



Economic Commentary

Survey-based inflation expectations

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Economic Commentaries

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 staff members 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.

Summary

This Economic Commentary summarises some of the results from a decade of the Riksbank's surveys of inflation expectations. It also briefly describes how the survey has developed and how it differs from the Economic Tendency Survey's questions on inflation expectations. Finally, it also presents an analysis of disagreement, an important concept in the academic literature. Since the pandemic started, disagreement has increased slightly. If disagreement is linked to the anchorage of the inflation target, it may be a relevant variable for the Riksbank's policy work.

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Inflation expectations have been close to 2 per cent

Surveys on inflation expectations and other economic variables have been conducted on the Riksbank's behalf since 1995, when the inflation target of 2 per cent started to apply. Initially, this was a quarterly survey but, since 2010, two surveys have been conducted. One is conducted every month with a sample of money market participants and the other every quarter with a broader group of economic agents. Several questions have been added and the monthly survey now encompasses eight economic variables (see Table 1). This Commentary, however, focuses on inflation expectations. Since 2010, money market participants' long-term inflation expectations have, on average, been close to the inflation target of 2 per cent. Overall, the development of inflation expectations in the Riksbank's survey resembles the one given by the Economic Tendency Survey for companies.

Rising disagreement

The main focus of the Riksbank's publications has been on aggregate measures of inflation expectations, such as the average and the median. However, it is possible to obtain further valuable information by also analysing other measures based on microdata². One such measure is 'disagreement'. This measure captures the extent to which a respondent deviates from other respondents and can provide relevant information in addition to that given by the average. This is used increasingly in the academic literature surrounding inflation expectations, as disagreement can give a more nuanced view of how firmly anchored an inflation target is. If the expected inflation, on average, coincides with the inflation target because some respondents expect

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² The analysis of microdata takes account of the characteristics of individual respondents.

much higher inflation and others much lower, the target may be less firmly anchored than the mean value suggests. Consequently, the Commentary presents some results from ongoing work on analysing disagreement, based on microdata from the survey. During the period from 2010 and on, there is a certain tendency for disagreement to rise and this coincides, to a certain extent, with falling inflation expectations. It is particularly clear that disagreement has increased since the start of the pandemic.

1 The Riksbank's survey of the expected development of economic variables

The Riksbank's survey of expectations of economic variables has existed in some form since 1995 and, since 2010, has been conducted every month with a selection of money market participants and every quarter with a broader sample of economic agents. Long-term inflation expectations have mostly been at or close to 2 per cent. The pattern of short-term inflation forecasts resembles that presented in the Economic Tendency Survey for companies.

1.1 Facts about the survey

Survey every quarter and every month to different groups of respondents

Every quarter since the end of 1995, the Riksbank has collected expectations of a number of economic variables from a number of different actors: money market participants³, representatives of employee and employer organisations, and purchasing managers at Swedish companies.⁴ As of January 2010, information has also been gathered every month from the money market participants as their work gives them reason to update inflation expectations frequently.

The survey is conducted by external actors on behalf of the Riksbank and has been conducted by Kantar Prospera (hereafter Prospera) since 2000. The assignment includes presenting the results of the survey to the general public. As part of this, Prospera publishes a number of moments from the surveys on its website every month, with a focus on the mean value of the various survey responses. However, the Riksbank also has access to the underlying microdata, which allows it to follow the individual, anonymised, institutions' responses. This type of data is receiving increasing attention in research and a part of the Riksbank's work on Prospera's microdata will be presented in this Commentary.

The survey has been developed over the years

In this Commentary, the focus will be on monthly surveys. The monthly surveys include a data set from a total of 65 money market participants that have participated

³ Typical examples of money market participants are banks, investment firms and pension funds.

⁴ Money market participants, employee organisations, employer organisations and purchasing managers in the trade and manufacturing sectors.

in the survey at some point.⁵ The most recent surveys have about 30 respondents and a response rate of 70-75 per cent.

At the start of the survey in 1995, five questions were asked, for each of the coming five years, about expectations of annual price development according to the CPI and annual wage development. Since then, the survey has been changed several times and, with time, has come to include more questions. The last reorganisation was carried out in February 2021 when questions on the Riksbank's asset purchases were added. Table 1 shows the variables and time horizons the money market participants are asked about at present. The survey asks what value each variable will have for each time horizon (for example, what CPI inflation will be in five years).

Tabell 1. Variables the money market participants are presently asked about

Yes indicates that the variable is included among the questions

Variable	3 months	1 year	2 years	5 years	75% confidence interval
CPI inflation	NO	YES	YES	YES	NO
CPIF inflation	NO	YES	YES	YES	YES
Repo rate	YES	YES	YES	YES	YES
Government bond yield	YES	YES	YES	YES	NO
GDP growth, annual	NO	YES	YES	YES	NO
Exchange rate, EUR/SEK	YES	YES	YES	NO	NO
Exchange rate, USD/SEK	YES	YES	YES	NO	NO
Asset purchases	YES	YES	NO	NO	NO

Note. 75% confidence interval means that the respondents submit a 75% confidence interval for their point estimate

Source: The Riksbank

The part of the survey that tends to receive the greatest attention is the inflation expectations.⁶ This is natural given the importance of the inflation target for monetary policy. Until 2017, the target variable for monetary policy was formulated in terms of the CPI. Since then, it has been formulated in terms of the CPIF. However, since there is a long time series of CPI inflation expectations and this is the measure used to describe expectations in the Monetary Policy Report, most of the analysis in this Commentary will focus on the CPI. In the survey, the respondents may specify what they believe inflation, measured as the CPI or CPIF respectively, will be in 1, 2 and 5 years respectively.

⁵ A participant is defined here as an institution and who represents this institution may vary over time. Note also that Prospera has attempted to contact more than 65 participants over the years but a number of respondents have never replied to the survey.

⁶ See, for example, the articles "What do inflation expectations tell us?" in Monetary Policy Report, February 2016, and "Inflation expectations in Sweden close to 2 per cent" in Monetary Policy Report, September 2019.

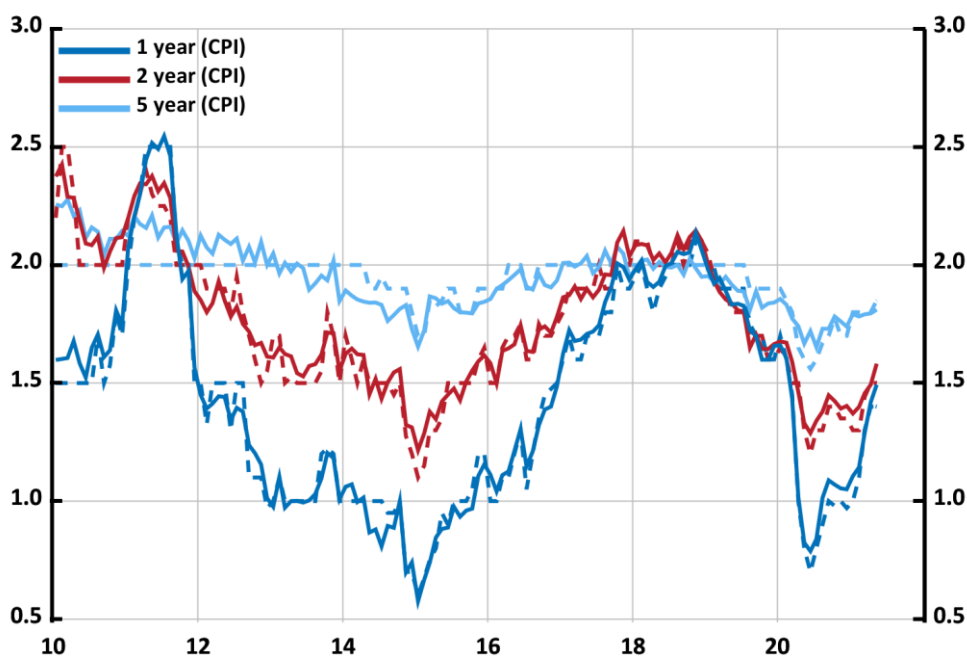
1.2 Development of inflation expectations

Expectations stable at close to 2 per cent

This section summarises the results of Prospera's survey according to the measures reported to the general public every month. Figure 1 shows the mean value (unbroken lines) and the median (broken lines) per month of the money market participants' expected inflation (measured using the CPI) for the three different time horizons. We can see that expected inflation five years ahead has been relatively stable at close to 2 per cent. However, after a period of lower inflation⁷, expectations fell slightly below 2 per cent over the period 2014-2015. Expectations recovered after a period of significantly more expansionary monetary policy.⁸ Over the period 2019-2020, expectations have again been slightly below target. Expectations in the shorter term follow a similar pattern, but vary significantly more.

Figure 1. Mean value and median of inflation expectations on various horizons

Per cent



Note. Unbroken lines are mean values, broken lines are medians

Source: Kantar Prospera

⁷ See the articles "Perspectives on the low rate of inflation", in Monetary Policy Report, February 2014, "Why is inflation low?" in Monetary Policy Report, July 2014, and "Low inflation – not just a Swedish phenomenon" in Monetary Policy Report, February 2015

⁸ See the article "What do inflation expectations tell us?" in Monetary Policy Report, February 2016

The Economic Tendency Survey results are partially different

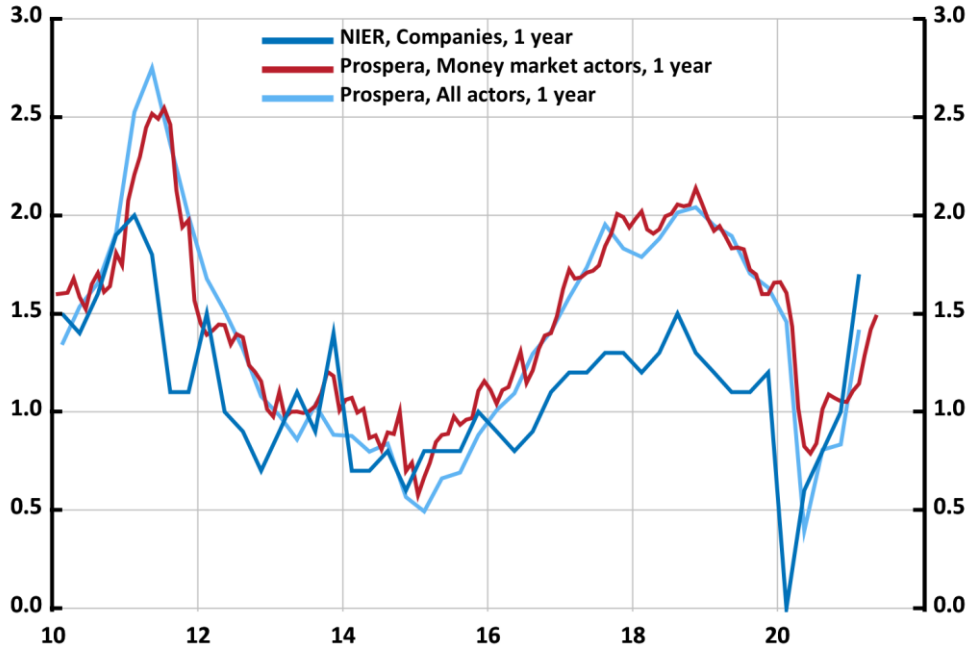
In its Economic Tendency Survey, the National Institute of Economic Research (NIER) conducts monthly surveys in which companies and households are asked for their assessments of the economy. Every third month since the mid-1980s, companies have also been asked about their inflation expectations twelve months ahead. Households and companies are completely different groups to money market participants and, in addition, there are several methodological differences between the surveys. For example, companies in the NIER survey may first state whether they expect prices in general (which is to say Swedish consumer prices) will increase, decrease or stay the same over the next 12 months, after which they are asked a follow-up question in which they give a figure for the percentage increase/decrease of prices. If they answer "unchanged" and do not state a figure, expected inflation is set at 0. Companies can also choose to state an interval, whereby the mid-point of the stated interval is reported.

Since the end of the 1970s, the NIER has asked households about their inflation expectations and what they estimate actual inflation to be. Since 1993, these questions have been asked every month. In the NIER survey, households' one-year inflation expectations are far above what we see in other measures (for recent months, just below 4 per cent). Households also state much higher perceived inflation now than the outcome for the CPI indicates. This means that their expectations deviate sharply from prevailing inflation but also from the future outcomes that we have subsequently seen realised. The NIER itself has also noted that the lower precision in household inflation expectations could make these somewhat less interesting as a basis for analysis.⁹ On the other hand, companies' expectations are below those observed in the Prospera survey and are closer to actual outcomes than household expectations; see Figure 2.

⁹ Special analysis in the Swedish Economy report December 2009, "Prognosprecisionen hos hushållens och företagens inflationsförväntningar i Konjunkturbarometern" (Forecast precision of household and corporate inflation expectations in the Economic Tendency Survey).

Figure 2. Inflation expectations 1 year ahead according to Prospera and the Economic Tendency Survey

Per cent



Sources: Kantar Prospera, National Institute of Economic Research

2 New measures and deeper analysis

A traditional way of presenting survey results is to report the mean value or median of the respondents' forecasts. However, there are other measures that can convey interesting information. Disagreement is one such measure and this section presents how disagreement can be measured and then used to obtain a more substantial picture of how well-anchored an inflation target is. Disagreement has increased since the start of the coronavirus pandemic and there is a tendency for disagreement in long-term inflation expectations to be greater in periods when average expectations are below the inflation target.

2.1 Introduction to the concept of disagreement

Why is disagreement interesting?

When inflation expectations are reported to the general public, an average or median of these is normally reported. However, there are also other measures that can be produced. In recent years, the discussion of disagreement has become increasingly pertinent and studies have been published using both US and European data. According to this literature, disagreement in itself can provide us with valuable information. For example, an inflation target of 2 per cent can be considered to be better anchored if all respondents expect inflation to be 2 per cent in the period ahead than if half of respondents expect 0 per cent inflation and the other half expect 4 per cent inflation. The mean value is, however, the same in both cases.

This section presents a few conclusions from the literature and then shows a few measures of disagreement and how these have developed. There then follows a brief discussion of the conclusions from this data.

Disagreement is connected to economic developments

Disagreement has long been a well-established concept in the academic literature and this Comment does not have the scope for a comprehensive overview of this literature. It is, however, worth mentioning a central article, *Fundamental Disagreement* by Andrade et al. (2016). The authors use data from Blue Chip Financial Forecasts to analyse disagreement in the forecasts for US variables. The paper is primarily descriptive and aims to explain the term structure of disagreement. This refers to how disagreement varies over different time horizons and is presented in the form of a ‘disagreement curve’. The authors define disagreement as the difference between the average of the ten highest and the ten lowest forecasts.

They find that there is disagreement on growth, inflation and the policy rate in both the short and long term. For growth, disagreement decreases over the forecast horizon, while it increases for the policy rate. Disagreement over forecasts for inflation and the policy rate has fallen over the years, which is probably connected with the modern central bank regime in the United States with inflation targeting and the lower and more stable inflation that this regime has entailed. On the other hand, disagreement surrounding inflation and policy rate forecasts tends to increase in conjunction with economic downturns.

Disagreement and uncertainty need not correlate

Rich and Tracy (2021) discuss the academically established concepts of disagreement and uncertainty. Disagreement means that different individuals make different forecasts¹⁰, while uncertainty concerns how uncertain an individual is concerning his or her own forecast. They note that these terms are conceptually different and need not

¹⁰ In general, one would typically imagine that a forecast is a weighted mean value of the future outcomes the forecaster can envision, but this reasoning can also be applied when it is the median or mode value that is being reported.

necessarily correlate. They find that the concepts are also weakly correlated empirically and consequently should not be treated as interchangeable. One further observation is that there is persistence and heterogeneity in both variables. Some individuals are consistently more uncertain than others, while disagreement varies over time.

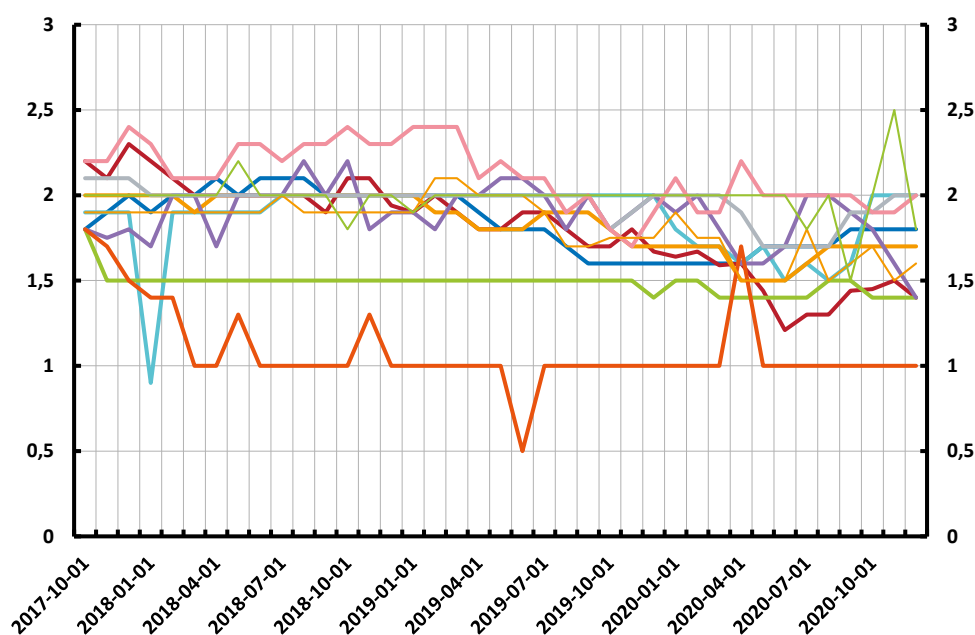
2.2 Disagreement in responses to Prospera's survey

Disagreement in long-term inflation expectations is greater now than at the start of the 2010s

Respondents may have different expectations of future inflation. A simple illustration of this can be found in Figure 3, which shows inflation expectations measured in terms of the CPI for a number of respondents. As we can see, there are significant and lasting differences between the respondents.

Figure 3. Long-term inflation expectations over time for a number of actors

5-year inflation expectations according to the CPI, per cent



Note. Eleven money market participants that have answered the question on CPI expectations five years ahead every time since January 2017.

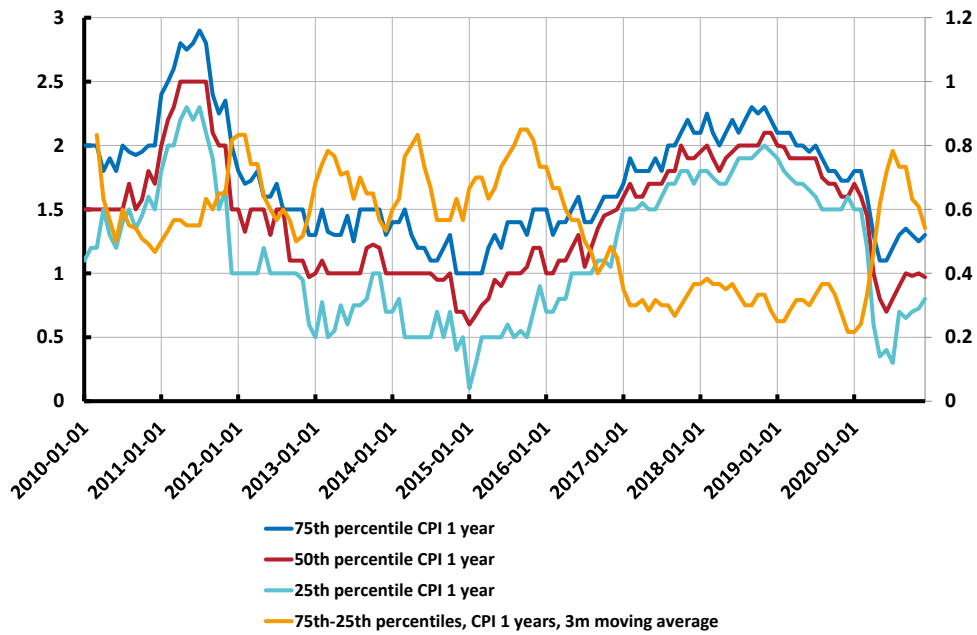
Source: The Riksbank

One way of summarising this type of information is to sort the expectations from highest to lowest expected inflation so as to identify the levels a certain percentile expects. For example, if the 25th percentile is 1.5 per cent, this means that 25 per cent of the respondents expect inflation of 1.5 per cent or lower. Figures 4-6 show different percentile levels for the money market participants' expectations of future inflation, measured according to the CPI, for the three different time horizons and, on the right axis, the difference between the 25th and 75th percentiles. One year ahead, there has often been a difference of over half a percentage point between the 75th

and 25th percentiles, but this difference is lower in 2017-2019 (Figure 4). A similar pattern is discernible for two years ahead (Figure 5).

Figure 4. Percentiles for expected CPI inflation, 1 year ahead

The left axis shows inflation expectations as a percentage, the right axis the difference in percentage points

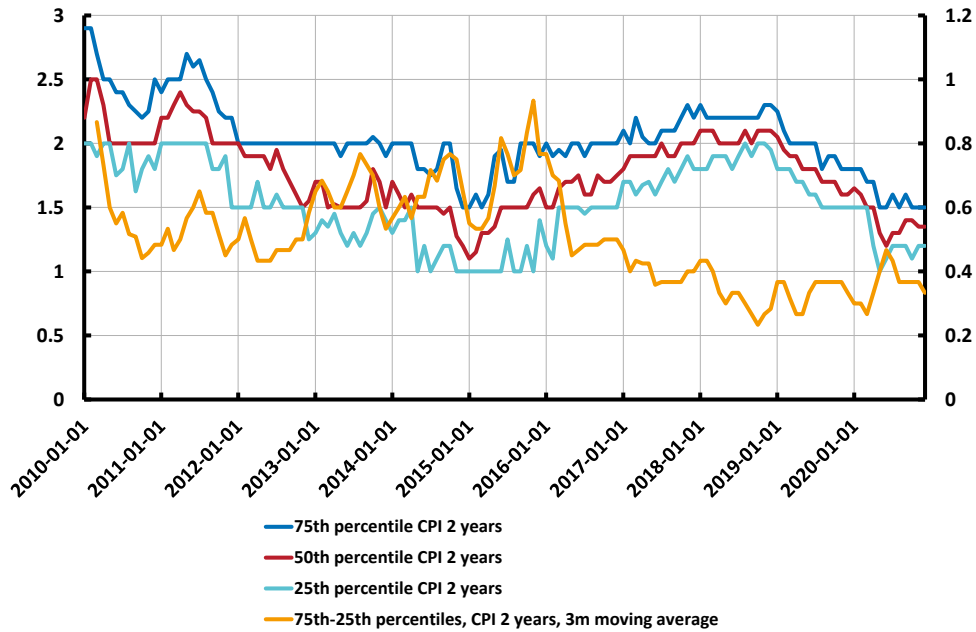


Note. The gap between the 75th and 25th percentiles is shown on the right axis

Source: The Riksbank

Figure 5. Percentiles for expected CPI inflation, 2 years ahead

The left axis shows inflation expectations as a percentage, the right axis the difference in percentage points



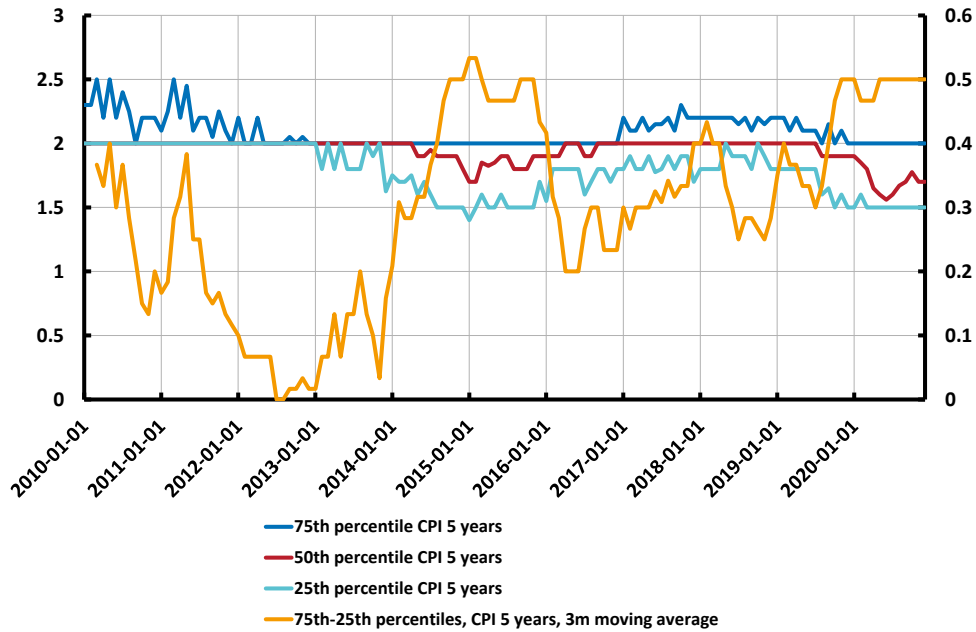
Note. The gap between the 75th and 25th percentiles is shown on the right axis

Source: The Riksbank

Five years ahead, the picture is different, however. At the start of the 2010s, most respondents were clustered around the inflation target. For example, the 25th and 50th percentiles were both 2 per cent in most observed months and the 75th percentile was often at 2 per cent too. This simply means that many respondents expected exactly 2 per cent. However, in 2014, the spread increased in the middle of the distribution so that the 25th, 50th and 75th percentiles moved apart. The levels approached each other again at the end of 2016 but did not completely recover. In 2019, the spread between the 75th and 25th percentiles five years ahead increased again and remained on a high level in 2020 (see Figure 6).

Figure 6. Percentiles for expected CPI inflation, 5 years ahead

The left axis shows inflation expectations as a percentage, the right axis the difference in percentage points



Note. The gap between the 75th and 25th percentiles is shown on the right axis

Source: The Riksbank

Disagreement, measured as an absolute deviation, has risen since the end of 2018

To analyse the development of disagreement more systematically, we will use a specific measure, taken from Rich and Tracy (2021), known as average absolute point disagreement (AAPD). The measure involves calculating, for each month and respondent, the average of the absolute deviation from the other respondents that month. This therefore measures how much the respondent's expectations deviate from the other respondents' expectations. The average or median of this measure for all respondents per month then gives a measure of how the aggregate disagreement has developed over time.

Let $i f_t^e$ be the point value for the forecast for respondent i at time t and n_t be the number of respondents at time t . The average absolute point disagreement (AAPD) for respondent j at time t is then given by:

$${}_j A A P D_t = \frac{1}{n_t - 1} \sum_{i \neq j} |i f_t^e - j f_t^e|$$

Conceptually, this measure is similar to the variance (which is the average square deviation from the mean value), but the AAPD is less sensitive to extreme values than the variance, as the AAPD uses absolute deviations. A further argument in favour of the AAPD, as opposed to the variance, is that it is a measure of individual deviation,

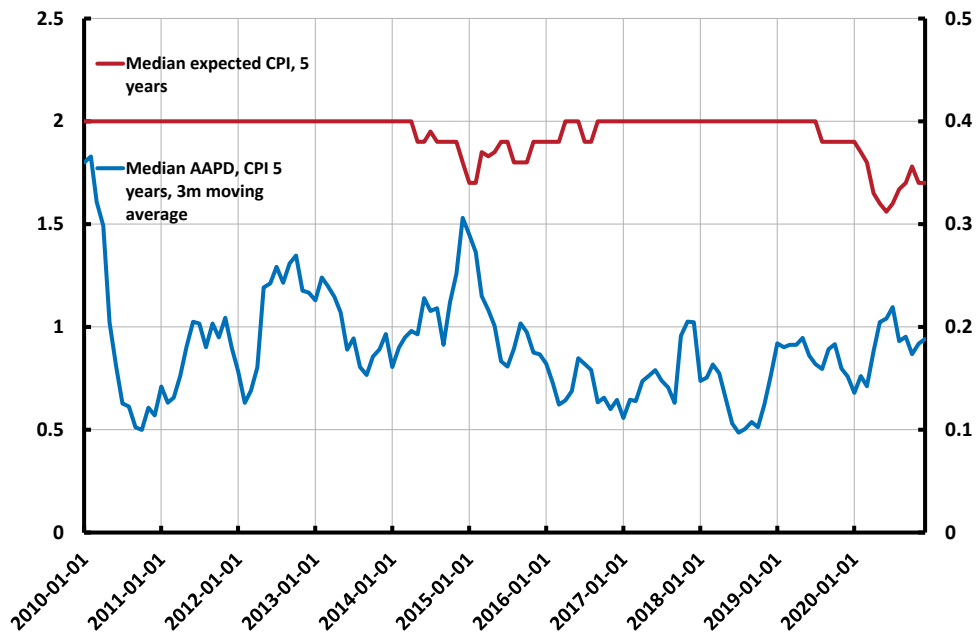
which makes it possible to analyse disagreement on the individual level and not just in the aggregate.

For example, this measure can be used to divide the respondents into percentiles on the basis of how much they deviate from other respondents (which is to say individual AAPD values). As these are absolute deviations, lower percentiles will include respondents whose expectations are closest to those of other respondents, while respondents in the uppermost percentiles will have expectations that deviate most from those of other respondents.

In Figure 7, we can see that the median for the AAPD five years ahead has had a slight tendency to be higher in periods in which inflation expectations on the same time horizon have been below target.

Figure 7. Median of expected CPI 5 years ahead and average absolute point disagreement for expected CPI 5 years ahead

CPI inflation, per cent, left axis, and AAPD, percentage points, right axis



Note. AAPD on right axis

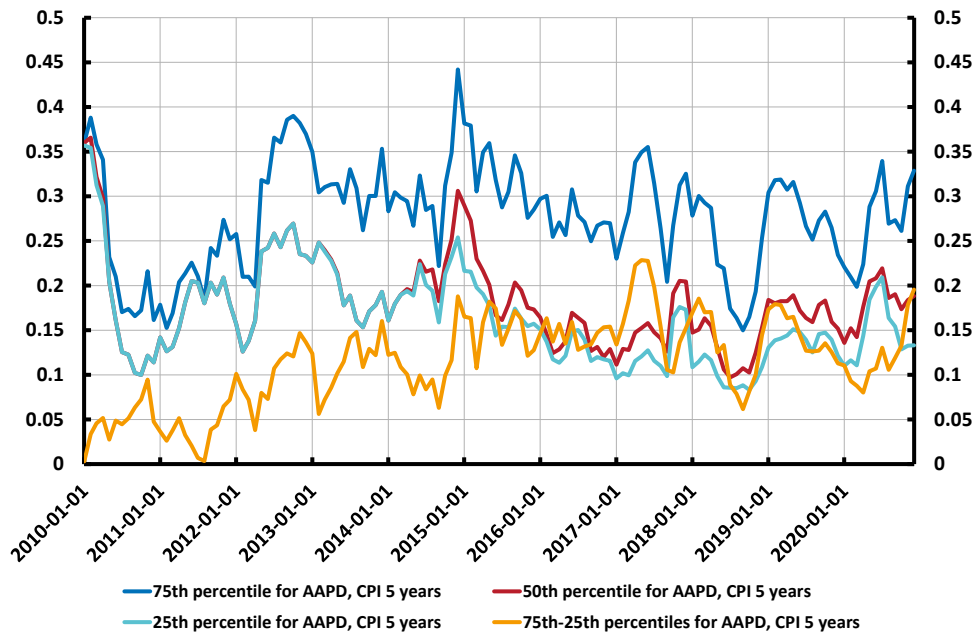
Source: The Riksbank

Figures 8-10 show how the percentiles for deviations have developed for the different time horizons. As it is primarily the long-term inflation expectations that are interesting, Figures 9 and 10 are in the Appendix. One interesting observation is that the 25th and 50th percentiles five years ahead almost continually coincided during the period 2010–2015. Until 2012, the difference with the 75th percentile was also quite small. This was because many respondents’ expectations were then clustered around 2 per cent. In contrast, when expectations fell below target in 2014–2015, a spread developed, which has since persisted, even after the mean value returned to close to tar-

get. The spread is greater over short horizons, which is natural as short-term expectations are contingent on many factors that can be assessed differently, but with no clear trend. However, in 2020, the differences increased noticeably one year ahead.

Figure 8. Percentiles for AAPD CPI 5 years

Percentage points, 3-month moving average



Source: The Riksbank

Disagreement may be relevant to policy work

As we can see in Figure 7, disagreement in long-term inflation expectations went up when the coronavirus crisis started and is now slightly over its long-term average, measured as AAPD. As during the period 2014–2015, we can also see a slight tendency towards disagreement being high when inflation expectations are below target on average. If greater disagreement in itself means that the inflation target is poorly anchored and coincides with expectations deviating from target, this may be an interesting variable in policy work.

However, we should be cautious about drawing far-reaching conclusions from what are only tendencies in a relatively limited dataset. The Riksbank continually follows up the work of analysing inflation expectations. Section 2.1 discussed uncertainty, how certain a respondent is about their own point estimate, as an interesting complement to disagreement. The 75-per cent confidence interval that the respondents in Prospera state for their point estimates of expected inflation is one way of measuring such uncertainty and thus reviewing this data would be a natural next step in the work of analysis.

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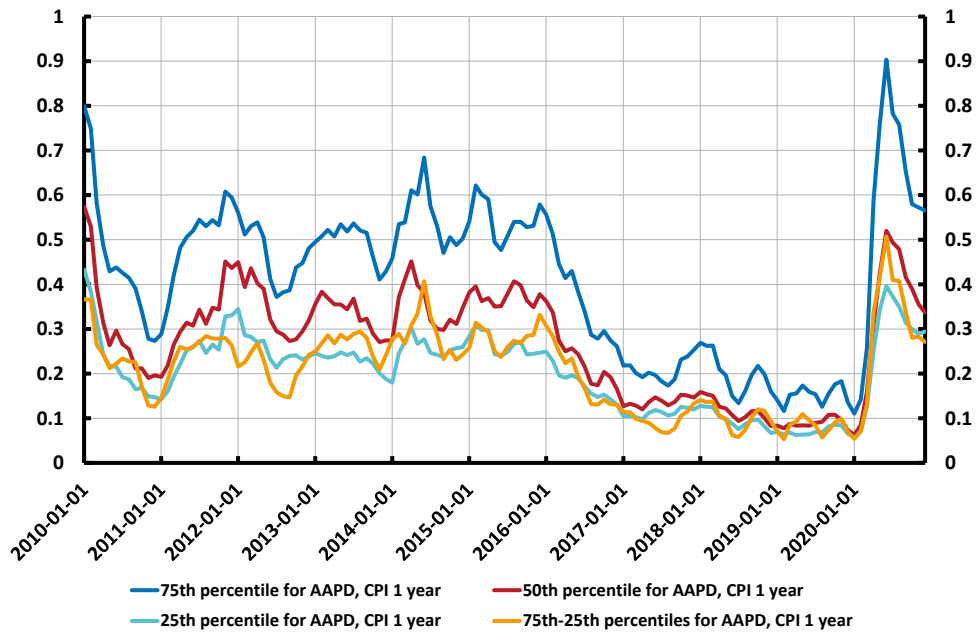
Andrade, P., Crump, R.K., Eusepi, S. & Moench, E., (2016) "Fundamental Disagreement", *Journal of Monetary Economics* 83, 106-128

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APPENDIX – AAPD

Figures showing AAPD for inflation expectations over shorter time horizons are presented below

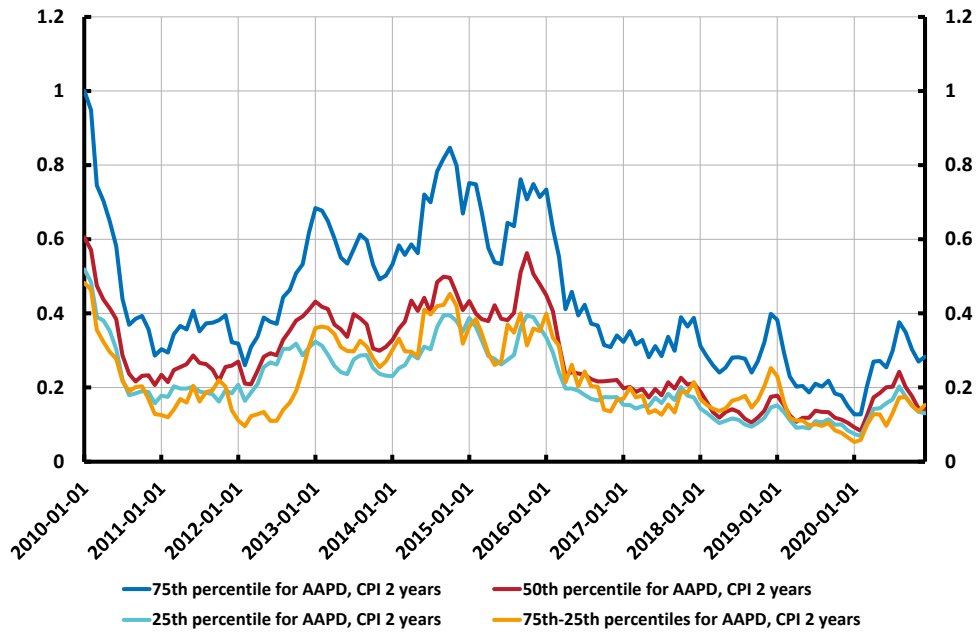
Figure 9. Percentiles for AAPD CPI 1 years
Percentage points, 3-month moving average



Source: The Riksbank

Figure 10. Percentiles for AAPD CPI 2 years

Percentage points, 3-month moving average



Source: The Riksbank



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