 and the Bank/GfK estimate from 2010 Q1 onwards. The Bank/GfK measure has been spliced to abstract from recent volatility in the Barclays Basix measure.
- (b) With thanks to James Cloyne, who helped with this analysis.

Movements in the level of longer-term inflation expectations

Given that the MPC's remit is to deliver price stability in the medium term, longer-term inflation expectations, provided they remain anchored, would be expected to remain relatively stable at levels consistent with the inflation target. Inflation at longer horizons is also less likely to be affected by current economic developments.

Developments in measures of households' longer-term inflation expectations have been mixed. The Bank/GfK NOP survey measure suggests that households' longer-term inflation expectations have risen a little over the past year and this measure is somewhat above its series average (**Table A**). This series has a very short backrun, however, and covers a period of less stable inflation, meaning that it is not clear whether the average is consistent with inflation being close to the target in the long term. In contrast, the Citigroup survey measure, which has a somewhat longer backrun, is slightly below its series average.

The results from surveys of professional forecasters' longer-term expectations have also varied somewhat. The average of the responses to a survey conducted by HM Treasury is broadly in line with its series average, but the average response to the quarterly survey of external forecasters (SEF) conducted by the Bank has risen since 2012, and currently appears a little elevated.⁽³⁾

Movements in financial market measures of longer-term inflation expectations over the past year are difficult to interpret. These measures reference the retail prices index (RPI), and during the latter part of 2012 they were affected by the possibility that the formulae used to calculate the RPI would be changed. The changes to the formulae that were under consideration would have reduced the wedge between RPI and CPI inflation, and so probably led many market participants to revise down their RPI inflation expectations. Indeed, market-based indicators of inflation expectations drifted down during 2012. And after the National Statistician announced on 10 January 2013 that the RPI would not be changed, they rose sharply.⁽⁴⁾

Abstracting from these movements, the levels of financial market indicators are broadly consistent with inflation expectations remaining anchored. Although both measures are slightly higher than their series averages (**Table A**), there

(1) See Barnett, Groen and Mumtaz (2010).

(2) There are a variety of possible causes of a surprise increase or 'shock' to inflation expectations. One possibility could be an 'inflation scare' whereby household inflation expectations rise due to households having perceived the MPC to be more tolerant of deviations in inflation from target than is the case. Alternatively, inflation expectations may have risen in response to a change in macroeconomic variables not included in the model.

(3) For more information about the SEF, see May 2013 *Inflation Report*, page 50.

(4) For more details, see 'National Statistician announces outcome of consultation on RPI', www.ons.gov.uk/ons/dcp29904_295002.pdf.

Table A The level of longer-term inflation expectations

	Time horizon	Start of data	Series average	Per cent				
				2011 H2	2012 H1	2012 H2	2013 Q1	2013 Q2
Surveys of households (longer-term measures)								
Bank/GfK NOP	5 years	Feb. 2009	3.3	3.5	3.4	3.4	3.6	3.6
Barclays Basix ^(a)	5 years	Aug. 2008	3.8	4.0	4.0	3.8	3.6	n.a.
YouGov/Citigroup ^(b)	5–10 years	Nov. 2005	3.4	3.6	3.4	3.5	3.5	3.3
Surveys of professional forecasters								
Bank	3 years	May 2006	2.0	2.1	2.1	2.0	2.1	2.2
HM Treasury	4 years	Feb. 2004	2.2	2.2	2.4	2.2	2.4	2.2
Measures derived from financial instruments^(c)								
Swaps	5-year, 5-year forward	Oct. 2004	3.3	3.3	3.3	3.0	3.4	3.5
Gilts	5-year, 5-year forward	Jan. 1997 ^(d)	3.1	3.1	3.1	2.7	3.4	3.3
Memo:								
CPI inflation ^(e)		Jan. 1997	2.1	4.7	3.1	2.6	2.8	2.4

Sources: Bank of England, Bank/GfK NOP, Barclays Capital, Bloomberg, Citigroup, HM Treasury, ONS, YouGov and Bank calculations.

- (a) The latest Barclays Basix data is for 2013 Q1.
- (b) The 2013 Q2 estimate for the YouGov/Citigroup survey is the average over April and May.
- (c) Financial market instruments are linked to RPI inflation. The 2013 Q2 average for financial markets data is taken between 2 April and 17 May.
- (d) The series for five-year, five-year forward RPI inflation derived from gilts started in January 1985. But for the purpose of this table, the series average is taken over 1997–2013 to be consistent with the start of the CPI data.
- (e) The 2013 Q2 estimate uses CPI data for April 2013.

are a number of factors that make such a comparison hard to interpret.⁽¹⁾ And market contacts report that participants expect CPI inflation to be around the target in the long run.

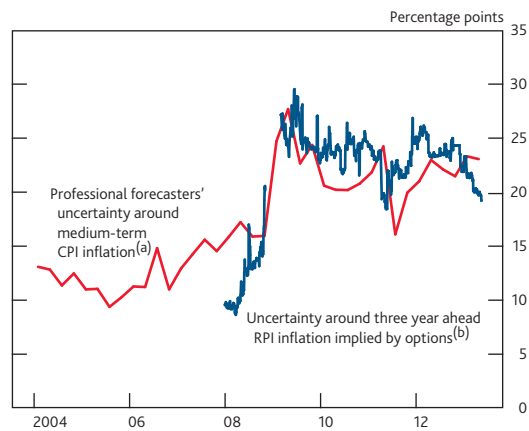
Uncertainty about inflation

If individuals were to become less certain about how the MPC will respond to future shocks which push inflation away from the target, one might expect to see a rise in measures of uncertainty about the future level of inflation. An increase in uncertainty may not necessarily signal that inflation expectations have become less well anchored by monetary policy, however. A change in individuals' views about the size or persistence of shocks that might affect the economy in the future could also raise uncertainty regarding inflation expectations.⁽²⁾

Uncertainty over the future level of inflation can be measured as the dispersion of inflation expectations, for example the interquartile range, derived from surveys of professional forecasters. The Bank's SEF asks each forecaster to attach a specific probability to a range of different outcomes for future inflation. Alternatively, option prices can be used to estimate the weight that market participants collectively attach to different future inflation outcomes.⁽³⁾

Neither uncertainty around professional forecasters' nor financial market measures of inflation expectations suggest that individuals have become less certain about how monetary policy will react to future developments over the past year (Chart 4). The measures remain high compared to their levels at the start of 2008, although that might partly reflect increased uncertainty about future economic shocks in the wake of the financial crisis.

Chart 4 Uncertainty around three year ahead inflation for professional forecasters and financial market participants



Sources: Bank of England, Bloomberg and Bank calculations.

- (a) Professional forecasters' uncertainty is calculated as the average probability that inflation will be more than 1 percentage point away from the target, calculated from the probability distributions for inflation in the medium term reported by forecasters responding to the Bank's survey. Forecasters reported probability distributions for CPI inflation two years ahead between February 2004 and February 2006; and for CPI inflation three years ahead from May 2006 onwards.
- (b) Standard deviation of the probability distribution of annual RPI inflation outturns for three years ahead implied by options. For technical reasons relating to the very low level of RPI inflation between November 2008 and February 2009, it is not possible to construct a full set of probability distributions for that period. Movements in longer-term option-implied uncertainty have been similar.

- (1) For example, higher demand for inflation index-linked market instruments by institutional investors such as pension funds is likely to have increased implied inflation expectations over time. And changes in the price collection methodology for clothing and footwear prices will have affected the CPI and RPI differently and so probably increased market participants' expectations about the rate of RPI inflation consistent with CPI inflation at 2%.
- (2) Haddow *et al* (2013) in this edition of the *Quarterly Bulletin* assess how uncertainty matters for economic activity more generally.
- (3) See Smith (2012).

Households' uncertainty about inflation being at the target also does not appear to have increased over the past year. The Bank/GfK NOP survey asks respondents how confident they are about inflation being within 1 percentage point of the target in two to three years' time. In 2013, responses were little changed from 2012, with around 30% of households very or fairly confident that inflation would be close to the target.

The responsiveness of inflation expectations to news

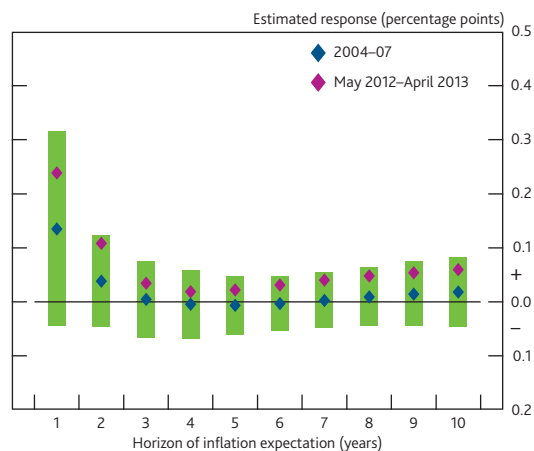
Another way to judge whether inflation expectations remain well anchored is to test their responsiveness to developments in the economy. For example, suppose there were economic news that suggested that CPI inflation was more likely to be away from the target in the near term than was previously anticipated. Individuals' expectations at longer horizons might become more responsive to this news if they expected deviations of inflation from the target to be more persistent or if they were attaching less weight to the MPC's determination to return inflation to the target in the long run.

In particular, inflation expectations might respond to 'news' in CPI inflation outturns. One way to estimate that response is to relate movements in financial market measures of inflation expectations on the day CPI inflation data are published to the news in the outturn. **Chart 5** shows the estimated change in market measures of inflation expectations in response to news in the CPI release, where that news is scaled up or down to equal 1 percentage point, using the difference between the inflation data and the market median expectation for the outturn as an indicator of the news. The higher the average change, the more inflation expectations are estimated to respond to CPI news. The blue diamonds show that during the period from 2004 to 2007, when inflation averaged close to 2%, inflation expectations one and two years ahead tended to increase in response to positive news in CPI inflation releases. Inflation expectations further ahead tended not to react, however.

Over the past year, inflation expectations at all horizons between one and ten years ahead have, on average, tended to move by slightly more in response to inflation news than between 2004–07. This is shown by the magenta diamonds in **Chart 5**, which lie above the blue diamonds. That might reflect an assessment by financial market participants that the MPC has become more tolerant of deviations of inflation from the target, and so is tentative evidence that inflation expectations might have become a little less well anchored. But the size of the changes is small relative to the uncertainty surrounding the estimates, as indicated by the green bars covering two standard errors on either side of the regression coefficients estimated over the 2004–07 period.

A de-anchoring of inflation expectations might also become evident if implied measures of inflation expectations at horizons beyond one year became more positively correlated with changes in one year ahead expectations. Given the MPC's

Chart 5 Estimated changes in instantaneous forward inflation rates derived from swaps in response to CPI news^(a)



Sources: Bloomberg, ONS and Bank calculations.

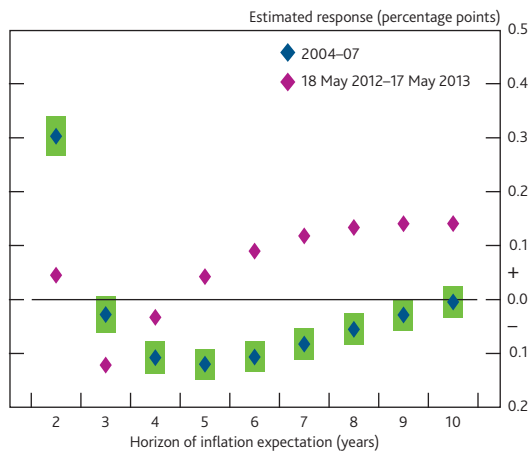
(a) The diamonds show the estimated slope coefficients from regressions of the change in instantaneous forward inflation rates at each horizon on the day on which CPI data were published against news in the CPI release. The instantaneous forward rates are derived from inflation swaps. Swaps data start in October 2004. News in the CPI release is measured as the difference between the data outturn and the Bloomberg median forecast. The bars cover two standard errors either side of the estimated slope coefficients for the 2004–07 period.

remit is to set monetary policy so that inflation can be brought back to the target within a reasonable time period without creating undue instability in the economy, inflation expectations one year ahead might well change in response to economic developments. If individuals believe that these shorter-term developments will also affect longer-term inflation, that would tend to increase the correlation between changes in shorter-term and longer-term expectations. Changes in these correlations could, however, also reflect other factors, including variations in liquidity in the markets for short and long-maturity instruments, for example. Over the past year, they might also have been affected by the consultation about changes to the RPI.

On this measure, there is tentative evidence that longer-term inflation expectations have become more responsive to economic news. Between 2004 and 2007, movements in two year ahead inflation expectations tended to be correlated with those one year ahead, but beyond that horizon, inflation expectations tended to change very little (**Chart 6**). Over the past year, however, inflation expectations at horizons between five and ten years ahead have been more responsive to changes in one year ahead expectations. But again, these movements are quite small.

To conclude this section, developments in households' and professional forecasters' inflation expectations have been mixed, but there is no clear evidence that they have become less well anchored. And while the levels of financial market measures appear broadly consistent with inflation expectations remaining anchored, there are some tentative signs that they have become somewhat more responsive to developments in the economy. That might suggest that

Chart 6 Estimated changes in instantaneous forward inflation rates derived from swaps in response to a 1 percentage point change in the one year ahead inflation rate^(a)



Sources: Bloomberg and Bank calculations.

(a) The average changes are estimated using the slope coefficients from regressions of daily changes in instantaneous inflation forward rates at each horizon on the daily change in the one year ahead instantaneous forward rate. The instantaneous forward rates are derived from inflation swaps. Data start in October 2004. The bars cover two standard errors either side of the estimated slope coefficients for the 2004-07 period.

financial market participants expect deviations of inflation from the target to persist for longer. In order to fully assess the risk posed by these tentative indicators, it is important to consider the extent to which past changes in inflation expectations have fed through into economic activity, as discussed in the next section.

Assessing the ways in which inflation expectations affect economic activity

Inflation expectations play an important role in determining the persistence of inflation. There are various mechanisms

through which this may occur, some of which are outlined in **Figure 1**. These channels always operate to some extent, but are only likely to become a cause for concern if inflation expectations become less well anchored to the target, or if the impact of inflation expectations through these channels becomes larger.

First, higher future prices may indicate lower spending power for households. Consequently, households may demand higher nominal wages in order to compensate for higher inflation expectations, in turn raising companies' input costs (Channel 1). Second, if companies expect prices to rise in the future, they may raise the prices of the goods and services they produce, and may also choose to raise wages (Channel 2). Third, a rise in households' and companies' inflation expectations could lead to a fall in real interest rates, holding monetary policy constant. Provided wage growth was expected to rise by less than the increase in inflation, this might encourage households and companies to bring forward their consumption and investment in order to avoid higher prices in future. In turn, this could result in higher prices in the near term due to increased demand (Channel 3). Finally, a rise in inflation expectations implied by financial markets could cause a depreciation of the nominal exchange rate, and consequently higher import prices (Channel 4).

One way to gain an overview of how inflation expectations have affected inflation over the past is to use a model such as the SVAR highlighted in the first section. A 1 percentage point increase (or shock) to two year ahead household inflation expectations is estimated to have a peak impact on CPI inflation of around 0.6 percentage points after one year. This suggests that, although actual changes in inflation expectations since 1993 have been very small, any future rises in inflation expectations should still be a matter of concern.

Figure 1 Channels through which inflation expectations could affect the persistence of inflation

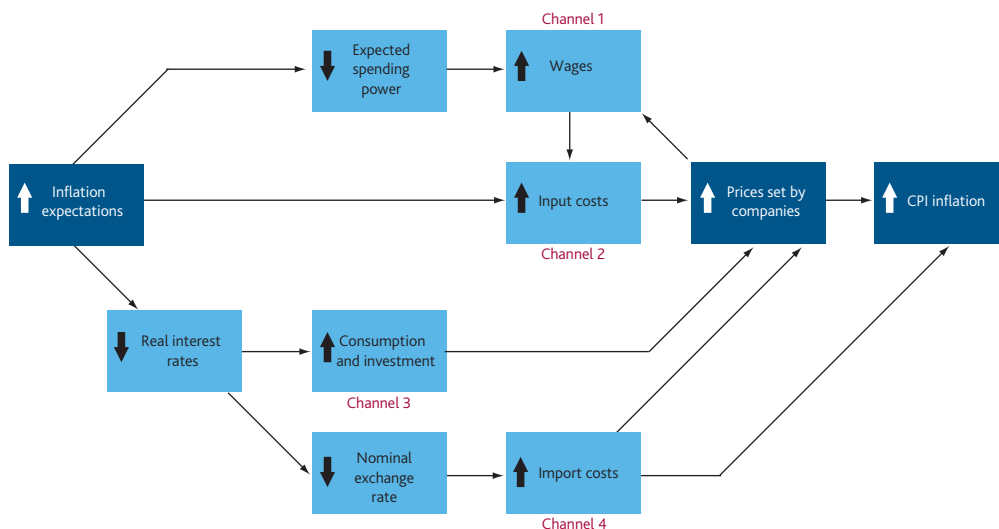
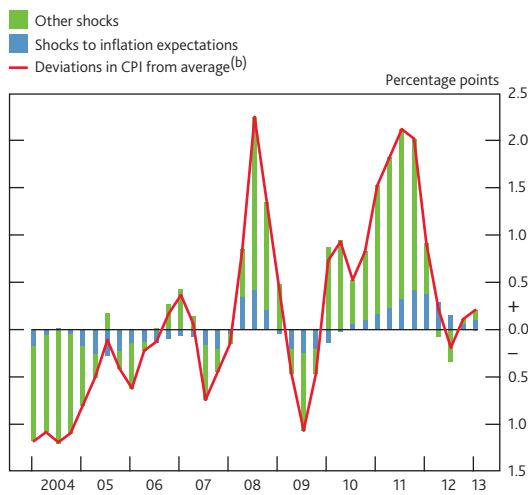


Chart 7 uses the same model to show the extent to which CPI inflation has been affected by the shocks to inflation expectations shown in **Chart 3** over the past decade. The model suggests that shocks to inflation expectations have made a small upward contribution to CPI inflation over the past three years.

Chart 7 Contribution of household inflation expectations to changes in CPI^(a)



Sources: Bank/GfK NOP, Barclays Capital, Bloomberg, ONS and Bank calculations.

(a) See footnotes to **Chart 3**.

(b) The red line represents deviations in CPI from the model-implied average over the period 1993–2013 Q1.

The next two sections use the available indicators to examine the extent to which inflation expectations may have affected CPI inflation through changes in wage and price-setting behaviour since the 1990s and over the crisis period. The third section briefly examines the consumption and investment channel and the nominal exchange rate channel.

Households' wage-seeking behaviour

An increase in households' inflation expectations might cause a change in their wage-seeking behaviour, which could in turn raise the persistence of inflation (Channel 1 in **Figure 1**). And the impact of inflation expectations on wage-seeking might change over time. This section assesses the extent to which changes in households' inflation expectations have fed through into wages.

Wages are determined by a combination of household bargaining and companies' wage-setting decisions. If households expect higher inflation to persist, they might begin to seek higher wages in order to compensate for their increased cost of living. Successful wage bargaining might result in companies being forced to set higher wages. In turn, these firms might charge higher prices to compensate for their higher wage costs, generating more persistent inflation. And higher wages could create further inflationary pressure by raising spending. A rise in companies' own inflation expectations (discussed in the next section) might also encourage them to set higher wages in order to retain staff, for

example if they expect an erosion in real wages to result in a reduced motivation of their workforce.

Quarterly nominal wage growth has been weak since the start of the financial crisis, and has been generally below the rate of inflation. The weakness of nominal wage growth might suggest that households' inflation expectations have not pushed up significantly on wages over the crisis. However, the impact of inflation expectations on wage growth is likely to be obscured by other factors currently pushing down on wages, for example weak productivity and slack in the labour market.

Testing the impact of households' inflation expectations on wage-setting behaviour

One method of determining the historical impact of households' inflation expectations on wage growth is to estimate a simple wage Phillips curve.⁽¹⁾ This approach allows us to isolate the influence of inflation expectations on wage growth, after controlling for other factors which might affect wages. These include changes in employees' productivity, cyclical unemployment and labour's share of income.

Table B shows the relationship between households' inflation expectations and nominal wage growth between 1993 and 2006, a period of relatively stable inflation and economic conditions. Households' two year ahead inflation expectations appear to have had some positive association with wage growth over this period: column 1 suggests that a 1 percentage point rise in two year ahead household inflation expectations was associated with a 0.88 percentage point increase in quarterly nominal wage growth. In contrast, the results for one year ahead expectations — shown in column 2 — are insignificant. The results also suggest that rises in productivity have been positively associated with wage growth, while rises in cyclical unemployment have acted in the opposite direction. However, the fact that the relationship between the labour share and quarterly wage growth becomes less significant when households' two year ahead inflation expectations are used could potentially be evidence of regression misspecification.

These results suggest that households' inflation expectations may have had some impact on wage growth in the pre-crisis period. When the regression sample is extended to cover the crisis period, however, the relationship between inflation expectations and wage growth becomes less significant.

The lack of significance between inflation expectations and wage growth in recent years is consistent with survey evidence from the Bank/GfK NOP inflation attitudes survey. This suggests that households' inflation expectations currently have little impact on their wage-seeking behaviour. The survey asks households whether they are planning to push for higher pay with their current employer in light of their inflation

(1) See Posen (2011) for another recent example.

Table B Relationship between households' inflation expectations and wages^{(a)(b)}

Independent variable	Nominal wage growth	
	(1)	(2)
Nominal wage growth (t-1)	-0.38 (0.24)	-0.29 (0.23)
Productivity growth (t-1)	0.94** (0.37)	1.13*** (0.37)
Labour share (t-1)	-0.30* (0.16)	-0.39** (0.17)
Unemployment gap (t-1)	-0.91*** (0.22)	-0.86*** (0.23)
Two year ahead inflation expectations (t-1)	0.88*** (0.33)	
One year ahead inflation expectations (t-1)		0.53 (0.35)
Observations	56	56
R-squared	0.40	0.35

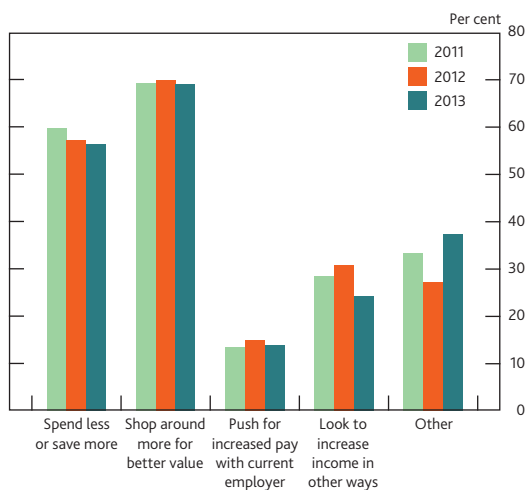
Robust standard errors in parentheses
Three stars, two stars and one star denote statistical significance at the 1%, 5% and 10% levels, respectively.

Sources: Barclays Capital, OECD, ONS and Bank calculations.

(a) Estimated using quarterly data. Sample period is 1993 Q1 to 2006 Q4.
(b) Regressors (all lagged one quarter): nominal wage growth (four-quarter moving average), productivity growth (four-quarter moving average), labour share (real wage/productivity), the unemployment gap, Basix one year ahead expectations, Basix two year ahead expectations.

expectations. In February 2013, only 14% of survey respondents who expected inflation to be more than 1 percentage point above the target over the next twelve months planned to push for higher wages (Chart 8), and this proportion had changed very little from the previous two years. When the remaining sample of households was asked why they did not plan to push for higher wages, around half answered that they were unable to influence their pay.

Chart 8 Working households' responses to above-target inflation expectations^{(a)(b)}



Source: Bank/GfK NOP.

(a) Respondents to the Bank/GfK NOP survey were asked which actions they are taking, or planning to take, in light of their expectations of price changes over the next twelve months.
(b) The sample was restricted to working households who expected inflation to be more than 1 percentage point above the target over the next twelve months.

Companies' wage and price-setting decisions

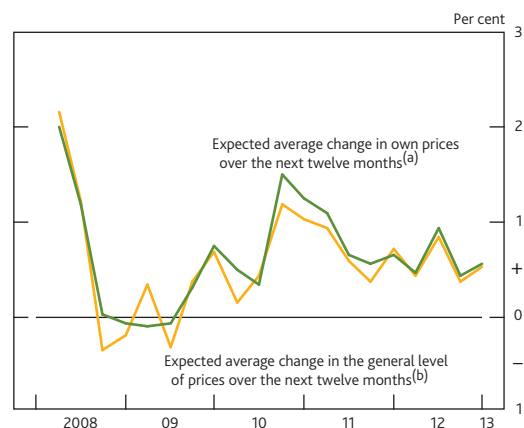
If companies' inflation expectations were to become less well anchored by monetary policy, this might lead to a change in

their wage and price-setting behaviour (Channel 2 in Figure 1). There are at least two mechanisms through which a rise in companies' inflation expectations might encourage them to set higher prices. First, if companies and households expect higher inflation in the short term, companies might feel able to charge higher prices without experiencing a drop in demand for the goods and services they produce. Second, if companies perceive that the MPC has become more tolerant of deviations in inflation from the target, they might expect production costs to increase or to persist at a higher level for longer. They may then choose to set higher prices in order to compensate. And as mentioned in the previous section, companies may set higher wages if they expect an erosion in real wages to result in a reduced motivation of their workforce.

Testing the impact of companies' inflation expectations on price-setting behaviour

Indicators of companies' inflation expectations are limited, but the available survey data suggest that these have remained muted over the crisis period. The CBI survey shows that companies' own pricing intentions have broadly tracked their price expectations for the industries in which they compete since 2008 (Chart 9). Both indicators have remained fairly stable over the past year. And the net percentage balance of companies in the British Chambers of Commerce (BCC) survey who are expecting to raise their own prices over the next quarter fell in 2013 Q1, to just below its historical average (Chart 10).

Chart 9 Companies' expected changes to prices over the next twelve months



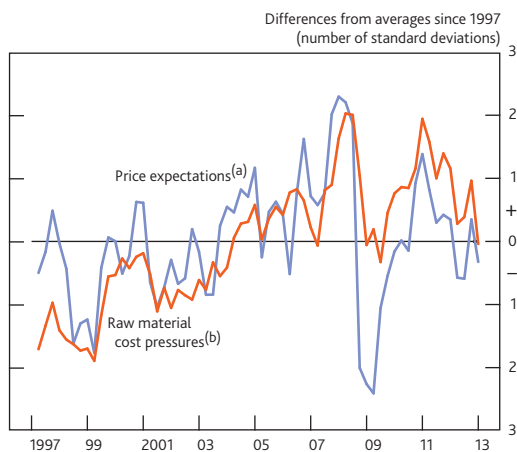
Source: CBI.

(a) Companies were asked: 'What percentage change is expected to occur over the next twelve months in your own average output price for goods sold into UK markets?'.
(b) Companies were asked: 'What percentage change is expected to occur over the next twelve months in the general level of prices in the markets that you compete in?'.

To assess whether any rise in companies' inflation expectations would pose a risk to inflation, we need to distinguish between changes in price expectations that are a response to changes in observed input prices or levels of competition, and those which are due to higher expectations of future inflation.

The BCC survey provides one way to assess the extent to which firms' price expectations have moved in line with observed input costs. **Chart 10** shows that the net percentage balance of respondents reporting higher price expectations has tended to move in line with the balance reporting that higher raw material prices are putting upwards pressure on prices, suggesting that raw material costs can explain a substantial proportion of the formation of price expectations. However, the balance reporting higher price expectations has been lower than the balance reporting upwards pressure from raw material prices since 2008. This tentatively suggests that rises in input costs have not caused inflation expectations to become de-anchored, although it could be the case that upward pressure from input costs is being offset by continued weakness in demand.

Chart 10 BCC survey measures of companies' price expectations versus cost expectations



Sources: BCC, ONS and Bank calculations.

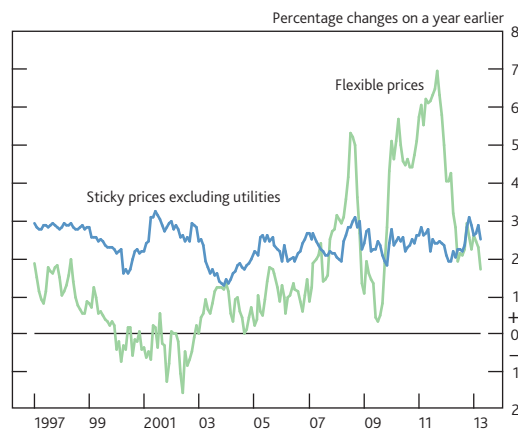
- (a) Net percentage balance. The exact question asked was 'Over the next three months, do you expect the price of your goods/services to: increase/remain the same/decrease?'
- (b) Net percentage balance. The exact question asked was 'Is your business currently suffering pressures to raise prices from raw material prices?'

The rate of inflation for goods and services in sectors where prices are changed infrequently provides an alternative way to assess how inflation expectations are affecting price-setting. 'Sticky' prices — those that change less often than average — are more likely to depend on companies' expectations of future inflation, rather than current observed input costs, since sticky prices are likely to incorporate forward-looking information. Sticky price inflation did rise a little in the second half of 2012 (**Chart 11**), but has since fallen back somewhat and is currently only slightly above its average level since 1997.

Testing the impact of companies' inflation expectations on wage-setting behaviour

There is little evidence that companies' inflation expectations have altered their wage-setting expectations over the past year. The CBI survey, which asks companies to state their wage growth expectations for the next twelve months, provides some indication of the relationship between companies' price

Chart 11 Inflation in sticky and flexible price sectors(a)

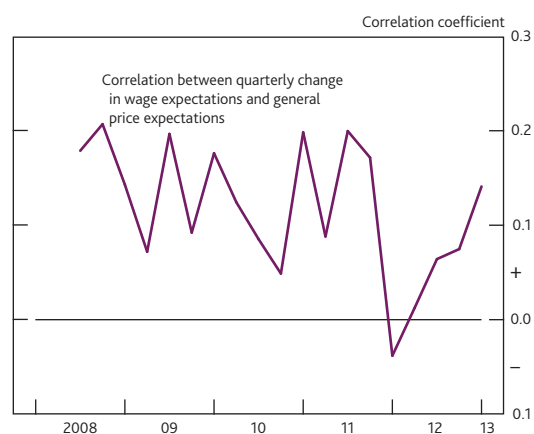


Sources: ONS and Bank calculations.

- (a) The CPI basket is divided into twelve subcomponents, based on the classification of individual consumption according to purpose categories. These twelve subcomponents were divided between flexible and sticky price sectors based on the frequency at which the prices of different types of goods and services change. These frequencies were calculated from the price quotes that underpin the monthly CPI, which the ONS makes available to researchers via its secure Virtual Microdata Laboratory (described in Ritchie (2008)). The flexible price sector comprises those components of the basket in which prices on average change more regularly than the median frequency and the sticky price sector comprises those components of the CPI basket in which prices on average change less often than the median frequency. The sticky price series excludes utility prices, which are more likely to be changed due to changes in gas and other commodity prices rather than developments in the wider economy. Both the flexible and sticky price series include the impact of VAT.

and wage expectations. The correlation between changes in companies' wage growth expectations and their industry-level inflation expectations rose slightly during 2012 (**Chart 12**). But it remains low both relative to the past and in absolute terms. The correlation between changes in companies' wage expectations and expectations for their own prices produces a similar pattern.

Chart 12 Correlation between changes in companies' wage and price expectations(a)(b)



Sources: CBI and Bank calculations.

- (a) Companies were asked: 'What percentage change is expected to occur in your firm's wage/salary cost per person employed (including overtime and bonuses) over the next twelve months?'
- (b) Companies were asked: 'What percentage change is expected to occur over the next twelve months in the general level of prices in the markets that you compete in?'

The impact of companies' inflation expectations on wage and price-setting over the crisis

The CBI survey allows us to summarise the average impact of companies' inflation expectations on the survey measures of

their price and wage growth over the crisis period. We run regressions of wage and price growth as reported in the manufacturing survey on companies' inflation expectations, from 2008 Q2 to 2013 Q1.⁽¹⁾ Since these are survey measures of wage and price growth, they may not be completely representative of the UK manufacturing sector. And although the manufacturing sector itself represents a relatively small proportion of UK output, this analysis could nevertheless tell us something about how inflation expectations affect companies' price and wage-setting behaviour.

The regression results in column 1 of **Table C** suggest that companies' inflation expectations (for the industries in which they compete) have a large impact on the prices they set. A 1 percentage point rise in a company's inflation expectations is associated with a 0.81 percentage point rise in the growth in its prices.⁽²⁾

Table C Determinants of price and wage-setting in the manufacturing sector^(a)

Independent variable	Annual reported growth	
	(1)	(2)
	Own prices	Wages
Annual own price growth ($t-4$)	-0.02 (0.04)	
Annual wage growth ($t-4$)		-0.17*** (0.06)
Industry-level price expectations ^(b)	0.81*** (0.15)	0.71 (0.86)
Wage expectations ^{(b)(c)}	-0.57 (1.06)	
Own price expectations ^{(b)(c)}		-0.73 (1.06)
Current rate of operation ^(b)	0.05 (0.04)	
Quarterly change in input costs ^(b)	1.52*** (0.35)	
Annual productivity growth ^(d)		-0.08*** (0.02)
Labour share ^{(b)(d)}		-4.29*** (0.88)
Unemployment gap ^{(b)(d)}		-1.52* (0.81)
Number of observations	1,668	1,607
Number of firms	287	277
Robust	Yes	Yes

Three stars, two stars and one star denote statistical significance at the 1%, 5% and 10% levels, respectively.

Sources: CBI, OECD and ONS.

(a) Estimated using quarterly data over the period 2008 Q2 to 2013 Q1.

(b) Variables are calculated as moving averages over three quarters, under the assumption that conditions in the current quarter and developments over the preceding six months are the main determinants of changes in prices and wages reported in quarter t .

(c) Own price and wage expectations may be determined jointly with actual prices and wages within each firm, and so are endogenous. We therefore instrument own price expectations and wage expectations with their own four-quarter lags.

(d) Variables are formed from aggregate data rather than firm-specific CBI data. Productivity and labour share are based on sectoral data for the manufacturing sector.

In contrast, companies' wage expectations do *not* appear to be directly associated with the prices they set, controlling for the other variables in column 1. And companies' inflation expectations are not significantly associated with wage growth

(column 2) over the sample period. This could suggest that firms in the manufacturing sector have not tended to change wage growth in response to changes in their price expectations. However, given the low labour intensity of the manufacturing sector compared to the service sector, we cannot necessarily extrapolate from these results to the whole economy.

The evidence presented in this section, while limited, suggests that changes in inflation expectations have been associated with movements in price and wage growth in the past. Although recent movements in inflation expectations do not seem to have pushed up on prices and wages, this is likely to be in large part due to the fact that inflation expectations have not increased substantially over the period analysed. If inflation expectations were to rise markedly, it is likely that they would increase the persistence of inflation.

Other channels

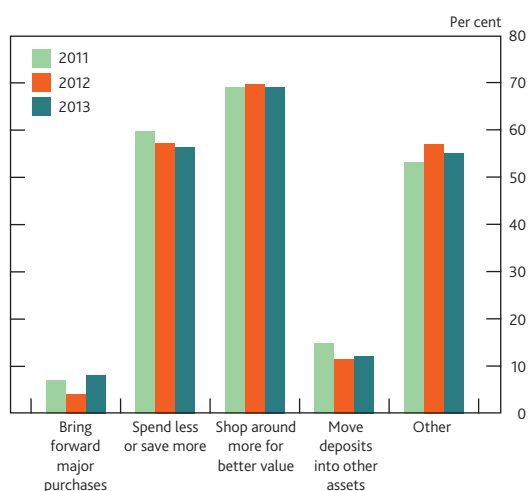
Channel 3 in **Figure 1** outlines the possibility that a rise in inflation expectations encourages households and companies to bring forward consumption and investment, however tentative evidence suggests that other channels might dominate. The Bank/GfK NOP survey reports that only a small proportion of respondents with high inflation expectations expected to bring forward major purchases in response (**Chart 13**). And over 50% of respondents expected to spend less or save more.

Channel 4 in **Figure 1** operates through the exchange rate. If inflation in the United Kingdom is expected to be higher than abroad, one might expect the nominal exchange rate to depreciate in the future in order to maintain a constant real exchange rate — and that could boost import prices and CPI inflation. However, the resultant exchange rate movement will depend on how monetary policy is expected to react. The nominal exchange rate is more likely to fall if policymakers are perceived to be tolerant of higher inflation, resulting in a fall in real interest rates. Simple correlations between inflation expectations implied by financial markets and movements in the nominal exchange rate suggest that inflation expectations are not exerting a significant effect through this channel at present.

(1) The CBI data are in panel form, meaning that the same firms are surveyed each quarter. This means that the regressions can be run using fixed effects, which control for the characteristics of each firm that are constant over time. This allows the impact of the other variables, including price expectations, to be separated from time-invariant factors that are specific to each firm.

(2) This analysis is complicated by the fact that the CBI inflation expectations data refer to expectations for the industry in which the firm competes, rather than expectations for the United Kingdom as a whole. Therefore the coefficient on industry-level price expectations in column 1 might be capturing industry-specific factors such as the level of competition. A preliminary test for this possibility is the significance of industry and industry*time dummies in the regressions: these did not affect the sign or significance of the results in columns 1 and 2.

Chart 13 Working households' spending and saving decisions in response to above-target inflation expectations^{(a)(b)}



Source: Bank/GfK NOP.

- (a) Respondents to the Bank/GfK NOP survey were asked which actions they are taking, or planning to take, in light of their expectations of price changes over the next twelve months.
 (b) The sample was restricted to working households who expected inflation to be more than 1 percentage point above the target over the next twelve months.

Conclusion

CPI inflation has been above the 2% target for a prolonged period and the MPC's latest projection is that it is more likely than not to remain above the target for much of the next two years. In large part, the deviation reflects the impact of energy, other import prices, VAT, and prices that are affected

by government and regulatory decisions. Therefore, the MPC has judged that it has been appropriate to look through the period of above-target inflation, subject to meeting the inflation target in the medium term. In the current economic circumstances, attempting to bring inflation back to the target too quickly would risk derailing the recovery and undershooting the inflation target in future.

There is a risk, however, that the prolonged period of above-target inflation could cause inflation expectations to become less well anchored. That could trigger changes in the nominal exchange rate, and affect consumption and investment decisions, as well as wages and prices, and could cause inflation to persist above the target for longer.

Most of the indicators discussed above are consistent with inflation expectations remaining anchored to the target, although there is tentative evidence that financial market measures of inflation expectations have become a little more responsive to developments in the economy.

Wages and prices would probably be affected if inflation expectations were to increase markedly. But, given the lack of movement in most measures of inflation expectations, there are few signs to suggest that they have affected wage growth and inflation yet. The imperfect nature of the data means, however, that there are large uncertainties around all of these indicators. The MPC will continue to monitor and assess them and they remain an important factor in policy decisions.

Annex

Available indicators of inflation expectations

	Time horizon	Start of data	Survey question/measure of inflation
Surveys of households			
Bank/GfK NOP	1 year 2 and 5 years	Nov. 1999 Feb. 2009	How much would you expect prices in the shops generally to change over the next one, two and five years?
Barclays Basix	1 and 2 years 5 years	Dec. 1986 Aug. 2008	What do you expect the rate of inflation to be over the next twelve months and over the next five years?
YouGov/Citigroup	1 and 5–10 years	Nov. 2005	How do you expect consumer prices of goods and services will develop over the next one and five to ten years respectively?
Surveys of companies			
BCC	3 months	Feb. 1997	Over the next three months, do you expect the price of your goods/services to increase/remain the same/decrease?
CBI	1 year	June 2008	How much would you expect your own prices and prices in the markets you compete in to change over the next year?
Surveys of professional forecasters			
Bank	1, 2 and 3 years	May 2006	Point forecasts for CPI.
HM Treasury	1, 2, 3 and 4 years	Mar. 2006	Point forecasts for CPI.
Consensus	5–10 years	Oct. 2004	Point forecasts for CPI.
Measures derived from financial instruments			
Swaps	1 to 25 years ahead	Oct. 2004	RPI-linked.
Gilts	1 to 25 years ahead	Jan. 1985	RPI-linked.

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