

International evidence on inflation expectations during Sustained Off-Target Inflation episodes

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The high level of UK inflation in recent years raises the possibility that inflation expectations may drift upwards, making the period of above-target inflation last for longer. This article presents some evidence on inflation expectations during Sustained Off-Target Inflation (SOTI) episodes in other inflation-targeting countries and outlines some of the key trends. The evidence suggests that short and medium-term inflation expectations have tended to drift in the direction of the deviation of inflation from target. But generally the movements in inflation expectations were more gradual than movements in inflation itself and expectations returned to their previous level once inflation returned to target.

Introduction

Inflation in the United Kingdom, measured by the annual change in the consumer prices index (CPI), has exceeded the 2% target set by the Government for much of the past three years. Since the start of 2008, CPI inflation has been above the target in 34 out of 40 months and has averaged 3.2%. This implies that the United Kingdom is now three years into a Sustained Off-Target Inflation (SOTI) episode — as will be defined later in this article. The sustained high level of UK inflation has led to concerns that inflation expectations may rise. As the accompanying article on pages 100–10 in this edition of the *Quarterly Bulletin* explains, higher inflation expectations may make the period of above-target inflation last for longer (Macallan, O'Grady and Taylor (2011)). In that article a framework is presented showing how a range of indicators can be used to assess the risk to inflation from inflation expectations. But given the imperfect nature of the data, the risk can only be assessed imperfectly. Given this uncertainty, it is useful to examine how other countries' inflation expectations have moved during past SOTI episodes.

By examining past SOTI episodes in other inflation-targeting countries, this short article attempts to draw lessons for the United Kingdom. The scope of the analysis is limited. It simply identifies a number of SOTI periods and then discusses the movements in inflation and in survey measures of inflation expectations during and immediately after those periods. It does not consider the effects of the stance of monetary policy, the underlying causes of the deviation in inflation or the cyclical developments in each country. These factors of course

affect the path of inflation and inflation expectations, but the broad trends in past behaviour may nonetheless provide a useful additional piece of evidence for policymakers.

The first two sections describe the selection of the sample of SOTI periods and how inflation evolved over these periods. Subsequent sections consider how inflation expectations at short, medium and long-term horizons appeared to have evolved as inflation deviated from target. The article then analyses how inflation expectations reacted once inflation returned to target, discusses the current UK experience and presents its main conclusions.

International SOTI episodes: sample and data

In December 1989, New Zealand was the first country to adopt a formal inflation target. A host of countries, including Australia, Canada, Chile, Israel and the United Kingdom, subsequently followed suit.⁽²⁾ Notwithstanding the perceived success of this monetary policy regime, periods of sustained off-target inflation have occurred in a number of these countries.

This article uses each country's inflation targets as a metric for assessing 'normal' levels of inflation. This provides a way to categorise periods of persistently high or low inflation, referred to as SOTI periods. The definition of 'off target' used in this

(1) The authors would like to thank Adrian Chiu, Robert Gilhooly, Abigail Hughes, Gilberto Marcheggiano and Jochen Schanz for their help in producing this article.

(2) See Hammond (2011) for a full list of inflation-targeting countries and the date inflation targeting was adopted.

article depends on the precise nature of the inflation target used by a country. For countries with a target range or a point target with a tolerance band, inflation is 'off target' if it is outside that range or tolerance band with the deviation from 'target' defined as the difference between inflation and the range or band. For those countries with a point target and no tolerance band, such as the United Kingdom, the 'target' is defined as the point target plus or minus 0.5 percentage points. Therefore, inflation is deemed 'off target' if inflation is outside that range. This definition therefore ignores small movements in inflation that are unlikely to have significant effects on inflation expectations.

There are two criteria used to define a SOTI period. First, inflation must have been 'off target' for 75% of any period of 24 months or more. This implies that SOTI episodes must be at least 18 months long. Brief one-off price shocks, which appeared in the annual inflation data for a year before dropping out, are therefore not included in the sample of SOTI episodes. This also allows time for agents to revise their expectations. Second, any identified periods beginning within 18 months of an inflation-targeting adoption announcement are ignored. This is because the introduction of a target may have affected inflation expectations over this period as well as any deviations of inflation from that target. **Table A** lists the periods meeting these criteria.⁽¹⁾⁽²⁾

Table A SOTI periods^(a)

Country	Date	Above/below 'target'
Australia	1995 Q1–1996 Q2	Above
Australia	1996 Q4–1999 Q4	Below
Australia	2000 Q2–2001 Q4	Above
Chile	2007 Q3–2009 Q1	Above
Colombia	2002 Q4–2004 Q2	Above
Colombia	2007 Q1–2009 Q1	Above
Czech Republic	2002 Q2–2005 Q3	Below
Hungary	2003 Q1–2004 Q4	Above
Hungary	2006 Q4–Now	Above
Iceland	2004 Q2–2010 Q3	Above
Korea	2005 Q3–2007 Q3	Below
Mexico	2002 Q3–2005 Q2	Above
Mexico	2008 Q2–2010 Q4	Above
New Zealand	1994 Q4–1996 Q4	Above
Norway	2003 Q3–2007 Q4	Below
Poland	2001 Q3–2003 Q4	Below
Poland	2007 Q4–2009 Q3	Above
South Africa	2002 Q1–2003 Q3	Above
South Africa	2007 Q2–2009 Q4	Above
Sweden	1996 Q2–2000 Q3	Below
Sweden	2004 Q1–2006 Q1	Below
Sweden	2009 Q1–2010 Q3	Below
United Kingdom	1995 Q3–1997 Q1	Above
United Kingdom	2008 Q2–Now	Above

Sources: National sources, Thomson Reuters Datastream and Bank calculations.

(a) See text for criteria for SOTI periods.

Given the limited number of countries with data on household inflation expectations, this article utilises a mixture of surveys of households and businesses to produce as large a sample as possible.⁽³⁾ When a country had multiple surveys at a specific time horizon (for example, both household and business surveys at a short-term horizon), the median expectation across all surveys was used. Although household inflation expectations appear to have been more volatile, with larger short-term movements than business expectations, they both moved in a similar direction in SOTI periods. And analysis suggested that excluding business surveys had only a small effect on the median measure of the change in inflation expectations for a country over SOTI episodes and did not offset the gains from having a larger sample.

Inflation in SOTI periods

Chart 1 shows a swathe representing the interquartile range of deviations in inflation from 'target' — as defined earlier — throughout the identified SOTI periods. It also shows the deviation of UK CPI inflation from 'target' during the current UK SOTI period. For each quarter of each SOTI period in the sample, the deviations are calculated and the interquartile range of these deviations measured. Zero on the x-axis is the last point at which inflation was at 'target' as defined earlier. Deviations in 'below-target' SOTI episodes are inverted to make the movement in inflation comparable to 'above-target' SOTI episodes — thus the y-axis represents the standardised movement in inflation from 'target'.⁽⁴⁾

The length of SOTI episodes has varied from just six quarters — the minimum possible given the definition of a SOTI period — to 26 quarters (the median SOTI period length is nine quarters). Individual SOTI periods are dropped from the sample once they end. This has the effect of gradually reducing the sample size shown in the swathe in **Chart 1** from 23 episodes after six quarters to only six episodes after thirteen quarters. **Chart 1** indicates this reduction in sample size by the lighter shades on the right-hand side of the swathe. Changes in the sample size mean that movements in the swathe and in the median deviation may reflect changes in sample as well as movements in inflation itself.

Chart 1 shows that, on average, inflation deviations picked up from the start of the SOTI period, deviating around

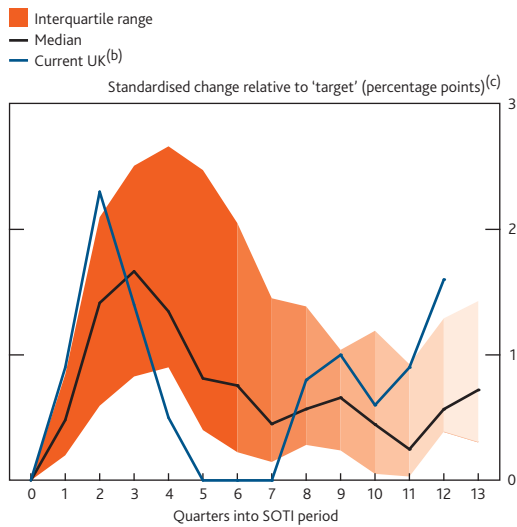
(1) The table excludes episodes where surveys of inflation expectations for households or firms are not available.

(2) Deviations from 'target' are measured at the same frequency as the inflation data are themselves published (ie generally monthly). As many inflation expectations surveys are conducted quarterly, the analysis in this article uses quarterly data. A quarter is included at the start of a SOTI period if inflation is 'off target' in the first or second month of that quarter. A quarter is included at the end of a SOTI period if inflation is 'off target' in the second or third month of that quarter.

(3) The analysis is focused on the inflation expectations of those directly involved in the wage and price-setting processes. So surveys of professional forecasters and financial market participants are excluded.

(4) Analysis suggests that inflation expectations move by a similar magnitude when inflation rises above or falls below its 'target'. So analysing standardised moves in inflation expectations should not bias the results.

Chart 1 Inflation throughout SOTI periods^(a)



Sources: National sources, Thomson Reuters Datastream and Bank calculations.

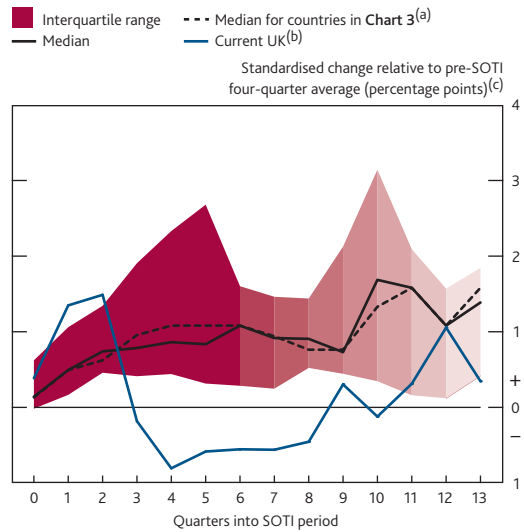
- (a) The chart shows deviations from 'target' as defined in the article. Thus for countries with a target range or a point target with a tolerance band, inflation is 'off target' if inflation is outside that range or band. For countries with a point target and no tolerance band, such as the United Kingdom, inflation is 'off target' if the deviation from the point target exceeds 0.5 percentage points. Thus in the case of the United Kingdom, CPI inflation must either exceed 2.5% or fall below 1.5% to be deemed 'off target'.
- (b) The current UK SOTI period began in 2008 Q2. At the time of going to print, the UK CPI inflation data were not available for the thirteenth quarter.
- (c) Deviations in 'below-target' SOTI periods are inverted to make the deviations in inflation from 'target' comparable to 'above-target' SOTI periods.

1.7 percentage points from 'target' after three quarters. Inflation deviations then gradually fell back. The median deviation of inflation from 'target' remains above zero throughout **Chart 1** as countries that have returned to 'target' are dropped from the sample. The current UK experience looks atypical, with a sharp fall in inflation in the middle of the SOTI period, in part reflecting the cut in VAT and the fall in energy prices following the global recession. The current UK SOTI episode is also longer than the median SOTI period length. On the basis of the MPC's latest *Inflation Report* forecast, 2011 Q2 is likely to be the thirteenth quarter of the current UK SOTI period. Only six of the 23 other periods have lasted longer than three years.

How did inflation expectations react?

As might be expected, one year ahead inflation expectations tended to move in line with inflation developments. **Chart 2** shows a swathe constructed in a similar manner to **Chart 1**, but now evaluates the deviation in one year ahead inflation expectations from their four-quarter average prior to the SOTI period. To compare movements in inflation expectations across both 'above-target' and 'below-target' SOTI episodes, the sign of the movement in inflation expectations is standardised so movements in inflation expectations in the same direction as the movement in inflation are treated as positive values. Thus a positive value either means that inflation expectations rose during an 'above-target' SOTI episode or fell when inflation fell persistently below 'target'. The chart also shows the movements in one year ahead inflation expectations in the current UK SOTI episode, where

Chart 2 One year ahead inflation expectations



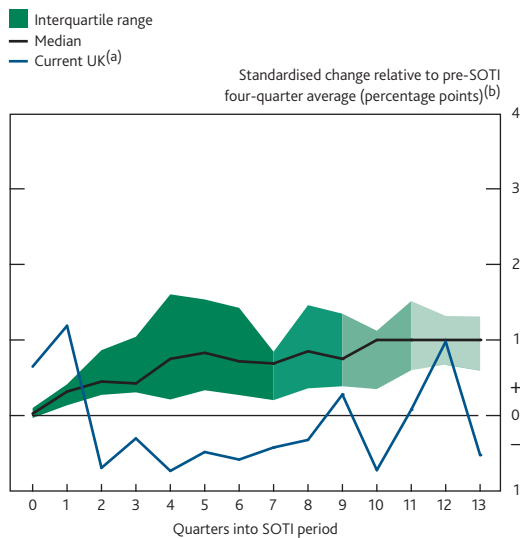
Sources: Bank of England, Barclays Capital, Citigroup, GfK NOP, national central banks, Thomson Reuters Datastream, YouGov and Bank calculations.

- (a) **Chart 3** uses a smaller sample as fewer countries publish medium-term expectations.
- (b) The median of the Bank/NOP, Barclays Basix and YouGov/Citigroup surveys at the one-year horizon.
- (c) Deviations in 'below-target' SOTI periods are inverted to make the deviations in inflation from 'target' comparable to 'above-target' SOTI periods. A negative value therefore implies that expectations are either below their pre-SOTI average in 'above-target' SOTI periods or above their pre-SOTI average in 'below-target' SOTI periods.

negative values indicate that inflation expectations fell even though inflation deviated above 'target' for most of the period.

Chart 2 shows that, over the first six quarters of the SOTI periods, one year ahead inflation expectations on average moved around 0.8 percentage points from their pre-SOTI average in the direction of the deviation from 'target'. This is significantly less than the peak movement in inflation, but the drift in inflation expectations beyond six quarters is more persistent than the move in inflation. The chart shows that UK inflation expectations picked up more sharply early in the current SOTI episode, but fell sharply as inflation also fell. Expectations have since risen again to be more in line with other countries' experience. The latest data, however, have highlighted the volatility in the survey measures of one year ahead inflation expectations. **Chart 2** also shows the median change in one year ahead inflation expectations for those countries that also have medium-term inflation expectations data (dashed line). This 'matched' sample is for comparison with **Chart 3** and will be discussed later.

Chart 3 evaluates movements in medium-term expectations — typically at a two or three-year horizon — compared to their pre-SOTI four-quarter average and presents them in a similar manner to **Chart 2**. The median standardised change in medium-term expectations two years into a SOTI episode was similar to that shown in **Chart 2**. But not all countries have medium-term inflation expectations data. This means the median (solid) lines in **Charts 2** and **3** are not strictly comparable. The median change in medium-term inflation expectations was a little smaller than that for short-term

Chart 3 Two/three year ahead inflation expectations

Sources: Barclays Capital, national central banks, Thomson Reuters Datastream and Bank calculations.

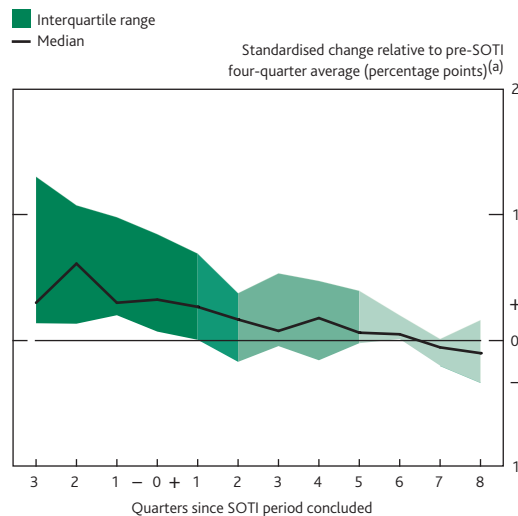
- (a) Barclays Basix survey at the two-year horizon. The Bank/NOP survey at the same horizon could not be used as it began part way through the current SOTI episode.
 (b) Deviations in 'below-target' SOTI periods are inverted to make the deviations in inflation from 'target' comparable to 'above-target' SOTI periods. A negative value therefore implies that expectations are either below their pre-SOTI average in 'above-target' SOTI periods or above their pre-SOTI average in 'below-target' SOTI periods.

expectations in a matched sample (the dashed line in **Chart 2**), in almost all periods. Medium-term expectations also appear to have picked up more slowly than short-term expectations. And there is little evidence of a sharp movement in inflation expectations — changes tended to accumulate gradually over time. Again the current UK experience is atypical: inflation expectations fell sharply two quarters into the current SOTI episode as inflation also fell. There is some evidence that expectations drifted up again as inflation picked up part way through the SOTI period, although the data are again volatile.

Few countries have assembled surveys that measure inflation expectations at the five-year horizon; Norway and Sweden are the only countries to have collected these data during previous SOTI periods.⁽¹⁾ Drawing robust conclusions from the four available episodes from these two countries is obviously fraught with difficulty. But the median deviation in long-term inflation expectations in this small sample is less than that for short and medium-term expectations. UK long-term inflation expectations (as measured by the YouGov/Citigroup survey of expectations 5–10 years out) are similarly little changed (see the accompanying article on pages 100–10).⁽²⁾

How did inflation expectations react after the SOTI period ended?

An important question for policymakers is how quickly inflation expectations return to their pre-SOTI average. **Chart 4** shows how medium-term inflation expectations moved at the end of a SOTI period. Zero on the x-axis is the final quarter of the SOTI period.⁽³⁾ Some countries' SOTI

Chart 4 Two/three year ahead inflation expectations after SOTI periods

Sources: Barclays Capital, national central banks, Thomson Reuters Datastream and Bank calculations.

- (a) Deviations in 'below-target' SOTI periods are inverted to make the deviations in inflation from 'target' comparable to 'above-target' SOTI periods. A negative value therefore implies that expectations are either below their pre-SOTI average in 'above-target' SOTI periods or above their pre-SOTI average in 'below-target' SOTI periods.

episodes ended within the past two years so data is not available for the full eight quarters after the SOTI ended. As in earlier charts, when a country falls out of the sample due to a lack of data, the shading of the interquartile range changes to reflect this.

Inflation expectations did return to their pre-SOTI average, but only after inflation itself returned to 'target'. **Chart 4** suggests that medium-term expectations reached their pre-SOTI average after around six quarters.

Current UK experience

Since the start of 2008, UK inflation has exceeded the 2% target set by the Government in 34 of the past 40 months and averaged 3.2%. That means that the United Kingdom is now three years into a SOTI episode, as defined above. This is longer than the majority of the other SOTI episodes considered. But a small number of countries have experienced similarly long SOTI episodes and can provide some insight for the current situation in the United Kingdom.

Charts 2 and 3 both show that survey-based measures of inflation expectations can be volatile, clouding comparisons

- (1) Market measures of inflation expectations are available for some countries, but as explained in Macallan *et al* (2011), not all the movement in these measures can be attributed to movements in inflation expectations. This article does not consider these measures of inflation expectations.
 (2) The Bank/NOP and Barclays Basix surveys at the five-year horizon could not be used as they began part way through the current SOTI episode.
 (3) As in earlier charts, inflation is defined as back at 'target' if it is within the central bank's target range or tolerance level limit (or within 0.5 percentage points of the target for those central banks with a point target and no tolerance range).

with past SOTI episodes. As noted earlier, for much of the current UK SOTI episode, UK inflation expectations were lower than their pre-SOTI four-quarter average. This may reflect the volatility of inflation in the earlier part of the current UK SOTI period. More recently, UK inflation expectations have drifted up and were comparable to past episodes twelve quarters into the SOTI. But the latest available data for 2011 Q2 suggests that inflation expectations have fallen back somewhat.

The volatility of survey-based measures of inflation expectations highlights the importance of considering a range of indicators of inflation expectations. The accompanying article on pages 100–10 discusses how a range of indicators might be used to monitor the risk to inflation from inflation expectations. That article suggests that there is little evidence of longer-term inflation expectations becoming less well anchored to the target. The signals regarding shorter-term inflation expectations are more mixed but there are few signs that they have become significantly de-anchored.

Conclusion

This article suggests that across a sample of inflation-targeting countries, when inflation has deviated from 'target' for a sustained period, short and medium-term inflation expectations have tended to drift in the same direction as the deviation of inflation from 'target'. Initial movements were smaller than inflation itself. However they were more persistent than the rise in inflation and on average medium-term inflation expectations returned to their pre-SOTI average around six quarters after inflation itself returned to 'target'. Evidence at longer horizons is sketchier, but seems to suggest that movements in long-term inflation expectations in other countries were smaller.

The UK experience is atypical, with inflation expectations moving both up and down during the current SOTI episode, probably reflecting the temporary fall back in inflation part way through the current UK SOTI episode. But there are only a small number of countries that have experienced SOTI episodes of a similar length to the current UK experience, so it is difficult to make firm comparisons.

References

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