

Has the anchoring of inflation expectations weakened?

Inflation expectations have risen markedly in the past year. It comes as no surprise that the recent surge in inflation should push short-term inflation expectations upwards, but it is a far more serious matter if it causes households, businesses, and market agents to revise their expectations about long-term inflation. Furthermore, there are indications that short-term shocks to inflation have a stronger impact on inflation expectations now than they have in recent years. All of this suggests that inflation expectations have become less firmly anchored to the inflation target in the recent term. This Box examines these developments and their potential implications.

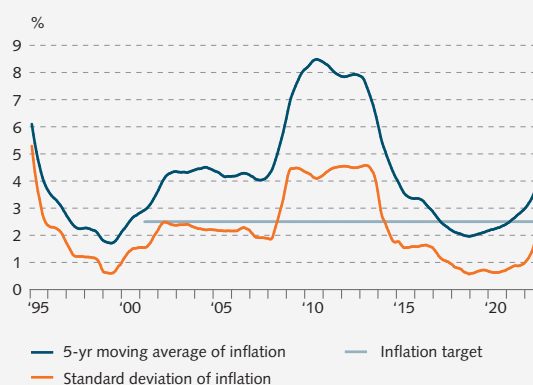
Inflation expectations have risen in tandem with the recent surge in inflation ...

As is discussed in Chapter V, inflation has risen rapidly in the past two years: after being aligned with the Central Bank's 2.5% target in mid-2020 but it had risen above 4% by early 2021 and was just a whisker shy of 10% this summer. As Chart 1 indicates, long-term trend inflation has therefore risen recently and is approaching the level seen at the beginning of the century, when the current monetary policy framework was adopted. As the chart also shows, inflation has grown more volatile, in line with its well-known tendency to fluctuate more widely as it rises higher.¹

Inflation expectations have risen rapidly as well. This can be seen in Chart 2, which shows short- and long-term inflation expectations from the beginning of 2012 onwards.² Short-term inflation expectations remained relatively close to the inflation target starting in 2014, after falling during the years beforehand. But they began to rise swiftly in late 2021 and averaged nearly 6% by Q3/2022.

Long-term inflation expectations have also risen in the recent term, albeit more modestly: they rose above 3% early

Chart 1
Inflation in Iceland – long-term trend and fluctuations¹
January 1995 - September 2022



1. The chart shows a five-year moving average and standard deviation of twelve-month inflation.

Sources: Statistics Iceland, Central Bank of Iceland.

- As is noted by the Bank for International Settlements (2022), the main reason lower inflation tends to be more stable is not necessarily that the price of individual product categories fluctuates less. It is rather that the co-movement between price movements in individual product categories grows weaker as inflation declines; i.e., changes in the price of individual product categories are less likely to spread to other categories or other sectors of the economy.
- Short-term inflation expectations are based on expectations one and two years ahead. They are measured in terms of the median value of household, corporate, and market expectations based on surveys carried out by Gallup and the Central Bank, as well as the breakeven inflation rate in the bond market, which is measured in terms of the spread between indexed and nominal Treasury bond yields. Long-term inflation expectations are measured in the same manner, except they are based on expectations five and ten years ahead, together with the five-year breakeven inflation rate five years ahead.

this year and were closing in on 4% by mid-year, after having long been well in line with the inflation target.³

... and seem less firmly anchored to the target

Headline inflation has measured 3% or more since July 2020 and has been over 5% for nearly a year. When inflation rises this high and deviates from target for such an extended period of time, the risk is that expectations will again become unmoored from the target after the protracted fight to anchor them, which finally appeared to bear fruit in the mid-2010s. This is reflected in the aforementioned rise in inflation expectations, as long-term expectations have now been more than ½ a percentage point above target for over a year and currently measure roughly 4%, as is noted above. In general, it appears to be generally expected that inflation will be around 1½ percentage points above the Central Bank’s target over an extended period. It therefore appears that the target’s *level anchoring* (see Ball and Mazumder, 2011) has deteriorated. This is less clear in the case of short-term expectations, however: although they have risen sharply, they have broadly increased in line with the Central Bank’s own forecasts for inflation one year ahead (Chart 3).

The impact of inflation shocks on inflation expectations has risen once again

Another approach to determining whether the anchoring of inflation expectations has weakened is to examine whether they are sensitive to short-term fluctuations in inflation – which Ball and Mazumder refer to as *shock anchoring*. If they are firmly anchored to the target, inflation expectations – at least, expectations over a sufficiently long period of time – can be assumed to remain steady even if current inflation is higher or lower than anticipated. Under these conditions, economic agents trust the Central Bank to bring inflation back to target over time. If they see that the Central Bank does not respond decisively enough to an unexpected surge in inflation, however, this can affect the decisions they make and increase the probability that a transitory rise in inflation will become entrenched.⁴

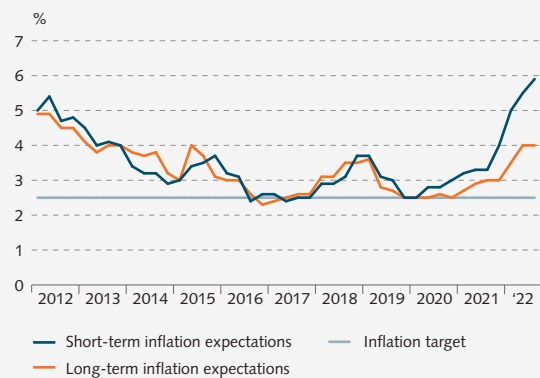
The following regression analysis is used to determine whether inflation expectations are affected by inflation surprises and whether this effect has grown stronger:

$$(1) \Delta\pi_{t+h}^e = \beta^h \pi_t^{NEWS} + \varepsilon_{t+h}$$

3 The decline in long-term inflation expectations from 2012 onwards played a key role in the disinflation episode of the 2010s, as is described in Pétursson (2022).

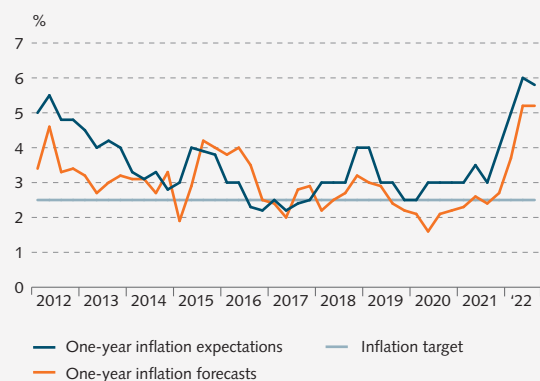
4 This is less likely to happen with very short-term expectations (one-year expectations, for instance), as it is unrealistic to expect monetary policy to be able or willing to tamp down fully on unexpected inflation within such a short period.

Chart 2
Short- and long-term inflation expectations¹
Q1/2012 - Q3/2022



1. Short-term inflation expectations are measured as the median of household, corporate, and market expectations one to two years ahead and the one- to two-year breakeven inflation rate. Long-term inflation expectations are measured as the median of household, corporate, and market expectations five to ten years ahead and the five- to ten-year breakeven inflation rate.
Sources: Gallup, Central Bank of Iceland.

Chart 3
Inflation expectations and inflation forecasts one year ahead¹
Q1/2012 - 3Q/2022



1. Median of household, corporate, and market inflation expectations one year ahead; and the Central Bank’s inflation forecasts one year ahead from various issues of *Monetary Bulletin*.
Sources: Gallup, Central Bank of Iceland.

where $\Delta\pi_{t+h}^e$ is the first difference in inflation expectations h year(s) ahead, π_t^{news} are inflation shocks, and ε_{t+h} is a residual. Inflation expectations are assessed on the basis of surveys conducted among households, businesses, and market agents, and on the basis of the breakeven inflation rate in the bond market. They are estimated over horizons of one, two, five, and ten years (plus the five-year breakeven rate five years ahead).

Inflation shocks are measured using the median error of financial market analysts' forecasts of annualised monthly changes in the CPI. The data are available from the beginning of 2006, and the analysis uses quarterly averages.⁵ The coefficient β^h measures the response of inflation expectations h year(s) ahead to inflation surprises, thereby giving an estimate of how firmly inflation expectations are anchored. If the anchor is firm enough, it should be statistically insignificant from zero.

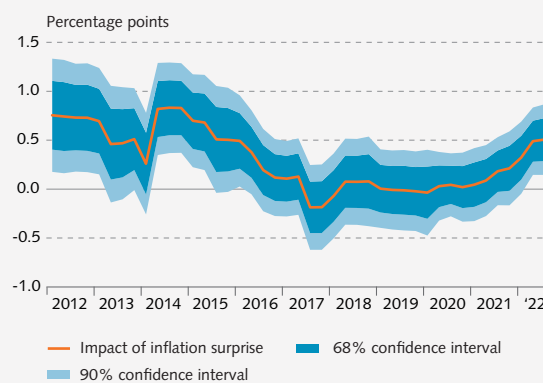
Equation (1) is estimated using quarterly data for the period Q1/2006 through Q3/2022 for all measures of inflation expectations over a five-year moving window.⁶ Chart 4 shows the estimation for short-term inflation expectations (i.e., up to two years ahead) from the beginning of 2012 onwards. It shows the median estimate for various measures of inflation expectations, but the outcome is the same for them all. As the chart indicates, the effects of inflation shocks are statistically significant early in the period: in 2012, for instance, an unexpected 1 percentage point rise in inflation leads to an increase in short-term inflation expectations by $\frac{3}{4}$ of a percentage point. The effects taper off gradually, however, and have disappeared by 2016. They start to grow again over the course of 2021, though, and have become statistically significant in 2022.

The same applies to long-term inflation expectations (Chart 5). The effects are statistically significant early on but have disappeared by the beginning of 2014. They begin to strengthen again as the period advances, however, and have become statistically significant at the beginning of 2022, based on the 90% confidence interval in the estimation (or by H2/2021 if based on a confidence interval equivalent

5 In evaluating the anchor for inflation expectations using quarterly data, as is done here, it is preferable to use inflation forecast errors as an explanatory variable rather than using, for instance, changes in inflation itself or deviations in inflation from target, as they are less subject to reverse causality (see, for instance, International Monetary Fund, 2016).

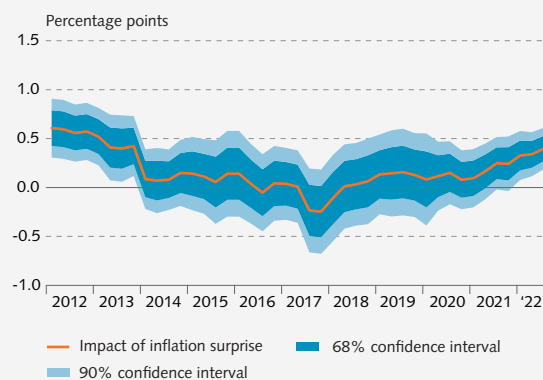
6 The breakeven inflation rate and data on households' and businesses' one-year inflation expectations are available from Q1/2006, whereas survey data on two-year expectations extend back to Q3/2008. Data on market agents' inflation expectations extend back to the beginning of 2012. Household and corporate expectations five years ahead cannot be used in the regression analysis, however, as the data only go as far back as 2018.

Chart 4
Impact of inflation surprise on short-term inflation expectations¹



1. Estimated impact of an unexpected 1 percentage point rise in inflation on short-term inflation expectations. The impact is estimated from Equation (1) using a five-year moving window. The chart shows the median of the estimation of market expectations one to two years ahead and the one- to two-year breakeven inflation rate.
Source: Central Bank of Iceland.

Chart 5
Impact of inflation surprise on long-term inflation expectations¹



1. Estimated impact of an unexpected 1 percentage point rise in inflation on long-term inflation expectations. The impact is estimated from Equation (1) using a five-year moving window. The chart shows the median of the estimation of household, corporate, and market expectations five to ten years ahead and the five- to ten-year breakeven inflation rate.
Source: Central Bank of Iceland.

to one standard deviation). Based on the most recent estimation, an unexpected 1 percentage point rise in inflation results in an upward revision of long-term inflation expectations by 0.4 percentage points.

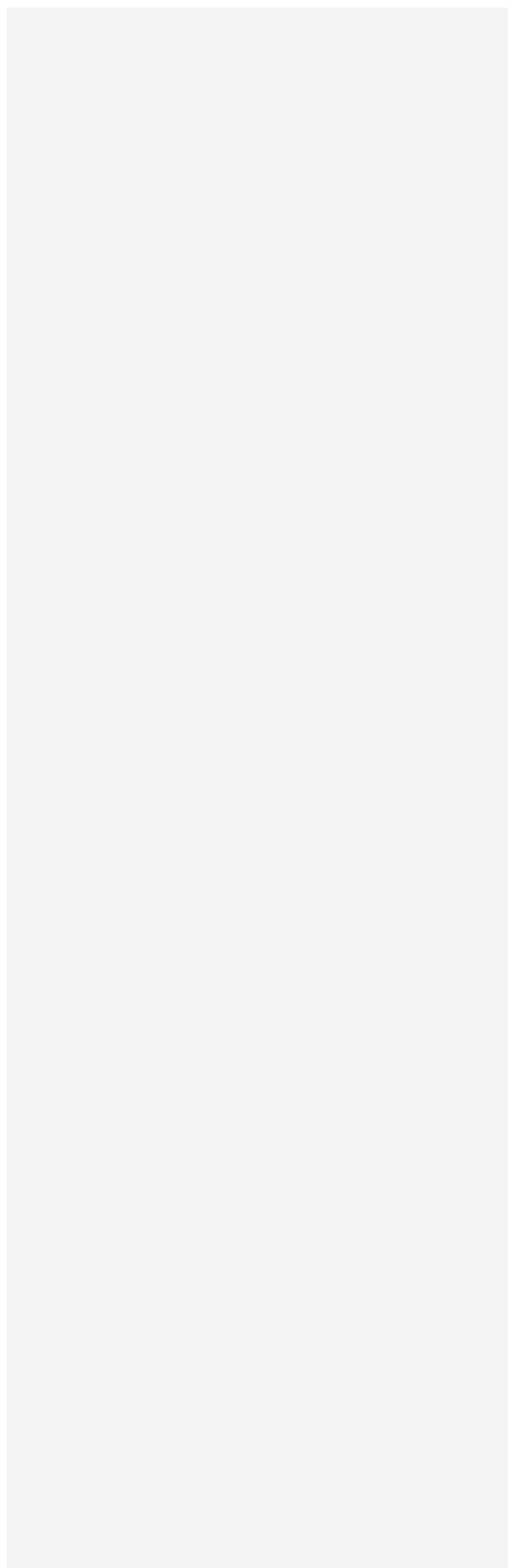
On the whole, the effects of inflation shocks on inflation expectations appear to have grown weaker as the 2010s progressed, in line with improved monetary policy performance in keeping inflation close to the Bank's inflation target. This is consistent with the findings from a similar analysis conducted by the Central Bank in 2017, which shows that the effect of inflation shocks on inflation expectations was strong during the period 2003-2007 but had become statistically insignificant by the 2012-2016 period (see Chart 4.12 on page 20 of Central Bank of Iceland, 2017). The results of the regression analysis that are shown in Charts 4 and 5 indicate, however, that these effects started to increase again in late 2021 or early 2022.

Why does this matter?

In the recent term, inflation expectations in Iceland appear to have become less firmly anchored to the target as inflation has risen. Expectations have risen, and both inflation and inflation expectations have grown more volatile. This has widespread implications. Greater fluctuations in inflation and inflation expectations lead, for instance, to wider swings in nominal and real interest rates, which in turn lead to greater volatility in real economic activity and the exchange rate of the króna (for further discussion, see Central Bank of Iceland, 2017).

When inflation expectations are more poorly anchored, it also becomes more difficult to bring inflation down again, and the impact of supply shocks and relative price changes on inflation becomes stronger and more persistent than when the anchor holds firmly. This can be seen, for example, in the interaction between wage inflation and price inflation, which has generally grown weaker as inflation expectations have become better anchored. For example, the findings of Bobeica *et al.* (2021) indicate that better anchored inflation expectations play a key role in explaining the weakening of the link between wage inflation and price inflation in the US over the past three decades. The findings of the Bank for International Settlements (2022) tell the same story: the impact of wage increases on inflation is less pronounced in countries that have achieved price stability than in countries with generally higher inflation.

A firmer anchor dilutes not only the effect of pay rises on inflation, but also the overall effect of supply shocks on inflation. The findings of the International Monetary Fund (2022) suggest, for instance, that supply shocks have a stronger and more persistent impact on inflation if expecta-



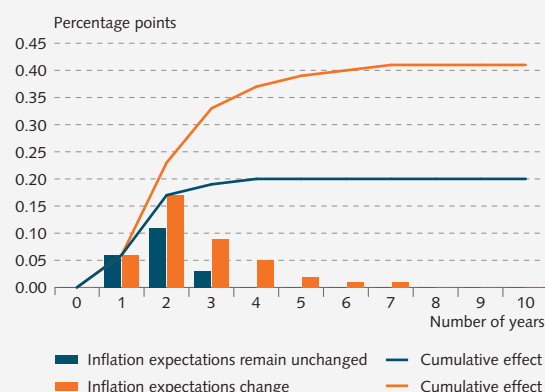
tions are poorly anchored, and Baba and Lee (2022) find that an increase in oil prices affects wages and prices less when inflation is low at the outset than when it is high (see also Bank for International Settlements, 2022). This is in line with the findings of Bems *et al.* (2021), which indicate that the inflationary impact of a terms of trade shocks is weaker and more transitory when inflation is low and inflation expectations firmly anchored. In part, Bems *et al.* attribute this partly to the impact on the exchange rate, which falls less when expectations are firmly anchored, but also to a decline in exchange rate pass-through. This accords with a number of studies showing that exchange rate pass-through grows weaker as the anchor for inflation expectations is firmer (see, for instance, Gagnon and Ihrig, 2004). It is also consistent with the findings of Edwards and Cabezas (2022), who concluded that exchange rate pass-through in Iceland had weakened significantly as monetary policy gained credibility following the monetary policy reforms undertaken just over a decade ago.

To give an idea of how much firmly anchored inflation expectations matter, Chart 6 compares the effects of a 1% permanent increase in import prices on domestic inflation, depending on whether long-term inflation expectations react to the shock or not. The inflation equation in the Central Bank's QMM model is used, and this 1% rise in import prices is generated through an increase in oil prices and global inflation (see also Chapter I of *Monetary Bulletin 2018/2*). Two scenarios are shown. The former assumes that long-term inflation expectations remain firmly anchored, while the latter assumes that the anchor gives way and long-term expectations rise in line with recent inflation. As can be seen, the impact is much weaker and tapers off far more rapidly if the anchor holds. If the anchor gives way, this 1% rise in import prices leads to a permanent 0.4% increase in consumer prices, whereas the long-term increase is half that size if the anchor holds firm.

Summary

Inflation expectations appear to have become less firmly anchored to the Central Bank's inflation target in the past year, in tandem with rapidly rising inflation and a persistent overshooting of the target. Less firmly anchored inflation expectations exacerbate the risk that high inflation will become entrenched, and as the anchor grows weaker, the task of bringing inflation down again grows more difficult. This underscores the importance of the recent swift monetary policy response in ensuring that expectations are brought back to target and anchored there.

Chart 6
Impact of a 1% increase in import prices on inflation¹



1. The chart shows the stylised effect of a permanent 1% rise in import prices on annual inflation and the cumulative impact on the price level. Two scenarios are shown. In the former, inflation expectations remain unchanged at the Bank's inflation target, while in the latter, the rise affects long-term inflation expectations.

Source: Central Bank of Iceland.

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