



Economic Commentary

How well are inflation expectations anchored at the target?

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How well are inflation expectations anchored at the target?

If the inflation target is credible, long-term inflation expectations in the economy are stable close to the target. They are not affected by periods of too low or too high inflation or by macroeconomic shocks that cause inflation to deviate from the target. In this Economic Commentary¹ we examine how expected inflation in five years' time will be affected by the previous inflation history and the expected inflation in one year's time. We find, for instance, that there were clear signs that anchoring weakened during a period starting around 2014, but during the recent high inflation the anchoring seems to have been maintained relatively well. Over the entire period, the expectations of the money market participants are more anchored than those of the other groups.

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Long-term inflation expectations are central to monetary policy

The purpose of an inflation target is to act as a benchmark for price setting and wage formation in the economy. When economic agents have a common view of how prices will develop in the future, it becomes easier for them to plan for the long term. When inflation is high, it also tends to fluctuate substantially from one year to the next. This makes it more difficult to take financial decisions about the future. Low and stable inflation therefore improves the conditions for favourable economic development and growth. High inflation also has a redistributive effect which generally favours borrowers at the expense of lenders, and generally those who have the possibility to protect themselves against inflation in various ways, over those who do not. The experience of previous episodes of high inflation, such as those in the 1970s and 1980s, shows that high inflation can be very costly for the economy.

For an inflation target to serve as a benchmark, it is necessary for economic agents to have confidence in it – that they expect normal inflation to be at the target. If there is such confidence, it facilitates monetary policy by making the inflation target easier to attain. If price setting and wage formation are based on the target, it will largely be

¹ Economic Commentaries are brief analyses of issues that are relevant to the Riksbank. They may be written by individual members of the Executive Board or by employees at the Riksbank. Employees' Commentaries are approved by their head of department, while Executive Board members are themselves responsible for the content of the Commentaries they write.

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self-fulfilling, and if inflation for some reason should deviate from the target, the central bank does not need to act very much to maintain it. If expectations are well-anchored, less changes in the policy rate than otherwise are required to change the real interest rate and affect demand.

One way to see whether there is confidence in the inflation target is to study what inflation actors in the economy expect in a few years. If they expect inflation to be at the target, one can conclude that they are confident that the central bank will be able to bring inflation back to target, even if it is currently some distance above or below it. Long-term inflation expectations are then firmly anchored.

Similarly, it is a warning sign if long-term inflation expectations start to deviate from the target. This means that even in the long term, economic agents do not believe that inflation will return to the target after deviating from it. One can then suspect that confidence is weakening and that inflation expectations risk becoming unanchored. There are therefore good reasons for central banks to keep an eye on long-term inflation expectations.

What can cause the anchoring to weaken?

Doubts about the inflation target may arise, for example, if inflation has been below or above the target for a long period – that is, if the central bank’s track record is not good enough. The participants can then begin to interpret this as the central bank failing in its task and therefore adjust their long-term inflation expectations upwards or downwards.

Doubts can also arise if major unexpected changes occur in the economy – what are called disturbances or shocks in economic terminology. Changes in short-term inflation expectations can be seen as a proxy for macroeconomic shocks relevant to inflation. Such shocks can change expectations about the future. If there is a structural change or a serious disturbance, it may mean that economic agents expect inflation to deviate from the target in the long term, too.

Measuring the degree of anchoring

One way to assess how well long-term expectations are anchored is to study direct measures of them and see to what extent they deviate from the target. However, information can also be obtained from the dynamics of expectations. In this economic commentary, we study how well long-term inflation expectations are anchored at the target by examining how they are affected by changes in short-term inflation expectations and by earlier inflation outcomes. In doing so we follow, for example Strohsal et al. (2016), Bouno and Formai (2018) and Dash et al. (2020).³ The idea is that if long-

³ In the Commentary, we focus only on this approach to estimate the degree of anchoring. For detailed reviews of the extensive literature on the anchoring of inflation expectations, see these studies and the references therein. For example, Levin et al. (2004) and Gürkaynak et al. (2010) study to what extent an explicit inflation target contributes to anchoring long-term inflation expectations.

term inflation expectations are well anchored, the impact of short-term inflation expectations and previous inflation outcomes should be low and if they are perfectly anchored, it should be zero. The model should therefore have a low coefficient of determination. If, on the other hand, long-term expectations are affected a lot by short-term expectations and past inflation, the anchoring is weaker. The size of the effect will thus be a measure of how well long-term inflation expectations are anchored at the target.

We estimate different variations of the equation

$$\pi_{t,5y}^e = \alpha_t + \beta_t \pi_{t,1y}^e + \gamma_t \bar{\pi}_{t-1} + \varepsilon_t, \quad (1)$$

where $\pi_{t,5y}^e$ is the expected inflation in five years, $\pi_{t,1y}^e$ the expected inflation in one year, $\bar{\pi}_{t-1}$ is the average for inflation in the quarters $t-4$ to $t-1$ and ε_t is an error term that is assumed to be independent, normally distributed with an expected value of zero and constant variance. The parameter α is a constant and β and γ capture the degree of de-anchoring via short-term inflation expectations and the inflation history. If the inflation target is completely credible, long-term inflation expectations are not at all affected by what happens to short-term inflation expectations or what inflation has previously been. We then have that $\beta = \gamma = 0$ and the deviations between $\pi_{t,5y}^e$ and the inflation target are small and random. The sum of the parameters indicates how firmly anchored inflation expectations are.

Previous studies show that the impact of short-term inflation expectations or inflation history is rarely constant.⁴ During certain periods, the impact may be small or non-existent and during certain periods larger.⁵ There is therefore reason to use an estimation method that allows the coefficients β and γ (and α) to vary over time. We do this by estimating the equation with a rolling window with a length of 20 quarters.⁶

⁴ See, for example, Strohsal et al. (2016), Bouno and Formai (2018), Dash et al. (2020), Möhrle (2020) and Yetman (2020).

⁵ Although inflation expectations show lower sensitivity to short-term inflation expectations during the 1990s and most of the 2000s in most countries, the anchoring is, according to this method of measurement, generally far from perfect and clearly weak in Japan; see Bouno and Formai (2018). During the period after the financial crisis there were episodes with temporary tendencies to de-anchoring in the United States and the United Kingdom, see also Strohsal et al. (2016). In the euro area, sensitivity to short-term inflation expectations increases from around 2014.

⁶ The first regression begins in Q1 1999 and ends in Q4 2003, while the final one covers the period from Q4 2018 to Q3 2023. One problem with the approach of rolling windows is that since the estimates refer to the last five years, it can be difficult to capture an ongoing change in the relationships. One way to try to mitigate this problem is to assign different weights to the observations, by giving observations early in the sample less weight and more current observations greater weight. Bouno and Formai (2018) use this method. In our estimates, however, the difference is marginal, which is why we only report the unweighted estimates. Strohsal et al. (2016) and Dash et al. (2020) instead use a Kalman filter.

Data on inflation expectations

Since the end of 1995, the Riksbank has collected quarterly expectations for inflation and a number of other economic variables from various actors: Money market participants (such as banks, investment companies and pension funds), representatives of employee and employer organisations and purchasing managers at Swedish companies. As of September 2009, the expectations of money market participants have also been collected on a monthly basis, as they have reason to update them frequently.⁷

The survey is conducted by external actors on behalf of the Riksbank and has been conducted by Kantar Prospera (hereafter Prospera) since 2000. The data is collected via telephone interviews. Prospera publishes the results on its website, focusing on the average of the various survey responses.⁸

One disadvantage of survey data is that the selection is relatively small. A total of 109 respondents replied to the September 2023 quarterly survey. Of these, 22 were employee organisations, 13 employer organisations, 19 purchasing managers in the retail trade, 24 purchasing managers in manufacturing and 31 money market participants. For all types of actors, however, it is of great importance to try to have as accurate a view as possible of future inflation, even in the longer term, such as five years. Another advantage is that the surveys are carried out relatively frequently, especially for money market participants.

Figure 1 shows inflation and inflation expectations for 1, 2 and 5 years ahead, both for money market participants and for all groups. There is some support a priori for the two mechanisms that could affect anchoring: Inflation has deviated from the target for relatively long periods, particularly downwards, and macroeconomic shocks have had a considerable impact on short-term inflation expectations from time to time. Overall, the movement in the five-year expectations has been small, but these too show some variation. Recently, inflation has risen markedly and for the first time since the inflation target was introduced in 1993, the question of whether there is a risk that the anchoring will begin to weaken “upwards” has been raised.

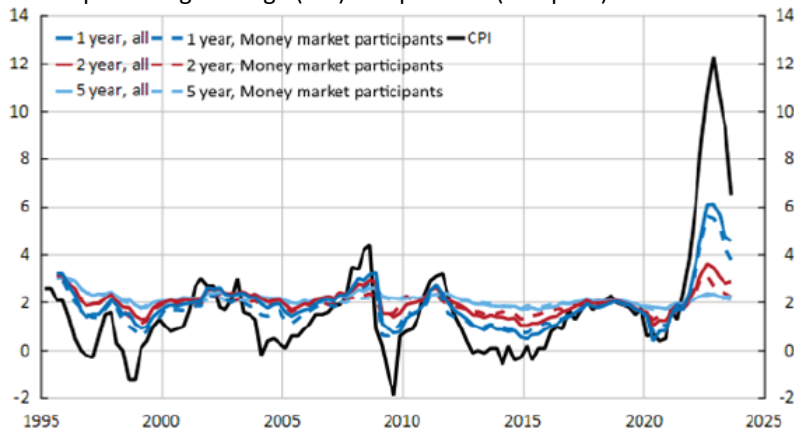
Figure 2 shows the relationship between inflation expectations 1 years ahead and inflation in the quarter before Prospera’s survey. The correlation is high, around 0.9, which means that changes in inflation tend to affect one-year inflation expectations in the same direction. In other words, the two variables contain roughly the same information. This supports the fact that the previous inflation history should be represented by an average for a longer period, as in equation (1), and not just by inflation in the quarter before.

⁷ For a description and an analysis of the underlying data, see Lundgren (2021).

⁸ See <https://www.kantarsifo.se/erjudande/prospera/inflation-expectations>.

Figure 1 Inflation and inflation expectations since 1995

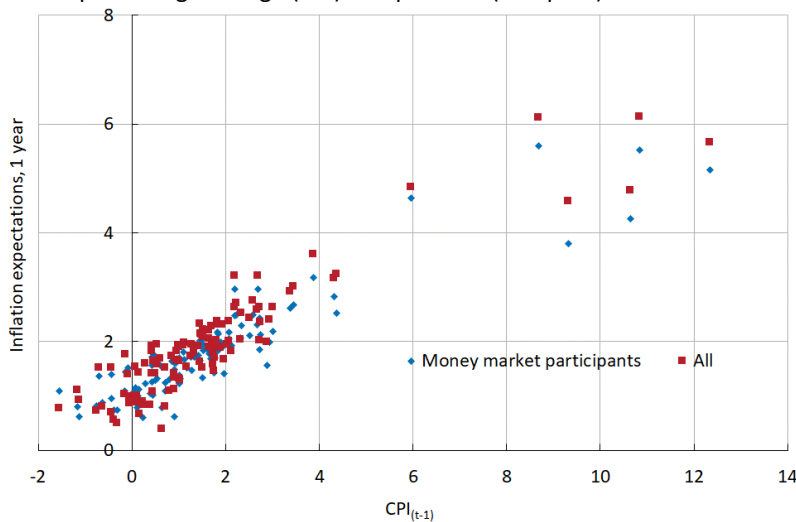
Annual percentage change (CPI) and per cent (Prospera)



Sources: Kantar Prospera and Statistics Sweden.

Figure 2. Correlation between short-term inflation expectations and inflation

Annual percentage change (CPI) and per cent (Prospera)



Sources: Kantar Prospera and Statistics Sweden.

A descriptive analysis shows that inflation expectations have on average been close to the target and slightly higher than CPI inflation during the period 1995–2023 (see Table 1). The standard deviation for expectations is lower than for actual inflation. The standard deviation is lower for money market participants than for all groups as a whole and decreases with the forecast horizon.

Tabell 1. Inflation and inflation expectations 1995–2003

Inflation

	CPI	CPIF	CPIF excl. energy
Mean value	1.7	1.9	1.7
Standard deviation	2.2	1.6	1.5

Inflation expectations according to CPI

Money market participants	1 year	2 years	5 years
Mean value	1.8	1.9	2.1
Standard deviation	0.9	0.4	0.2
All participants	1 year	2 years	5 years
Mean value	1.9	2.0	2.2
Standard deviation	1.0	0.5	0.3

Note: Per cent. Refers to monthly data for inflation during the period 1995–2023 September and quarterly data for expectations during the period 1995 Q2 through 2023 Q3.

Sources: Statistics Sweden and Kantar Prospera.

Short-term inflation expectations are most important on the whole

In Table 2, we present the results for estimates of equation (1) for CPI inflation.⁹ The sample period starts in 1999, i.e. the year in which price stability was entered into the Sveriges Riksbank Act and the Riksbank was given an independent Executive Board. Since inflation has been unusually volatile in recent years – first with a rapid fall in the context of the pandemic and later with a very rapid and sharp rise – we make two estimates: One for a sample ending in 2019 and one for a sample ending in 2023. The estimates are first reported for the two periods as a whole, that is, the coefficients do not change over time.

The results show that short-term inflation expectations are on the whole the most important for long-term inflation expectations. The history of inflation has hardly any significance, especially when the years after the pandemic are included. Another observation is that estimates of the coefficients and the coefficient of determination of the model are higher for all agents than for money market participants alone. This is particularly true in the period up to 2019, when the differences are significant. The de-anchoring measure, i.e. the sum of the coefficients $\hat{\beta}$ and $\hat{\gamma}$, amounts to 0.28 and 0.10 respectively (see Table 2). When the period after 2019 is included, the de-anchoring measure for all groups is halved and the coefficient of determination falls. For money market participants, the result remains unchanged. This can be interpreted as a high level of confidence in the inflation target and the current monetary policy stance, despite inflation having far exceeded the target. The results also show that the

⁹ Prospera did not begin to ask questions about expectations of CPIF inflation until the end of 2017.

long-term inflation expectations of the money market participants are well-anchored seen over the period as a whole.

Tabell 2. Estimates of equation (1)

Period	All		Money market participants	
	1999-2019	1999-2023 Q3	1999-2019	1999-2023 Q3
$\hat{\alpha}$	1.67 ***(0.07)	1.86 ***(0.09)	1.86 ***(0.06)	1.84 ***(0.06)
$\hat{\beta}$	0.23 ***(0.05)	0.14**(0.06)	0.05(0.05)	0.09**(0.04)
$\hat{\gamma}$	0.05*(0.03)	-0.00 (0.02)	0.05*(0.03)	0.01 (0.02)
Adj. R ²	0.78	0.40	0.36	0.39

Note: Newey-West HAC standard error in brackets and asterisks indicate statistical significance. *, ** and *** indicate that the estimates are statistically different from zero at the 10, 5 and 1 percent significance levels, respectively.

The fact that the de-anchoring measure changes when we study two different samples is a clear sign that the anchoring is not constant over time. Figure 3 shows how it has developed over time in estimates with rolling windows with a length of 20 quarters. Some observations can be made. For money market participants, the average de-anchoring measure is 0.13. This is quite low, which means that their long-term expectations have on average been firmly anchored.¹⁰ In addition, for a fairly long period from about 2010 and a number of years forward, the de-anchoring measure was close to 0. This means that expectations were almost perfectly anchored at the target.

We also find two periods with signs of weakening. The first one starts around 2014 and continues for a number of years. It was also during this period that the Riksbank conducted an expansionary monetary policy that also included asset purchases to bring inflation up to the target. The second period coincides with the volatile inflation trend in recent years. However, the de-anchoring measure remained on average relatively low and amounted to around 0.20 during these periods. The highest value, 0.25, was recorded in connection with the outbreak of the pandemic. Measured in this way, there were thus signs during these periods that long-term inflation expectations at the target had weakened somewhat. The factor that contributes significantly to the weakening during both periods is short-term inflation expectations. From 2022, the de-anchoring measure has fallen steadily to the historical average level again, as monetary policy has tightened. This is despite the fact that inflation has never before deviated so sharply from the target.¹¹

The estimates for all groups show that the anchoring has become gradually stronger after the outbreak of the pandemic. In recent quarters, the de-anchoring point has

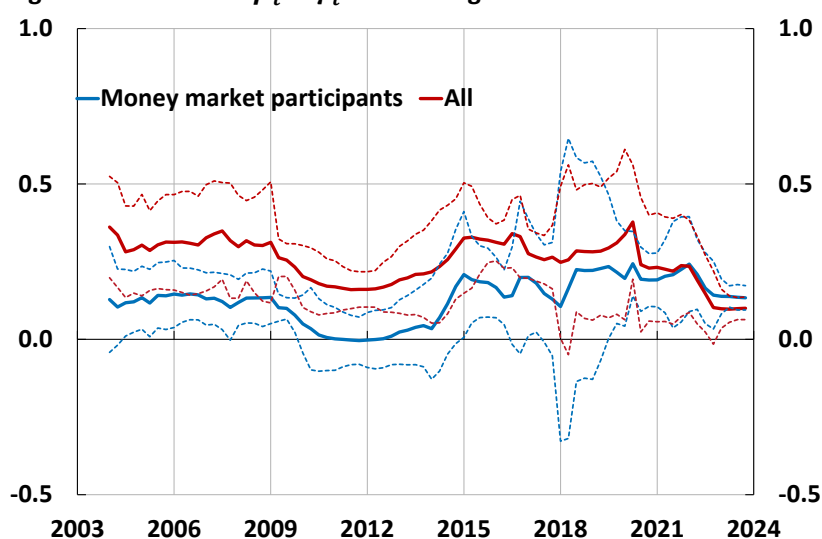
¹⁰ Money market participants' expectations are very well anchored over the entire period and especially the period prior to 2014, compared with the corresponding results in other countries, see for example Buono and Formai (2018).

¹¹ With similar results, we have also carried out estimates of monthly data for the period 2011 to 2023, with 24 and 60 months lengths respectively in the rolling windows.

stabilised just below 0.10, which is lower than the historical average and the level of money market participants at the same point in time.

One possible explanation for the current low level of the de-anchoring measure, but which is difficult to substantiate, is the fact that the Riksbank showed determination in bringing inflation *up* to the target from 2014 and a number of years ahead, and showed the same determination when inflation later became too high. In that case, the previous policy can be regarded as an investment in confidence in the inflation target and meant that the policy rate increases did not have to be larger than they were.

Figure 3. Estimate of $\beta_t + \gamma_t$ with rolling windows



Note: Dashed lines show 95% confidence intervals for each de-anchoring measure.

Sources: Kantar Prospera, Statistics Sweden and the Riksbank.

High confidence in the inflation target and the current monetary policy stance

In this Economic Commentary, we examine the impact on the expected inflation rate in five years' time of expected inflation in one year's time and the previous inflation history. The first explanatory variable is intended to capture macroeconomic shocks relevant to inflation, while the second is a proxy for the Riksbank's track record in attaining the inflation target. If long-term inflation expectations are well anchored, the impact of changed short-term inflation expectations and previous inflation on long-term inflation expectations should be zero or close to zero.

We find, for instance, that anchoring weakened in connection with the period from 2014 when inflation was below the target and during the pandemic.¹² The anchoring has been maintained well despite the recent high inflation and the estimate for the

¹² Inflation expectations from 2014 also weakened in the euro area, see Bouno and Formai (2018).

aggregate of groups indicates that the anchoring has been strengthened. The expectations of the money market participants are generally better anchored over the period as a whole.

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